

# Towards improved waste management in Bago Region, Myanmar – An initial assessment

## Baseline report



# REPORT

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**Summary**  
The baseline report draws on research carried out as part of the 'Bago Waste' project, led by NIVA, in the Bago Region of Myanmar. It provides an initial assessment of the waste management situation in Myanmar, with special reference to one of its administrative Regions (Bago). Findings are based on a literature review, field observations and interviews carried out since the start of the project in January 2020. We explore the waste governance system in Myanmar with respect to relevant national laws, policies and strategies, in addition to examining current waste management practices for collection, segregation, recycling and disposal. The report also delves into emerging trends in waste management on the global policy scene, as well as examining common policy approaches that drive the shift towards greater circularity. In conclusion, a way forward is sketched that ties together the reports findings.

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## Preface

The *Capacity building project on waste management in the Bago Region* ('Bago waste project') aims to improve waste management infrastructure, raise awareness, remove waste from selected rivers and sites, in addition to encouraging sustainable production, use, and recycling of waste by the private sector – with a focus on plastic pollution. The Bago waste project (2020 – 2022) is funded by the *Norwegian Development Assistance Program Against Marine Litter and Microplastics* and by the Norwegian embassy in Yangon, Myanmar. The Norwegian Institute for Water Research (NIVA) is leading the project, and working together with local partners in Bago township, namely the civil society organisation Justice for All, and the private waste management company Group of Agricultural Machinery Company Limited (MJT).

The overall purpose of this baseline report is to provide insights into the current waste management system and governance in Myanmar, specifically in the Bago Region and Bago township. By combining local level insights with national and international scientific research, the baseline provides a unique insight into the waste management situation at the very local level, relating it to the contemporary discourses around waste management and circularity at the international level. In addition, the baseline provides a point of departure for the Bago Waste project's future activities by identifying gaps and potential solutions.

The two years since the project started in January 2020 have been turbulent and characterised by two major events: one global and one national. Firstly, the Covid-19 pandemic has restricted travel and physical meetings since March 2020, and secondly the military coup in Myanmar on February 1<sup>st</sup>, 2021 that has led to civil strife, economic distress and international isolation. From a project perspective, the coup also led to a cessation of collaborative ventures with government actors. In this situation, we, the project lead and partners, have had to adapt regularly to the situation through creative means which have included intense use of digital communication, visual documentation and flexible planning – while pursuing clear overall objectives. Despite the numerous challenges, it was possible to pursue project outcomes, improving the knowledge base on waste management in Bago Region while also engaging in activities that prioritise a *change in practice*.

The report has been prepared and written by **Ingrid Nesheim, Idun Rognerud, Emmy Falk Nøklebye, Valentina Tartiu and Hans Nicolai Adam**. We would also like to acknowledge the contributions and inputs by **Kyaw Min San** and **Ye Htun Aung**, without whom this baseline report would not have been possible to finalise.

Waste management issues are often poorly documented in the regional and township setting in Myanmar, with scarce information on waste volumes, handling practices and emerging governance regimes. The 2021 military coup has compounded this problem, with many international actors withdrawing, civil society actors marginalised and government resources focused on the immediate conflict.

The Bago Waste project will continue to gather data, engage in research and build local waste management capacity with our co-operation partners, building on the baseline and using it as a point of reference. We also hope the baseline report will be of use to researchers, policy makers and other actors interested in waste management issues in Myanmar, Bago Region and beyond.

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### List of Abbreviations

3R	Reduce, reuse, recycle
ADB	Asian Development Bank
ASEAN	Association of Southeast Asian Nations
BHRI	Bago Healthy River Initiative
CDC	City Development Committee
DAO	Development Affairs Organization <sup>1</sup>
DRD	Department of Rural Development
ECC	Environmental Conservation Committees
ECD	Environmental Conservation Department
EO	Executive officer
EPR	Extended producer responsibility
ESD	Education for sustainable development
EU	European Union
GAD	General Administration Department
GAO	General Administration Office
GCED	Global citizenship education
GNI	Gross national income
HDPE	High density polyethylene
IWRM	Integrated water resource management
MCDC	Mandalay City Development Committee
MJT	Group of Agricultural Machinery Company Limited
MMK	Myanmar kyat
MONREC	Ministry of Natural Resources and Environmental Conservation
MONRFEC	Ministry of Natural Resources, Forestry and Environmental Conservation
MoU	Memorandum of Understanding
MP	Member of Parliament
MSME	Micro-, small- and medium enterprises
MSW	Municipal Solid Waste
NGO	Non-governmental organisation
NIVA	Norwegian Institute for Water Research
NLD	National League for Democracy
NWMSMP	National Waste Management Strategy and Master Plan
PET	Polyethylene terephthalate
POP	Persistent organic pollutants

<sup>1</sup> The Development Affairs Organization (DAO) is a ministry on Region and State level, and a department on township level, here often colloquially referred to as the «municipal department» (Arnold et al 2015; Dominic, 2018).

PPP	Public-private partnership
PRO	Producer responsibility organisation
PVC	Polyvinyl chloride
SAC	State Administration Council
SDGs	Sustainable Development Goals
SUPP	Single use plastic product
TDC	Township Development Committee
UNDP	United Nations Development Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
VTA	Village tract administration
VWA	Village ward administration
YCDC	Yangon City Development Committee

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## Summary

This baseline report provides an initial situational assessment of waste governance and management in Myanmar, with specific reference to Bago Region and Bago township, drawing on empirical findings and an international literature review. The compilation of this baseline has been undertaken within the *Capacity building project on waste management in the Bago Region*, a project supported by the Norwegian Development Assistance Program Against Marine Litter and Microplastics and funded by the Royal Norwegian embassy in Yangon.

Chapter 1 introduces the project context and background, including the purpose, methods and the operational situation of the project during challenging circumstances, marred by the Covid-19 pandemic and recent military coup of February 1<sup>st</sup>, 2021. Chapter 2 compiles litter and plastic pollution statistics, collection and recycling rates in Myanmar based on a literature review. In general, a limited amount of primary data sources exist, but studies document (e.g Hoornweg and Bhada-Tata 2012 ) accelerated waste generation linked to rapid economic growth, including rising plastic waste volumes. Large industrial units and private companies in the construction, industry, retail sectors, food service industry, and e-commerce industry are key generators of plastic waste. The increased waste generation has not been matched by investment in and development of waste management systems.

Chapter 3 presents the waste governance system in Myanmar and the relevant national laws, policies and strategies for waste governance. Several laws and policy frameworks have been developed and adopted for environmental management and to incentivise sustainable management practices. However, policies and strategies specifically developed for waste management are relatively recent, and some are still under development. The National Waste Management Strategy and Master Plan 2018 – 2030 developed by the Environmental Conservation Department (under the Ministry of Environment, Forestry and Environmental Conservation) is the key national policy for improved waste management in Myanmar, specifying targets and approaches for the 3R (reduce, reuse, recycle) strategy on the Union, State and Region level. The strategy has yet to be actively adopted and translated into action on state/region level.

Chapter 4 provides an overview of current waste management practices in Myanmar for collection, segregation, recycling and disposal. The chapter also presents information about the role of the informal sector in waste collection and recycling, building on document analysis and secondary information, supplemented by interviews taken during 2020-21. The lack of sound waste handling schemes for collection, sorting and recycling is a fundamental challenge in most of Myanmar. Much of the waste handling and recycling is operating unsustainably. Chapter 5 presents the system for governance and management of waste in Bago Region, including information on ministries, departments and committees, and private actors with a role in waste governance and management, including waste disposal. In Bago Township, the Township Development Committee (TDC) has outsourced waste collection in urban areas to the private company Group of Agricultural Machinery Company Limited (MJT).

Chapter 6 on emerging trends in waste management introduces some key concepts in the reassessment of waste management on the global policy scene, before elaborating on common policy approaches that drive the shift towards greater circularity. The chapter discusses how shifting to a circular economy can prove particularly challenging in emerging economies with limited formal waste management infrastructure and requirements for different strategies. Here public-private partnerships can be utilised to improve capacity and waste management. Finally, the chapter

emphasises the important role of the informal sector as providers of waste management services and the need for environmental awareness and education to drive behaviour change towards more sustainable management of waste. The final chapter 7, presents concluding remarks and a way forward.



# 1 Introduction

## 1.1 Project background and purpose

This baseline is part of the project *Bago Waste: Capacity Building on Waste Management in Bago Region* (in short 'Bago Waste'). The project was developed through a collaborative process between the Bago government, the Bago Township Development Committee (Bago TDC), the Ministry of Natural Resources and Environmental Conservation (MONREC) and the Norwegian Institute for Water Research (NIVA). The project was preceded by the Integrated Water Resources Management Institution building and training project, Phase I (2015-2018)<sup>2</sup>, a collaborative project between the Watershed Management Division, Forest Department, MONREC and NIVA. Among the outputs of this project was a sub-basin management pilot in the Sittaung River Basin (Nesheim et al. 2018). The pilot study area was the Bago Sub-Basin and the project addressed the main phases of the water cycle: characterization, classification, prioritization, setting of environmental goals, and a program of measures, as well as prioritising among suggested measures for the production of a River Basin Management Plan.

The discussion to prioritize waste management issues was undertaken at Bago Sub-basin Area Committee meetings, and at Non-Governmental Stakeholder Group meetings. The Bago Sub-basin Area Committee, and the Non-governmental Stakeholder Group were established in 2016 for coordination and discussion of water related issues among authorities and among civil society actors in the Bago Region and Bago township authorities (Nesheim et al. 2018). Within both these groups, it was agreed that disposal of garbage and wastewater into the river needed to be a prioritized problem area<sup>3</sup>. It was emphasised that it is necessary to raise awareness and improve law enforcement related to garbage disposal. Another key issue being pointed at was the lack of, the need for a better system for disposal of garbage. People dwelling around the rivers, streams and lakes usually discharge solid waste items into waterbodies indiscriminately, adversely affecting water resource quality. Disposal of garbage and sewage is a critical issue to be addressed to create a healthy ecosystem in Bago River. This led the Chairman of the Bago TDC, Dr. Aung Khin, to contact NIVA in April 2018, to discuss the need for a project addressing waste governance and handling. Following this, the *Bago Waste* project was conceived, with the aim to build capacity in Myanmar (Bago Region) to tackle waste pollution from domestic and small-scale industrial sources and provide a knowledge platform suitable for developing local waste management plans.

Subsequently, NIVA submitted a proposal focusing on waste management in Bago to the Royal Norwegian Embassy in Yangon. Funding was granted January 2020 for three years from the *Norwegian Development Assistance Program Against Marine Litter and Microplastics* and from the Norwegian Embassy. The Bago Waste project (for project details see the project homepage<sup>4</sup>) has several objectives. It focuses on the Bago Township and the Bago River and aims to contribute to the *Assistance Program's* stated impact: "to prevent and substantially reduce the scope of marine litter from sources in developing countries" to target the outcomes of (i) improved land-based waste

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<sup>2</sup> Presentation of the Integrated Water Resource Management (IWRM) project at the Myanmar Norway Environmental programme's homepage: <https://mnenvironment.com/integrated-water-resources-management/>

<sup>3</sup> Collaboration with the Bago TDC and the institutions responsible for collection and handling of domestic waste in Bago City were first established as part of the IWRM Phase I project.

<sup>4</sup> Bago waste project homepage: <https://mnenvironment.com/bago-waste-project/>

management; (ii) river waste clean-up; and (iii) the private sector's production, use, and responsible waste management.

The overall purpose of this baseline report is to provide insights into the waste management system and governance in Myanmar, specifically Bago Region and Bago township. By combining local level insights with national and international scientific research, the baseline provides a unique insight into the waste management situation at a very local, contextual level, and relating it to the contemporary discourses at the international level. In addition, the baseline provides a point of departure for the Bago Waste projects' future activities by identifying gaps and potential solutions.

The baseline proceeds as follows: First we provide an overview of the socio-economic context and waste generation situation in Myanmar (Chapter 2), before proceeding to unpack the governance system, actors, policies, and legislative frameworks with respect to national waste management (Chapter 3). The following chapters analyse waste management practices, including collection, segregation and landfilling, as well as the role of private and informal sector in waste management, on a national level (Chapter 4) and specifically in Bago Region (Chapter 5). We then examine some emerging trends in waste management (Chapter 6) in relation to circular economy and zero waste policies, strategies and regulations targeting plastics, private public partnership, recognising the informal sector, and environmental education and awareness, before proceeding to the conclusion and suggesting a way forward.

## 1.2 Methodology and project approach

This baseline report has been compiled by qualitatively analysing and synthesising primary and secondary data. The authors of the report have been in continuous engagement with local co-operation partners and relevant actors at regional and local level. Interviews during the start of 2020 (regional and local authorities) were conducted in person, following which the interviews turned to digital format. Two focus group discussions were held in 2020/2021 in group meetings attended by authorities, civil society and private sector representatives. Separate interviews were also held with MJT on the waste management situation at the Bago township level. In addition, political representatives, including the responsible Region minister, local member of parliament as well as elected representatives at the township level, in charge of various aspects of the waste management system were interviewed by the local co-operation partners. Empirical and primary data thus draw on key informant interviews with local actors and partners, in addition to observations and photo documentation from field visits, and documentation from partners, while secondary data sources comprise scientific and grey literature within the thematic area of (plastic) waste management, including publications from governmental and international organisations. It should be noted that there are data gaps in the field of waste generation, collection, and releases into the environment in Myanmar. Accurate and up-to date (quantitative) data sources remain partial, employ different methodologies and are at times outdated. Little coherent national data collection systems and methodologies exist. Some data is available from major urban centres (e.g. Mandalay, Yangon), however, even those quantitative data representations suffer from considerable uncertainty and do not lend themselves for easy comparison or representation. Most of the literature draws on English language articles, with some information at the regional and local level— specifically related to laws and regulations — that are only available in Myanmar language translated and interpreted by Myanmar based partners.

In the Bago township area, the data acquired by the project researchers include primary data from co-operation partner, the waste management company in charge (MJT), collected from September 2019

onwards, providing a unique data set for the area. Data is largely drawn from the household level, in addition to MSMEs (Micro, Small and Medium Enterprises), including those from market areas. Primary data on the public-private waste collection system in the township has been collected through interviews conducted in Myanmar language with Bago TDC, the DAO Cleaning Unit, Bago Region ECD and MJT between August 2020 and January 2022.

The quoted projections and literature from the pre 2021 period are affected by the present socio-economic economic and political conditions (i.e coup d'état in 2021), which have had a severe impact on economic growth and will likely invalidate in part or entirely earlier projections made.

The project started through an inception phase from January 2020 – July 2020. Subsequent visits and meetings with key actors in this period were used to identify activities and engage with relevant partners to ensure effective implementation and stakeholder involvement at the outset. Following the inception phase, an agreement was signed with the Bago Region Government. Civil society organisation Justice for All<sup>5</sup> and the private waste management company Group of Agricultural Machinery Company Limited (MJT), which oversees waste collection for Bago city, were identified as project co-operation partners. In October 2020, a first meeting of the Bago Waste Group, an advisory forum comprised of stakeholders across government, civil society and private sector was held. The Bago Waste Group was headed by then MONRFEC (Ministry of Natural Resources, Forestry and Environmental Conservation) minister for Bago Region, Dr. Saw Nyo Win. Since January 2020, activities on awareness raising, establishment of pilot model sites and research on various aspects of the waste management systems in Bago township were initiated.

### 1.3 Coup in Myanmar and COVID 19

In February 2021, a military coup unseated the democratically elected government led by the National League for Democracy (NLD)<sup>6</sup>. Subsequently a military regime was established, which forms the government till date (December 2021) and governs the country through the 'State Administrative Council'. Several international donors, including the Norwegian government, froze bilateral government to government development co-operation soon thereafter. This also affected the Environmental Programme II and the Bago Waste project. For the Bago Waste project, the Agreement with the Bago Region Government was frozen, and no government or military actors form any part of collaborative project activities. The Bago Waste project, however, is operational and continues to engage and co-operate with the private sector and civil society to improve the waste management situation in Bago township. The post coup situation, and subsequent civil strife contribute to a dynamic and volatile situation in the country with severe impacts for its civilian population, who live in a state of fear and economic distress. In this baseline we touch upon some of the impacts and repercussions of the coup, specifically with respect to governance, however an in-depth analysis of the coup situation is beyond the scope of this baseline with future outcomes subject to great degree of uncertainty.

The COVID-19 pandemic, leading to global lockdowns and restricting movement of people nationally and internationally from March 2020 onwards, has also had an impact on the project. Project visits by the NIVA team were not any longer feasible and for temporary periods, physical in person work in Bago township had to be delayed. Nevertheless, the project and partners have adapted to the

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<sup>5</sup> <https://www.justiceforall-lawfirm.com/>

<sup>6</sup> After the coup by the Tatmadaw the military in Myanmar on February 1<sup>st</sup>, the State Administration Council (SAC) was formed by Senior General Min Aung Hlaing, the commander-in-chief of the Defence Services.

situation, specifically through the adoption and use of digital communication means. Weekly or bi-weekly meetings were held digitally throughout to discuss work plans, monitor and document activities. A structured approach of planning and follow-up ensured that targets were met and adapted when necessary to a dynamic situation. Considering health risks to partners and the public, physical meetings and work were only held keeping in mind best safety practices that involve social distancing, the use of masks and adherence to national and local health regulations.

## 2 Status of litter and plastic pollution, collection rate and recycling in Myanmar

### 2.1 Geography and socio-economic situation

Myanmar is the largest country in mainland Southeast Asia with a land area of 676,575 km<sup>2</sup>. The country borders Bangladesh and India to the west, and China, Laos and Thailand to the east. To the south is the Bay of Bengal in the Andaman Sea. The country has four main river systems: the Ayeyarwaddy, Chindwin, Sittaung and Thanlwin river, with a network of tributaries and rivers which flow into the Andean sea in the south-west through the Irrawaddy delta, and in the south-east through the gulf of Martaban. The Bago Region, representing the case area of this report, is located in the south central plain of Myanmar. The region hosts the Bago River, which runs downstream from the mountainous Pegu range, before it joins with the Myittha River to form the Yangon River which runs into the gulf of Martaban. The Bago river is approximately 331 km long, with a catchment area of approximately 5348 km<sup>2</sup>.

Around 54 million people live in Myanmar, with about 30 percent of the population residing in urban areas (UNCRD 2019, 129). In a 2019 report, it was expected that another two million people would move from rural to urban areas by 2030 (Møller 2019: 9). Urbanisation, rapid economic growth, and consequent increases in consumption levels have created considerable waste management challenges in Myanmar as adequate waste treatment and disposal infrastructure for municipal, industrial, biomedical, and electronic waste is lacking (Premakumara et al. 2017). Long standing ethnic conflicts in the border regions of the country, political instabilities, economic capacity issues and widespread corruption complicate the governance over environmental issues such as waste (Stokke et al. 2018: 37-38).

In 2017, Myanmar was considered a least developed country (LDC) with a per capita GNI of 1 455 USD, and an annual economic growth rate between 6 to 7.5 percent. This made Myanmar one of the fastest expanding economies in the world (Premakumara et al. 2019: 225). The previously optimistic scenarios of economic growth have been impacted, and instabilities exacerbated, after the military coup on February 1<sup>st</sup> 2021 (see Chapter 1.2). In the coup, the Myanmar military, also known as Tatmadaw, declared the earlier landslide election victory of the NLD as fraudulent and invoked emergency powers to take control of the country through force. In parallel, a civil disobedience movement started to oppose the violent takeover, leading to widespread protests and a boycott of military related actors. The NLD elected Committee Representing Pyidaungsu Hluttaw formed the National Unity Government together with representatives from ethnic armed groups and parties as a means to oppose the current regime. At present, the National Unity Government declared a state of emergency and is in a state of war with the Military Council.

The combined consequences of the coup and the ongoing COVID-19 pandemic (since March 2020) have been devastating for Myanmar's population. Reports indicate a significant rise in internal



Figure 2.1 Map of Myanmar

displacement, violence against civilians, poverty and starvation alongside the curtailment of civil rights and liberties (McCann 2021). A UNDP report from April 2021 expects that the situation could reverse economic gains from the last 16 years (since 2005), and that almost half of Myanmar may fall into poverty by 2022 (UNDP 2021). Due to the recent instabilities, data on waste generation prior to the coup and the pandemic may no longer be accurate.

## 2.2 Municipal solid waste generation

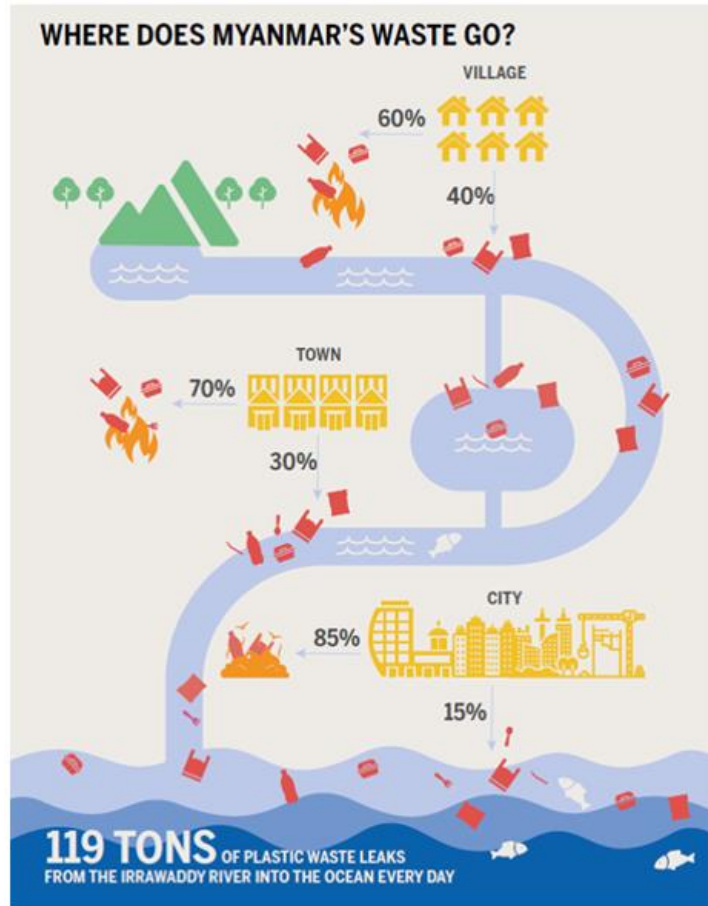
Economic growth and increased waste generation has not been matched with investment and development of waste management systems in Myanmar. Waste collection and recycling infrastructure therefore remains at a rudimentary level. While urban areas typically have some degree of organised waste collection, rural areas largely lack organised waste collection systems. In many townships this has led to highly polluting practices, such as uncontrolled dumping in landfills and waterways, as well as open burning of waste (Jeske 2019; Premakumara et al. 2019: 225).

In 2012, a World Bank study referred to data from 2000 to estimate municipal solid waste (MSW) generation in Myanmar to **5,616 tonnes/day** or **0.44 kg/capita/day** (Hoornweg and Bhada-Tata 2012). In 2016, another study estimated Myanmar's annual total MSW generation to 10.5 million tonnes, equalling **28.850 tonnes/day** with a national average of **0.53 kg/capita/day**. This estimate was based on data from three dumpsites in Mandalay, adjusted for assumed lower per capita averages in rural areas (World Bank 2019). A recent study compiled existing estimates and calculated that Myanmar's population of 54 million produces around **20.000 tonnes/day of MWS**, with a per capita waste generation of **0.38 kg/capita/day** (Premakumara et al. 2017). This study also suggests that approximately 55 percent of Myanmar's total waste is generated by the three major cities, Yangon (1,981 tonnes/day), Mandalay (955 tonnes/day) and Nay Pyi Taw (160 tonnes/day) (Premakumara et al. 2017). Based on these three estimates, Myanmar's waste generation could lie on average between **0.38 and 0.53 kg/capita/day**, probably on the higher end of the range in urban areas in comparison to rural areas, while totalling to somewhere between **20.000 and 29.000 tonnes/day** (excluding obsolete estimates from year 2000), if not higher, accounting for rapid economic growth and an influx of consumer goods. However, these figures represent the total volume of waste transported to final disposal sites and do not include uncollected, burned or waste that is self-managed by waste generators (Netherland Enterprise Agency 2017, in Premakumara et al. 2017). Moreover, the estimate is likely to only represent MSW after the informal sector has collected and processed recyclable materials (World Bank 2019). Based on data from Mandalay and Yangon, MSW primarily originates from households (60 percent), as well as markets (15 percent), commercial producers (10 percent), gardens (5 percent), hotels (2 percent), and other institutions (8 percent) (Premakumara et al. 2017). Accordingly, MSW in these cities is mainly composed of organic materials (77 percent), followed by plastic (13 percent), paper (7 percent) and other materials (3 percent). The volume of MSW generation is expected to rapidly increase in the coming years (Gameralalage et al. 2019).

## 2.3 National plastic waste generation

Although plastic usage is a relatively recent phenomenon in Myanmar, plastic waste management has been highlighted as one of the most pressing issues that municipal governments need to address (Møller 2019, 10). Inadequately managed plastic waste and littering are key sources of environmental pollution. Estimates suggest 0.46 million tonnes of plastic waste were mismanaged in Myanmar in

2010, and this number is projected to more than double by 2025 (Jambeck et al. 2015). Jambeck et al. (2015) further predicted that 10-20 percent of this plastic waste reaches oceans in the form of marine debris. These numbers situate Myanmar as the 17<sup>th</sup> largest contributor to ocean plastic pollution, based on the amount of inadequately managed waste and an estimated 2 percent littering rate (Jambeck et al. 2015). Myanmar's largest river, the Irrawaddy (Ayeyarwady) River, is estimated to be the 9<sup>th</sup> most polluted river in the world (Lebreton et al. 2017), carrying 119 tonnes of plastic waste to the ocean every day (Figure 2.2.) (Jeske 2019). Within the Irrawaddy river basin, the largest amount of plastic waste (32 tonnes/day) originated from the Ayeyarwady Region, followed by Yangon Region (29 tonnes/day) (Frontier Myanmar, 2020). A survey conducted in 2019 revealed that plastic is the most common material found on Myanmar's beaches, and that 50 percent of this plastic comes from mismanaged waste in waterways and coastal towns (Plastic Atlas Myanmar, 2020: 50).



*Figure 2.2. Plastic waste flows from mismanaged sources – Myanmar. (Source: Plastic Atlas Myanmar, 2020: 50).*

Economic growth and changes in consumption behaviour has accelerated waste generation, while shifting the composition of waste (Jeske 2019). For example, there has been an influx of single-use plastic products (SUPP) such as shopping bags, water bottles, food packets and plastic sachets (Perria 2020: 1). Consumption of SUPP has increased manifold over recent years. For example, average plastic bag use per person has increased from 3 bags per week in 1993 to 5 per day 2018, while plastic bottle consumption increasing from 0.7 per person per month in 1993 to 6.3 per person per month in 2018 (Myanmar Plastic Industries Association, 2017, cited in Akenji et al. 2019: 63). In total, approximately 2 billion PET bottles are estimated to be consumed in Myanmar every year, equivalent to 40,000 metric tonnes, a number which is expected to continue to increase by 10-15 percent per year (MPE & VCA 2020).

While data is scarce, and the sources of plastic waste are manifold, large industrial units and private companies represent key generators of plastic waste. These include the construction industry, retail sector, food service industry, and e-commerce industry. The building and construction sector is one of the largest consumer sectors of polyvinyl chloride (PVC) and non-fibre plastics. In comparison to consumer products such as plastic packaging, plastics used in the building and construction sector may enter the environment as waste when buildings are demolished, often decades after it is produced (Geyer et al. 2017). In Myanmar, the residential construction sector has been the dominant industry

sector for the past five years, accounting for about 50 percent of the industry's value, followed by infrastructure, which accounted for a 20 percent share in recent years (Mordor Intelligence 2020:11). Since the COVID-19 outbreak, plastic packaging (especially SUPP) used in the food service industry and retail sector has increased in line with government advice and individual precaution to follow more stringent hygiene protocols. When Myanmar went into its first phase of lockdowns in May 2020, some restaurants and shops refocused their retailing activities, making their food, drinks and products available for home delivery through retail aggregator services like Food Panda and Door2Door (Myanmar Times 2020). Plastic waste generation from the nascent e-commerce industry in Myanmar is also taking shape as a new waste stream. Internet penetration is primarily driven by smartphones, as nearly 40 million of the population (approximately 80 percent) have access to smartphones. It is expected that the growing middle-class population, along with government efforts like the formation of Digital Economy Development Committee to boost the digital economy, will accelerate e-commerce growth across the country with a concomitant rise in the use of packaging materials for delivery in the e-commerce industry (Mordor Intelligence, 2020:16). Thus, consumer plastic waste generation (e.g. from plastic containers, cutlery, sachets and wrappers) is expected to increase significantly.



## 3 Myanmar waste governance system, legislation, and policy

### 3.1 Myanmar governance system with focus on waste

Administratively, Myanmar is divided into seven regions, and seven states and union territories<sup>7</sup>. Regions encompass areas where the majority is Burmese, and states cover areas with large ethnic minority populations<sup>8</sup>. The next lower administrative level is the district, and each district consists of several townships. Within townships there are village tracts (urban areas) and village wards (rural areas) which refer to several villages grouped together (Figure 3.1)<sup>11</sup>.

Next we present the union level governance system (in 3.1.1), the decentralised governance system (in 3.1.2) and the role of some core NGOs and private sector actors in waste management (in 3.3.3). The governance regime presented primarily refers to the situation before February 1<sup>st</sup> 2021. The governance situation in Myanmar has been seriously impacted by the coup d'état on February 1<sup>st</sup> 2021 (see chapter 1.2). The State Administration Council (SAC) regime has had a serious impact on the general governance functioning in the country due to its termination of civil servants across multiple government bodies, and specifically on the waste governance regime due to the regime's decision to abolish the public election system on the municipal level. While the national level government is responsible for waste policy, waste management and collection practices was a township level responsibility in accordance with the municipal law (UNDP Myanmar, 2014). The responsibility for waste management has now been transferred from the Township and City Development Committees (TDCs and CDCs) to the region and state level government by the SAC<sup>9</sup>.

#### 3.1.1 Union level governance and waste

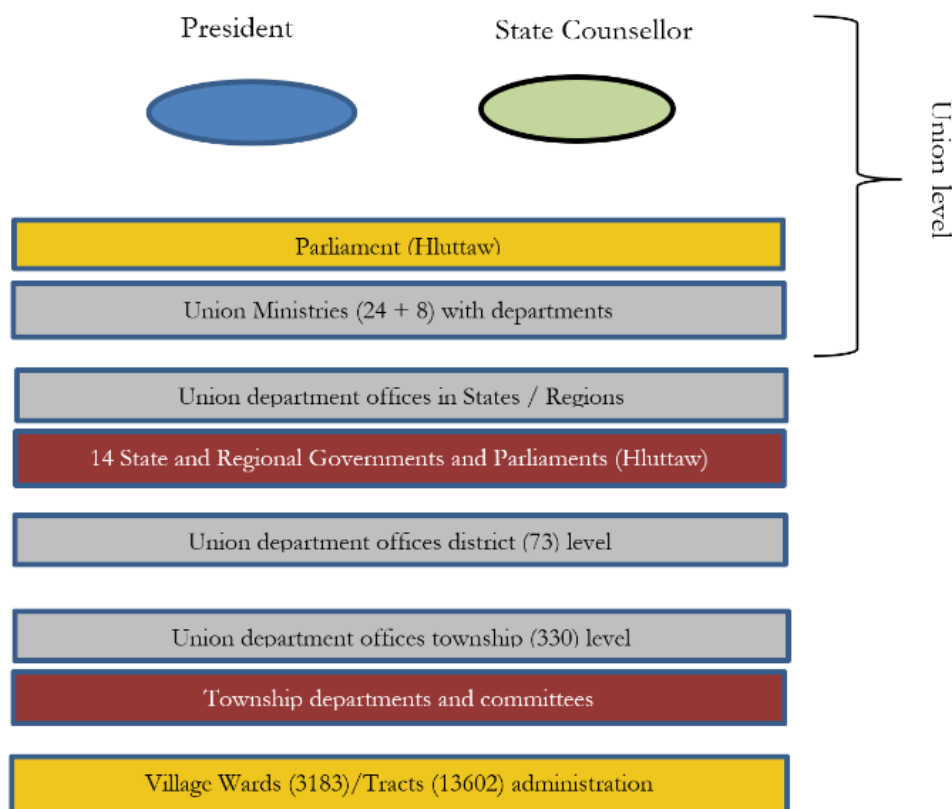
*The Myanmar Union government* consists of ministries, departments and a two chamber parliament called Hluttaw (Figure 3.1). The headquarters of the ministries and departments are located in the capital Nay Pyi Taw and each department has decentralised offices on state/region and district levels. The majority of departments also have offices on township level (Interview, October 2021, Bago City).

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<sup>7</sup> The Myanmar constitution, 2008 specifies seven regions and seven states and the capital Nay Pyi Taw prescribed as Union territory being under the direct administration of the President (Merin, n.d.)

<sup>8</sup> These administrative units are named in the 2008 constitution where it is stated that States and Regions are constitutionally equivalent.

<sup>9</sup> The State Administration Council (SAC), the government appointed by the military following the February 2021 coup d'état abolished chapter 3 and 5 of the Bago Region municipal law on February 18, 2021 (UNDP Myanmar, 2014; Myanmar law library, 2021). This amendment of the law removed the system democratically elected by the people from the TDC, and gave direct control to region level SAC and to the DAO.



**Figure 3.1.** Illustration of the structure of Union Government and sub-national governance, reflecting the situation before February 2021. (Source: Revised and adapted from UNDP; GAD 2021).

Whether a Ministry is represented in a township depends on the size of the township and on the relevance of the Ministry's area of responsibility within the particular township. As illustrated in figure 3.1., the governance system is hierarchical with funding, budgets, priorities and activities being delegated from the union level departments down to the union department offices in states/regions, and further down from the state/region department to district and township level department offices. Similarly, department offices report back up the ladder on their activities. Heads of departments at township level are thus accountable to their superior at the district or state/region level.

Village level administrations are organised by means of groups of villages; village tracts being urban areas and village wards being rural areas. The village tract and the village ward administration (VTA / VWA) include an employee from the General Administration Department (GAD) as the chief administrator and a clerk<sup>10</sup>. Duties of the VTAs and the VWAs are to maintain law and order and to act as the intermediary between the townships and the village tracts and wards. The GAD within the Ministry of Home Affairs has a special role of administrative coordination at each level of governance.

The Myanmar Union Ministries are responsible for drawing out the overall national policies, while State and Regional Union departments are responsible for contextualising, operationalising and specifying what the national policy means at the regional level. Union departments are not responsible for handling waste, and municipal solid waste management (MSWM) is the responsibility of the

<sup>10</sup> Before the coup on February 1st 2021 the ward / tract level administration also included elected representatives from each village.

respective townships and city development committees (Premakumara et al. 2017). Below we list ministries and departments which have a role in waste legislation and policy making:

**The Ministry of Natural Resources and Environmental Conservation (MONREC)** is the focal ministry for overall environmental management in Myanmar, including solid waste management. MONREC was established in 2016 by merging the Ministry of Mines and the Ministry of Environmental Conservation and Forestry (World Bank 2019: 52).

**The Environmental Conservation Department (ECD)** is one of the 11 departments under MONREC. It is responsible for the management and protection of natural resources and regulating pollution of water, air and land. The ECD is responsible for waste governance, that is, policy and decision-making regarding rules and actions for waste management in city areas, rural areas, industrial zones, agricultural zones, rivers and sub-basin areas. As such, the ECD plays a key role in promulgating laws, policies and a strategic action plan in cooperation with development committees related to solid waste management, and organises conferences, workshops, and training for raising public awareness on solid waste.

The ECD office on region and state level is the responsible authority for environmental conservation at regional level. Regarding waste, the office is responsible for increasing awareness regarding waste management activities. By instructions from the Union level ECD, Environmental Conservation Committees (ECCs) are established in each Region and State. The ECD regional office takes the secretary role in the ECCs.

The ECD office at the district level is responsible for increasing awareness amongst actors in the district for sound waste handling, in particular, disposal of waste management by households, schools and higher education, industry, and hospital. Some districts have established Environmental ECCs, but the degree that committees on district level focuses on waste management varies (pers. com.).

#### **Ministry of Agriculture, Livestock and Irrigation**

The Department of Rural Development (DRD) office Regional and State level focuses on rural infrastructure development such as development of roads and access to water for rural people. In some areas, DRD staff collaborate with Region / State Parliament members (MPs) for rural development including waste collection and control.

**The Ministry of Industry** is responsible for managing state-owned industries, including 18 industrial zones, 3 special economic zones, as well as coordinating with private industries to promote engagement with the industrial sector. Moreover, seven industrial zones are planned to be further extended (ECD MONREC, 2018). The ministry's role includes discussing waste handling and recycling of industry generated waste, including hazardous, recyclable and plastic waste.

#### 3.1.2 Decentralised governance of waste

Decentralised governance occurs on Region and State level according to the constitution of 2008. Each Region and State have an appointed government consisting of a Chief Minister, other Ministers, an Advocate General, a legislative authority, and a parliament, called Hluttaw<sup>11, 12</sup>. Each Ministry consists of a Minister and the Ministers office. There are no affiliated departments. The Chief Minister is responsible for engaging with the state/region's unicameral legislative assembly (Hluttaw) and is

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<sup>11</sup> The 2008 constitution created new state and regional structures involving sub-national governments.

<sup>12</sup> After the coup d'état in February 2021 there is no election system for state/region Hluttaws, and there is not election process for township development committees.

appointed by the Union president. The General Administrative Department (GAD) is responsible for administrative coordination of departments and committees on state/region, district and township level. The number of Ministries and areas of responsibility varies among States and Regions. All States and Regions, however, have a Minister responsible for environmental affairs and a Minister leading the Development Affairs Office (DAO).

On the township level, the Development Committees include elected representatives. There are 333 townships in Myanmar and the election constituency for the Union Parliament and the region and state parliaments are based on the townships. There is no elected body for governance on district level. The township and city development committees (TDC/CDC) - including actors from township/city DAOs and two elected members from civil society - are responsible for overall waste management.

There has, since the coup d'état in February 2021 not been an election system for state/region Hluttaws, nor an election process for township development committees<sup>13</sup>.

Below, the role of decentralised bodies for urban waste management with reference to the situation before February 18<sup>th</sup> 2021, are as follows:

**State/region minister for environmental conservation:** this minister is responsible for deforestation and pollution issues. The minister leads the environmental conservation committee in the state/region. The minister is directly responsible to the state/region chief minister, the cabinet, and the Union minister of natural resources and environmental conservation<sup>14</sup>.

**Minister of Development Affairs Office (DAO) state/region level:** A key responsibility of the DAO Minister (also referred to as the municipal minister) and function of the state/region DAO office, is to coordinate and supervise the township DAO offices, and to decide on policy priorities of the DAO in consultation with the chief minister and the cabinet of ministers. The township DAO office is responsible for waste management in urban areas, including waste collection and disposal (Arnold et al. 2015). The DAO office commonly includes four or more departments: 1) administration, 2) engineering, 3) law, tax and security, and 4) cleaning unit. The cleaning unit is the executing public entity collecting waste.

The DAO delivers a significant range of services such as construction of roads, local infrastructure, and waste collection funded through household taxes (e.g. property tax) and fees<sup>15</sup> (Asian Foundation, 2018; Møller et al. 2020). People are not always aware of paying for waste collection, as this payment may not be a visible part of the property tax. Levels of payment and systems of payment for waste collection varies<sup>16</sup>. In recent years, there has been a general increase in the allocation of capital expenditure for waste collection including the purchase of waste collection infrastructure (e.g. trucks)

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<sup>13</sup> On February 18<sup>th</sup> the SAC regime abolished Chapter 3 and 5 of Bago Region municipal law.

<sup>14</sup> In some states / regions one minister is responsible for both environment issues and for development affairs issues including such as cleaning of waste. This is the situation in the Bago Region.

<sup>15</sup> These taxes and fees are the main streams of revenue for the DAO and are collected by the tax department of the DAO.

<sup>16</sup> According to Yee (2019) households' payment for waste collection ranges from 300 to 900 MMK/month/household (USD0.2 to USD0.6), while commercial enterprises pay special collection fees ranging from 20,000 to 150,000 MMK per month based on the volume of waste produced. Waste collection can also be charged based on the waste volume and price for one truck (3 tonnes capacity) comprising about 35,000 MMK (25.5 USD) per trip (ECD/MONREC, 2018). Meanwhile, Premakumara et al. (2017) reports that in Mandalay charges for household or domestic waste collection are based on the volume of waste disposed, and that in Yangon charges are also specified according to location.

and it is argued that the revenues generated from the waste management system are in general not sufficient to cover these expenses (Premakumara et al. 2017, Møller et al. 2020).

Some CDC/TDCs and DAOs have outsourced waste collection and collection fees to private companies. Møller et al. (2020) list nine townships which have done so and report economic challenges, including a general underestimation of the cost of service provision.

**Township / City Development Committees (TDC/CDC)** are, according to national legislation, responsible institutions for waste collection in urban areas in Myanmar (Municipal areas) (Arnold et al. 2015:23). The Committee includes representatives from different township departments including the Development Affairs Organization (DAO) and elected representatives.

### 3.2 Legislation, policies, strategies with relevance for waste management

Myanmar has recognised the urgency of addressing pollution from waste, and plastic pollution in particular. In response, Myanmar has adopted several international conventions and declarations, such as the *Bangkok Declaration on Combating Marine Debris*, the *ASEAN Framework of Action on Marine Debris*, as well as the *National Waste Management Strategy and Master Plan (NWMSMP)*. However, existing laws, policies and initiatives are not sufficiently established to effectively address plastic waste management at present. Inadequate waste management policies and regulations are compounded by a lack of financial schemes for improving technology, including central government financial support, as well as private investments (Akenji et al., 2019:63). The following sections will explore relevant international frameworks aiming to better manage and reduce waste and pollution, as well as national level strategies and regulations with the same core purpose.

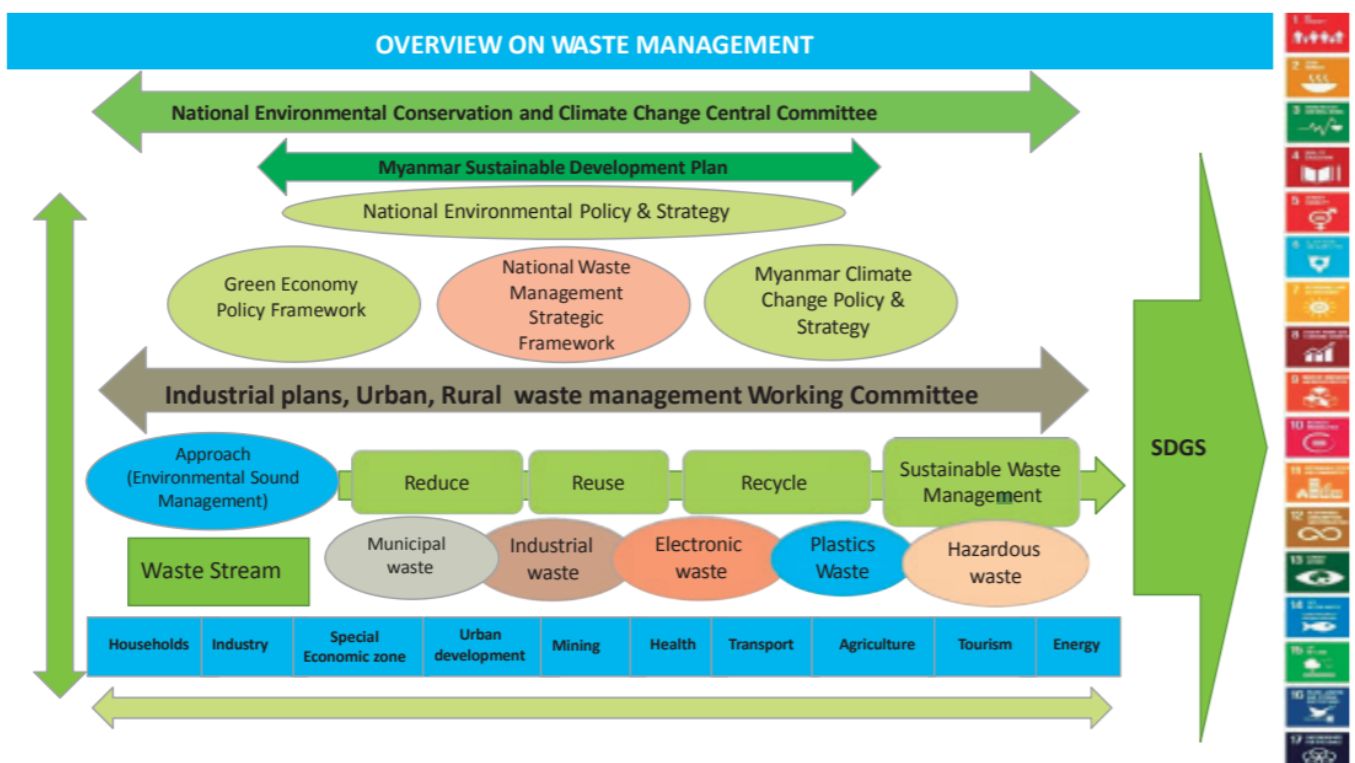
#### 3.2.1 International treaties and conventions on waste reduction and management

The Myanmar government has signed several international environmental treaties and conventions to address issues concerning waste management. The signed treaties and conventions represent an international commitment for Myanmar to manage waste sustainably and to reduce litter in the environment - including in marine areas. Below are some of the most important international treaties and conventions of relevance to this topic.

- **Stockholm Convention on Persistent Organic Pollutants** (signed in 2004). The treaty was designed for the aim to eliminate or restrict the production and use of persistent organic pollutants (POPs).
- **The Ha Noi 3R Declaration** Sustainable 3R Goals (Reuse, Reduce, Recycle) for Asia and the Pacific for 2013-2023 (signed in 2013). The declaration represents a commitment to voluntarily develop, introduce, and implement policy options, programmes, and projects towards realising the 3R goals in the region, with the ultimate goal of achieving a resource-efficient and resilient society and transitioning to green economy.
- **Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal** (signed in 2015). The treaty was designed to reduce the transboundary movements of hazardous waste (not radioactive waste) between nations, and specifically prevent transfer of hazardous waste from developed to least developed countries. The Convention is also intended to minimise the amount and toxicity of wastes generated, and ensure their environmentally sound management.

- **Bangkok Declaration on Combating Marine Debris** (signed in 2019). The signed declaration represents a commitment of strategic measures to “promote cooperation for the protection, restoration and sustainable use of coastal and marine environment, respond and deal with the risk of pollution and threats to marine ecosystem and coastal environment, in particular in respect of ecologically sensitive areas”.
- **ASEAN Framework of Action on Marine Debris** (Akenji and Bengtsson 2019, 63) encompasses four priority areas: (i) Policy Support and Planning; (ii) Research, Innovation, and Capacity Building; (iii) Public Awareness, Education and Outreach; and (iv) Private Sector Engagement (ASEAN,2019:1). The framework proposes voluntary activities the signatories can implement to reduce marine debris.
- **ASEAN Consultative Committee on Standard and Quality of Product**, Prepared Foodstuff Product Working Group for harmonising standards. Myanmar has adopted the recommendations under the working group. The recommendations include harmonised standards for lead, cadmium, chromium, bisphenol A, chloromethane and formaldehyde.

### 3.2.2 National level regulations, strategies, policies on waste management



*Figure 3.2 Myanmar waste management structure with policies and strategies and links this to the Myanmar SDGs, and the Global Development Goals (Source: from NWMSMP, 2018).*

Myanmar does not presently have national level policies or initiatives specifically targeting plastic pollution, but the government is preparing a plastic action plan. However, several laws and policy frameworks have been developed and adopted for environmental management and to incentivise sustainable management practices. The policies and strategies specifically developed for waste management are relatively recent, and some are still under development. It may be noted that many of these legislations have been drafted in close collaboration and with support from bilateral donors and multilateral organisations. Figure 3.2. provides an overview of the Myanmar waste management

structure with policies, strategies and links to the sustainable development goals. Regulations and strategies for waste management have mostly been developed at national level. The exception refers to the situation in Mandalay and Yangon where the respective City Development Committees has developed waste management strategies (MCDC and ECD 2017)<sup>17</sup>.

The lack of reliable data on waste generation and management, including marine litter data and recycling activities is a barrier for developing evidence-based policies to tackle marine litter and plastic pollution. Constraints for effective implementation of policies, such as the lack of financing of treatment technologies and infrastructure must be addressed, and institutional coordination is needed for monitoring, evaluation, and enforcement of laws and regulations governing the waste sector.

Below, the relevant laws, rules and strategies for waste management is listed:

- **National Sustainable Development Strategy (NSDS 2009):** The strategy focuses on four core areas: sustainable and equitable socio-economic development; conservation of the environment; preservation and promotion of culture; and good governance. The NSDS is an important guiding document to ensure harmony and balance between the following three sectors: environment, economy, and society.
- **The Environmental Conservation Law (2012):** The Environmental Conservation Law is a framework law enabling coordination between government departments, government organizations, international organizations, non-government organizations and individuals in matters of environmental conservation (Hildèn et al. 2016). MONREC is the responsible ministry, as is the National Environmental Conservation Committee. The objectives of the law is to implement the Myanmar National Environmental Policy; to lay down the basic principles and provide guidance for systematic integration of environmental conservation in the sustainable development process; to ensure a healthy and clean environment and conserve natural and cultural heritage; to reclaim ecosystems from degeneration; to manage and implement action against loss of natural resources and enabling their sustainable use; and implement measures for promoting public awareness and cooperation in educational programmes.
- **Environmental Conservation Rules (2014):** Specifies the requirements and objectives of the 2012 Environmental Conservation Law, for instance with regard to environmental impact assessments and water quality standards. MONREC is responsible ministry.
- **Myanmar Special Economic Zone Law (2014):** Implemented by the Ministry of National Planning and Economic Development, and the Myanmar Investment Commission. The objectives stated include: support the main objectives of the national economic development plan, affect employment for the people, to promote their living standards, to promote the export of goods with the improvement of production and to increase foreign exchange earnings; encourage, promote and attract being for the balanced development of the industrial, economic and social sectors in the State; promote cooperation in industrial, economic and commercial activities, services and financial transactions between the State and other countries.

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<sup>17</sup> A Master Plan for Waste Management for Yangon is being developed by Yangon CDC with the support of Japan International Cooperation Agency (PKII, n.d.); Mandalay CDC City waste management strategy and action plan (2017-2030), developed with technical assistance from UN Environment and CCET (MCDC and ECD, 2017).

- **National Environmental Quality (Emission) Guideline (2015):** MONREC formulated the National Environmental Quality (Emission) Guidelines in collaboration with the Asian Development Bank (ADB) in December 2015. The objective is to provide the basis for regulation and control of noise, air emissions, and liquid discharges from various sources to prevent pollution and protect human and ecosystem health. The guidelines consist of a general section and an industry-specific section.
- **National Environmental Policy (2018):** Developed by ECD (MONREC) with support from UNDP and the Finnish Ministry of Foreign Affairs aiming to place environmental considerations at the centre of efforts to promote economic and social development. It reaffirms and builds on the 1994 National Environmental Policy, and on the obligations contained in Environmental Conservation law. The National Environmental Policy aims, among others, at: (i) providing environmental services for waste planning and infrastructure for urban and rural areas, (ii) encouraging the enterprises to adopt clean production principles and practices (Environmental Conservation Department, 2019, cited in Zar Yee et al., 2019:7).
- **Myanmar Sustainable Development Plan (MSDP) (2018-2030):** Prepared by the Ministry of Planning and Finance. The MSDP is structured around 3 Pillars and 5 goals. Strategies are developed for each of the 5 Goals, with accompanying action plans. In Goal 5 (Pillar 3: People and the planet), the strategy to improve land governance and sustainable management of resource-based industries ensuring our natural resources dividend benefits all our people – the following action plan is described: *“Provide efficient public municipal services including solid waste collection and management systems combined with public education on recycling and waste minimization practices”*.
- **National Waste Management Strategy and Master Plan (NWMSMP) 2018 - 2030 (ECD/MONREC 2017).** The NWMSMP is developed by ECD in cooperation with the UN Environment and IGES/CCET and other relevant ministries and departments. The plan’s mission is to: *“develop and implement a holistic and integrated waste management strategy based on principles of inclusiveness, zero waste, zero emissions and circular economy to achieve a greener, cleaner and healthier environment in Myanmar”*, extending sound waste collection and eliminate uncontrolled disposal and open burning specifying key targets and proposed activities (Appendix 1). The NWMSMP Action Plan aims to achieve 70 percent solid waste collection by 2020, 85 percent by 2025, and 100 percent collection by 2030 (The World Bank 2019: xv).

The NWMSMP (2018 – 2030) 3R policy is the relevant strategy for State and Region level. However, the strategy is yet to be actively adopted and translated into action on state/region level. No particular law regarding waste governance have been passed by state/region Hluttaw (the Pyithu Hluttaw). On township level, the municipal law passed by the state and region Hluttaw includes sections which specifies the duties and responsibilities for waste management and collection by the city and township development committees. Rules for waste management and collection with reference to the sections in the municipality law have been developed by the Development Affairs organization (DAO) minister on the state/region level.



The NWMSMP Action Plan outlines six main strategic goals:

- A. Extending sound waste collection and eliminate uncontrolled disposal and open burning
  - B. Extending sustainable and environmentally sound management of industrial and other hazardous waste
  - C. Prevent waste through 3Rs (reduce, reuse, recycle)
  - D. Ensure sustainable finance mechanisms
  - E. Awareness raising, advocacy and capacity building
  - F. Compliance, monitoring and enforcement
- **Myanmar Climate Change strategy and action plan (MCCSAP) (2017 – 2030).** The MCCSAP developed by MONREC outlines a vision of a climate-resilient, inclusive nation that can address climate risks and harness the benefits of low-carbon development. The aim, “to become a climate-resilient country, while also contributing to global efforts to curb GHG emissions, reducing its contribution to climate change within a realistic timeline of 15 years” is stated. Also, the relevance of waste management for reducing climate gas emissions is acknowledged, by the aim of “improved technology for energy and waste management to reduce GHG emissions and promote environmental sustainability”.
  - **Master Plan for Hazardous Waste Management in Myanmar (proposed, 2019)** developed by ECD, MONREC in partnership with the Norwegian Environment Agency and SINTEF. The proposed Master Plan for Hazardous Waste in Myanmar was submitted to ECD in 2019 for finalization and approval by the ECD. In the plan, regulatory, institutional and technical arrangements for implementing a national hazardous waste management system, including collection, storage, pre-treatment, reuse/recycling options and final disposal facilities are described and proposed for the short term (2020), medium term (2025) and long term (2030) (NEA and SINTEF, 2019).
  - **Procedures on Transboundary Movement of Hazardous Waste and Other Wastes:** a draft regulation was developed in 2018 by ECD assisted by the Norwegian Environmental Agency. The Procedures on Transboundary Movement of Hazardous Wastes and Other Wastes was submitted to the Attorney General Office in April 2019 for comments. The procedures specify which types of waste are hazardous waste.
  - **Rules on Hazardous Waste Management:** The draft Notification on specifying types of Hazardous Wastes specifies which types of waste that are hazardous waste. The list is based on the European Waste List. Management of such wastes is described in the developed draft Rules on Hazardous Waste Management, including a description of a manifest system (NEA and SINTEF, 2019).
  - **Plastic action roadmap plan** (under development): Prior to 2020, the Myanmar government was working on a plastic action roadmap to reduce plastic pollution. The proposed roadmap consists of five action points, however, the status of the roadmap is currently unclear. The action plan aims to 1) analyse negative economic impacts of plastic mismanagement; 2) prioritize public policy based on the identification of top ten plastic items found in the environment; 3) analyse the effectiveness of potential plastic policies based on international experiences; 4) estimate plastic leakages from priority cities into waterways; and 5) analyse the range of accompanying annual

leakages from priority cities; and prepare a roadmap to put the plan into action (The World Bank 2019: 68).

## 4 Waste management practices: collection, sorting, recycling

### 4.1.1 Waste collection practices

Waste collection in Myanmar is the responsibility of the township and city development committees (TDCs/CDCs). The committees are responsible for ensuring well-functioning waste collection, typically as a service provided by the Township DAO Office cleaning unit. The DAO owns the waste collection infrastructure and collects waste in urban areas. The TDC and the CDCs are responsible for ensuring collection of waste from residential, public and industrial properties. In recent years, several TDCs and CDCs have established public-private partnership arrangements with private waste collection companies. In these townships, waste is typically collected both by the cleaning unit under the DAO (municipal department) and by the private waste collection companies in some kind of arrangement. The degree to which this is a well-coordinated arrangement varies (interviews 2020 and 2021 with operating waste collection companies). The collected waste is regularly transported to open dumpsites lacking environmentally appropriate controls (Gamaralalage et al. 2019).

In rural areas, there is no officially appointed government body responsible for waste collection. Consequently, households typically deposit waste at informal dump sites, and some regularly burn their wastes. In recent years, some local village administrations - at times in collaboration with state/region MPs - initiate voluntary community waste management. Community-led waste management involves volunteers collecting waste from public spaces, including monasteries, schools and urban streets, using small trucks which are not exclusively used for transporting the collected waste to unorganised landfills.

In urban areas, waste is generally collected directly from households or from public collection points. For example, in Mandalay, 72 containers are placed around the city, close to markets, business centres and neighbourhoods (Premakumara et al. 2017). Waste collection is labour intensive as collection services rely on manual workers and non-specialised vehicles. Types of waste collection infrastructure varies across townships and may include tractor-pulled carts (htaw-lar-gyi), three-wheeled trucks (thonebane), medium-sized trucks (pa-zin-khaung), and large open-bed trucks (naut-pwint) (Figure 4.1). Small and large trash compactors exist, but this is not common (Interview, December 2021, Bago city). In larger cities, such as Mandalay and Yangon, fleets of flatbed and cable trucks to pick up garbage containers are more common, while in smaller townships, tractor-pulled charts and three-wheeled trucks are used. Many places experience problems with narrow lanes that are difficult for vehicles to enter. Collection is commonly announced by bell ringing, radio, social media or loudspeaker announcements.



**Figure 4.1** Common garbage collection vehicles in Myanmar (Source, Adapted from Møller et al. 2020).

In Bago, the waste collection company MJT announces waste collection on Facebook and processes waste collection fees using QR codes in the app *Waste Tax Collector*<sup>18</sup> (Figure 4.2). Alongside municipal and contracted waste collection services, informal waste pickers collect waste from streets, households, and directly from restaurants, markets, and coffee shops, as well as from the landfills, often using manual pushcarts (lat-toon-hle) (Figure 4.1).

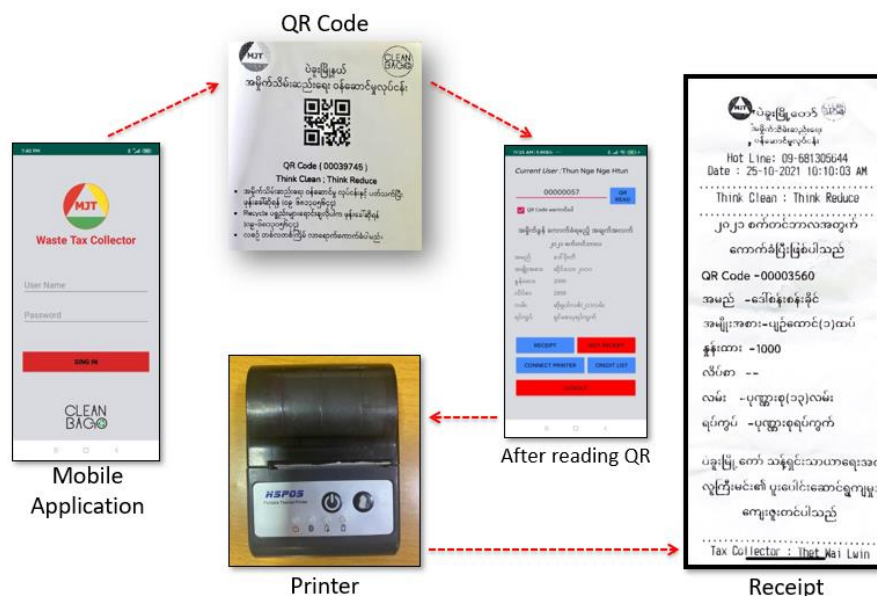
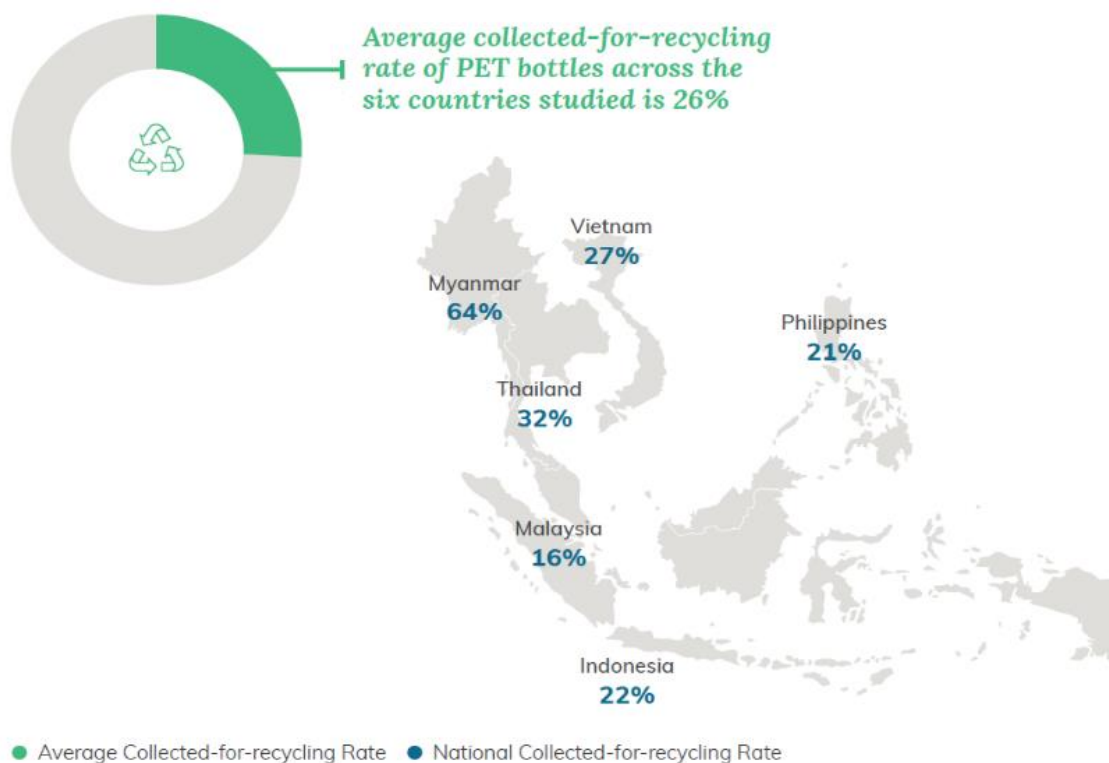


Figure 4.2 Overview of MJTs waste collection app (Source, MJT, 2021).

Despite there being no system in place for PET bottle collection in Myanmar, a considerable proportion of PET bottles are recycled (Figure 4.3) (GA Circular 2019). This can be explained by the relatively high value of PET bottles in the recycling market, making its collection an income opportunity for the poorer segments of the population. A large portion of the PET bottles are collected by informal waste pickers who sell them to smaller PET recycling companies (elaborated in chapter 4.1.5). Local collection of PET bottles can be linked to international recycling chains, where evidence suggests that PET is sold to international markets, including large companies in Asia and the EU (interviews 2021 with operating waste collection companies). Yet, PET bottles and other types of plastics can still be observed in water bodies, along the streets and in formal and informal dump sites. Hence, a system including incentives for more effective disposal and waste collection practices is needed. This discussion needs to involve several actors, including the production chain, the shops, the markets, and informal waste collection sector and resellers for successful outcomes.

<sup>18</sup> <https://www.facebook.com/exaMyan/posts/2558665381060213/>

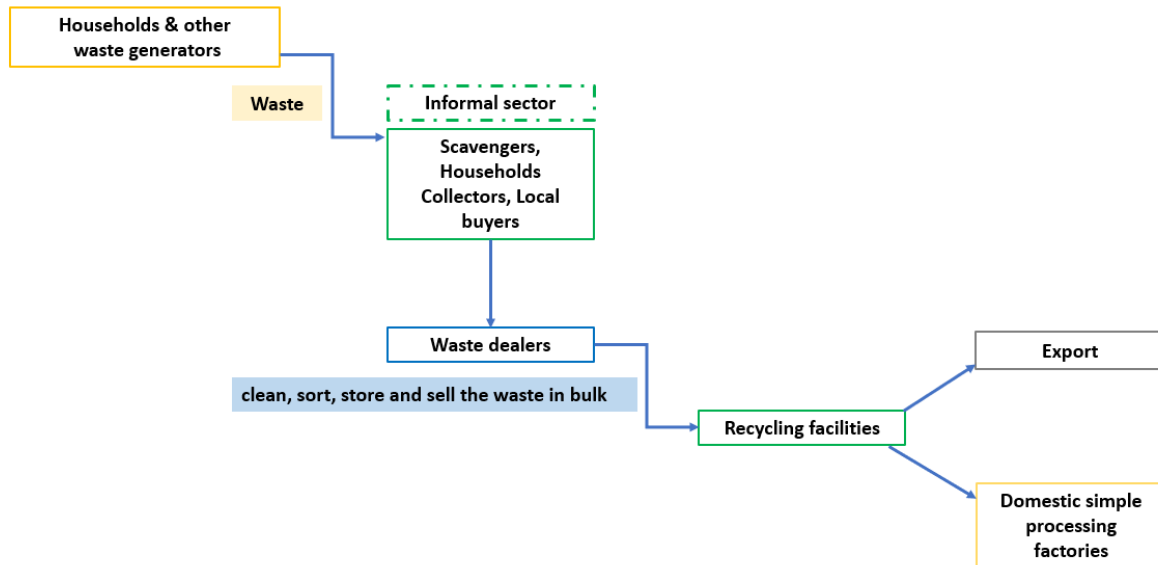


**Figure 4.3** Estimated national collected-for-recycling rates for six southeast asian countries (Source: GA Circular 2019, p.26)

#### 4.1.2 Systems for waste segregation at source

Few formal systems have been established for organised waste segregation in Myanmar. The exception is industrial and hospital waste, which is to be sorted according to a waste collection procedure, formulated by the ECD (Environmental Conservation Law 2012; National Health Law 1972; National Health Plan, 2017-2071<sup>19</sup>). Accordingly, hospital waste should be segregated into different colour bags: (i) black (MCDC), blue or green (YCDC) for non-hazardous health care waste or domestic waste (ii) yellow for pathological waste, infectious waste, and (iii) red for sharps, syringes etc. However, according to MJT, the private waste collecting company in Bago, the degree that this segregation system is followed on the ground varies. Also Karstensen et al. (2017) reports that industrial solid waste is handled and treated together with municipal solid waste, with no evidence of waste segregation practises being in place on the ground. Among the challenges for segregation of hospital waste according to this system, is that coloured plastic bags are difficult to access (Interview December 2021). Among the consequences, is that infectious waste is incinerated or burned in cemeteries while sharp wastes are buried underground in landfills (Premakumara et al. 2019: 12). Yangon CDC (YCDC) and Mandalay CDC (MCDC) estimate that on average, collected medical waste equals to respectively 280 and 779 tonnes per year (Premakumara et al. 2019. A large part of this (more than 70 percent) is infectious waste.

<sup>19</sup> The Environmental Conservation Law includes a chapter on urban environment where industrial waste is addressed. Hospital waste is regulated by the *National Health Law and Hospital Guidelines* under the National Health Plan implemented by the Ministry of Health and Sports.



**Figure 4.4** Visual representation of a typical recycling system in Myanmar cities. (Source: Own elaboration based on ECD/MONREC,(2018).

#### 4.1.3 Disposal practices and landfills infrastructure

Disposal of waste occurs in formal and informal dumpsites. In this context, formal dumpsites refer to large open landfills with few environmental protection measures. These formal dumpsites are established to serve urban areas, but no specific legislative rules for their management exists. Although the township DAO is responsible for establishing landfills for urban areas, not all urban areas have dedicated landfills and the responsibility for landfill management varies among townships. In townships where waste collection is outsourced to a private company, the private company may be responsible for management, as is the case in Bago township. In townships where waste collection and landfill management is outsourced to a private company, the contract may define the division of responsibilities such as the responsibility for managing access to the landfill and responsibility for emergencies such as fires.

The National Waste Management Strategy and Master Plan for Myanmar (2018-2030) aims to ensure safe treatment and disposal of waste in officially approved landfill sites. This entails protection against uncontrolled dumping and open burning, and implementation of waste disposal standards at landfills, including regulations on standard engineering design, and receipt/disposal requirements for different classes of landfills. ECD (2018) recognises that converting open landfills into sanitary landfills can be a way forward for safe disposal of waste. The Asian Development Bank (ADB) describes four basic elements of a sanitary landfill: 1) formal engineering preparations; 2) trained staff for site supervision; 3) disposal of waste in layers covered in soil; and 4) hydrogeological isolation to isolate toxic leachates (ADB 2017, in Møller 2020: 18).

Overall, most townships in Myanmar lack adequate systems and methods for enabling and handling segregation of waste. Hence, most waste, including other special/hazardous wastes, such as medical waste, electronic waste, waste from mining areas, mercury waste, construction and disaster waste, is ultimately disposed of in open landfills, dumpsites or is subject to open burning (ECD, 2018). No proper collection and treatment systems are available for either domestic or industrial liquid waste and

sludge. In most townships, smaller informal dumpsites can be observed along streets, rivers and adjacent to markets, in addition to formal dumpsites. Some informal dumpsites are occasionally cleaned by the municipality department or the private waste management company. In other cases, these sites are cleaned by neighbourhood groups. There is also a rural-urban divide, wherein rural areas, which have no formal systems for waste disposal, most waste is handled directly by the households, shopkeepers or industry. This can imply that waste is subject to open burning, buried or dumped into waterbodies. Most dumpsites also face a range of challenges in terms of operations and management (Premakumara et al. 2017, 10). Fires generating toxic smoke and fumes commonly take place in the landfills, adding to health hazards posed at dumpsites. Other health hazards include the spread of rodents, insects, and pathogenic organisms, in addition to dust pollution and ground and surface water pollution from uncontrolled leachate (Premakumara et al. 2017).

The Pyin-Oo-Lwin Township has one of the few managed landfills in Myanmar. The Pyin-Oo-Lwin DAO constructed a low-cost system that takes advantage of the landscape's natural slope, locating the landfill in a narrow gorge between two small hills. The landfill has an in-house constructed concrete tube to collect leachate from the waste. It also has half a dozen vertical PVC tubes to collect methane gas to avoid dumpsite fires and potentially monetise the waste later. Next to the landfill is a simple sorting station for recyclables (Møller 2020).

In Yangon, the Japanese company Dowa Eco-System Co., LTD, has established and begun operating Myanmar's first industrial waste treatment and controlled landfill facility in the Thilawa Special Economic Zone. It is envisioned that this landfill will receive industrial waste from across the country and provide comprehensive waste management services to cover collection, transportation, intermediate treatment and recycling of waste according to their different characteristics (Premakumara et al. 2017: 11).

#### 4.1.4 Role of private sector and NGOs in waste management in Myanmar

Recyclable waste, such as metal, textiles, electronics and plastics, is typically repaired locally or segregated for reselling to small recycling companies, before it is transported in bulk to larger reselling and recycling centres in Yangon and Mandalay, or exported to Thailand, for further processing in factories (Interviews with local actors in the Bago Region, 2021). The recycling industry represents different types of business value chains, from shorter chains with few actors, to longer chains of several actors including international links. Informal recycling actors are deeply integrated in these value chains, primarily at the lower levels as waste pickers, waste collectors, and local buyers (junk shops), as illustrated in Figure 4.4. The role and situation of the informal sector in waste management is expanded on in the following sub-section (4.1.5). There is currently a lack of accurate and reliable data on recycling volumes, ratios and the number of recycling factories present in Myanmar cities (ECD/MONREC, 2018:8). However, there are numerous examples of privately owned companies, mostly small and intermediate sized, and other initiatives which form key components of recycling infrastructure in Myanmar, illustrating the role of non-government stakeholders in waste management.

One such example is Myanmar Recycles (established in 2017), which operates an industrial-scale plastic film recycling factory at the Myaungtaga industrial zone in outer northern Hmawbi Township. Myanmar Recycles has developed a commercial market for plastic recycling with an initial focus on post-consumer plastic waste which is difficult to collect and recycle, such as plastic film and high-density polyethylene (HDPE) containers. The company buys plastic waste directly from waste collectors, and sorts, washes and pelletises the plastic to be sold as plastic resin (3R Initiative, 2020;

Frontier Myanmar, 2020). Another private actor is the Commercial Plastics Company Ltd. (set up in December 2016), located in Hlaing Thar Yar industrial zone in Yangon, which recycles post-consumer PET bottles collected from all over Myanmar (CPC, 2020). In October 2020, the company Delta Capital envisioned to become the first food-grade bottle-to-bottle recycler in Myanmar, producing recycled PET compliant with international safety requirements for export to manufacturers also beyond national borders (MPE &VCA, 2020). RecyGlo (founded in 2017) is another initiative which sorts waste from more than 40 clients, including hotels and United Nations agencies, and directs it across a network of small factories that recycle different categories of waste. In 2019, RecyGlo received US\$150,000 in seed funding from the Norwegian investment fund, Katapult Ocean, and has recycled over 1,000 tonnes of waste since starting operations (Frontier Myanmar, 2020).

While outsourcing waste management services to private companies may be more economically viable for municipalities, it is not always a success in practice, as was observed when the DAO in the popular tourist destination and hill town Pyin-Oo-Lwin in Mandalay outsourced waste collection to a private contractor in 2017 (Møller 2020). Although waste collection coverage remained about the same (65-70 percent) under the private contractor, the DAO experienced that the contractor neglected peri-urban and hilly areas that were harder to reach and did not respond to emergency clean-ups in a timely manner, while the public complained about not receiving sufficient collection serviced despite an increase in waste collection fees. Outsourcing thus became an incomplete solution which shifted the cost from the DAO to residents without a proportional increase in service quality. Consequently, the DAO cancelled the contract early and took back control of waste collection with financial support from the state/region government.

Community based organisations and neighbourhood groups have been playing an active role in reducing waste in the environment, rivers and other waterbodies. One example is the Bago Healthy River Initiative (BHRI). The BHRI activities include participation in waste collection campaigns organised by MPs and the Bago TDC, as well as patrolling bridges over Bago River in the evenings to prevent people from throwing waste into the river. In Bago, these initiatives can be classified as informal relationships between the TDC, community based organisations, neighbourhood groups and the private waste management company, MJT. However, since February 2021, these initiatives have stopped or reduced significantly, due to a combination of the military takeover and Covid-19 side-tracking waste management issues and making campaigning and gatherings virtually impossible.

#### 4.1.5 The role of the informal recycling sector in waste management in Myanmar

The informal recycling sector significantly contributes to collection and recycling processes in low- and middle-income countries, including Myanmar (ESCAP 2019). Accurate and reliable data on the scale, recycling volumes, and waste handling capacity of the informal sector is limited both globally and in Myanmar. Estimates from Yangon City suggest that the informal sector is involved in managing 5 percent of collected and recycled waste (Premakumara et al. 2017). This is significantly lower than estimates in other low- and middle income country contexts, as unofficial data sources suggest the informal sector accounts for 15 percent of total plastic waste collection in Indonesia (World Economic Forum 2020), 17-60 percent of urban MSW in China (Linzer and Salhofer 2014; Salhofer et al. 2015, in Steuer et al. 2017), and up to 60 percent of all collected recyclable waste in India (MoHUA 2019). In theory, the formal sector incorporates municipal and private sector waste management services that are registered and legally recognised, while the informal sector encompasses all unregistered, non-contracted and so-called 'illegal' waste collection and recycling practices. However, as the previous

sections have shown, there is often a fluid divide between formal and informal sectors, for example, when non-contracted (informal) waste pickers trade with formally registered recycling shops. It is important to understand the role of the informal recycling sector in waste management because inclusion of informal actors in strategies to reduce pollution is a key part of developing increasingly circular and sustainable waste management solutions.

Key informant interviews with stakeholders involved in waste management in the Bago Region indicate that there may be between 10.000 and 20.000 waste pickers in Yangon, and about 200-300 waste pickers across Bago city (Interview, Bago township, November 2021). While these numbers are uncertain, it is expected that the numbers of active waste pickers are increasing in response to growing demand for recyclables from formal and informal recycling companies, both in Myanmar and internationally. The informal sector collects and recycles different recyclable materials, including metal, textiles, plastic, electronic waste and paper.

Informal waste collection and recycling in Myanmar offers job opportunities and an income source for a significant number of urban poor (Premakumara et al. 2017: 23). Field observations and interviews conducted in Hlaing Tharyar, Yangon, demonstrated that there are few entry barriers to waste picking, as investment costs are minimal (Constant et al. 2020: 12). Observations from Bago suggest that while being competitors, informal waste pickers are part of a larger group represented by a leader who partakes in price negotiations and determines who can collect waste where (interview actor Bago Region 2021).

In Myanmar, collection and sorting of recyclable waste from municipal waste can happen both formally and informally across all stages of the MSW management chain, from waste generation, to collection, transfer, transportation and final disposal (Møller et al. 2020). The DAO cleaning unit and private waste collection companies may in some areas collaborate with informal waste pickers. Such arrangements may involve contracts for waste pickers to collect waste in areas that are difficult to access, such as markets or narrow streets, and deliver the waste to the waste company at an agreed pick up point (Interview actor Bago Region 2021). In other instances, private companies contracted by townships may engage informal waste pickers to collect recyclable materials from wastes deposited at disposal sites and landfills against a daily fee (interview actor Bago Region 2021; Møller 2020).

In urban areas in low- to middle-income countries, it is common to describe the stages of the informal recycling chain through a hierarchical structure (Krishnan and Backer 2019), for example, categorised using different levels (Hande 2019). In Myanmar, the first level consists of waste pickers who collect recyclable waste from landfills, public areas and households. At landfills, waste is dumped into temporary disposal sites where it is manually hand-sorted by waste pickers using manual tools such as rakes (Premakumara et al. 2017). In Yangon, some households and apartment dwellers pay informal waste collectors for door-to-door collection typically 200-300 MMK per bag (Møller 2020:13). Evidence suggests that competition between informal waste pickers and collectors may occur (Constant et al. 2020). The townships may also have informal agreements with contractors that charge households for door-to-door collection, while paying YCDC workers to take the collected waste to landfills (Møller 2020).

Following waste picking and collection, waste is sold to waste dealers, sometimes referred to as junk shops or itinerant waste buyers, who represent the second level of the recycling hierarchy. A sample survey carried out in Yangon City identified that 86 tonnes of recyclable materials are collected and transferred to waste dealers per day by the informal sector (Premakumara and Hengesbaugh, 2016:



5). Waste dealers typically clean, sort (into more specialised categories), store and sell materials in bulk to recycling industries, both locally and for export (Premakamura 2017), who usually are formal businesses and represent the third level in the recycling hierarchy.

Accurate data on informal waste collection, recycling and trade between actors in the informal recycling network is limited, with a greater degree of grey areas than MSWM, given the informal nature of labour. Nevertheless, this section shows that the waste pickers, sorters, segregators and recyclers classified as part of the informal recycling sector significantly contribute to waste management in Myanmar and must be recognised for their contribution as key stakeholders in a waste value network.

## 5 Bago Region, governance and management of waste

### 5.1 About Bago Region

**The Bago Region** is located in southern central Myanmar. It includes the Bago River, which flows from the Pegu Yoma mountain range at an elevation of 800 metres above sea level in the north, running south through meandering sections of over 331 km before it reaches the Yangon River near Yangon City. The drainage systems of the Bago River Basin are in poor condition and a major cause of flooding<sup>20</sup>. The Bago River flows through Bago City, the main urban area within the Bago township, and experiences seasonal flooding almost every year during the monsoon period.

Bago Region includes the Bago, Pyay, Tharrawaddy and Taungoo districts. There are several townships in each district. Here we focus on Bago Township which is a one of seven townships in Bago District<sup>21</sup>. Bago Township covers 2,905 km<sup>2</sup> and hosts a population of 491,434 people in 107,132 households (2014 Myanmar Census). The 2014 census reports that the population density in the township varies from 195 to 559 people per km<sup>2</sup>. The primary occupation in Bago Region is agriculture, and the majority of the population are smallholder farmers, although there is also industry in the district. Four areas are designated as industrial zones covering 1480 acres in Bago Region (mostly in the Bago Township area). These include the Bago industrial complex (foreign industrial zone and local industrial zone), i-Land Park Myanmar and Inntakaw industrial zone (MIMU 2019). Currently about 112 companies are located in the industrial zones.

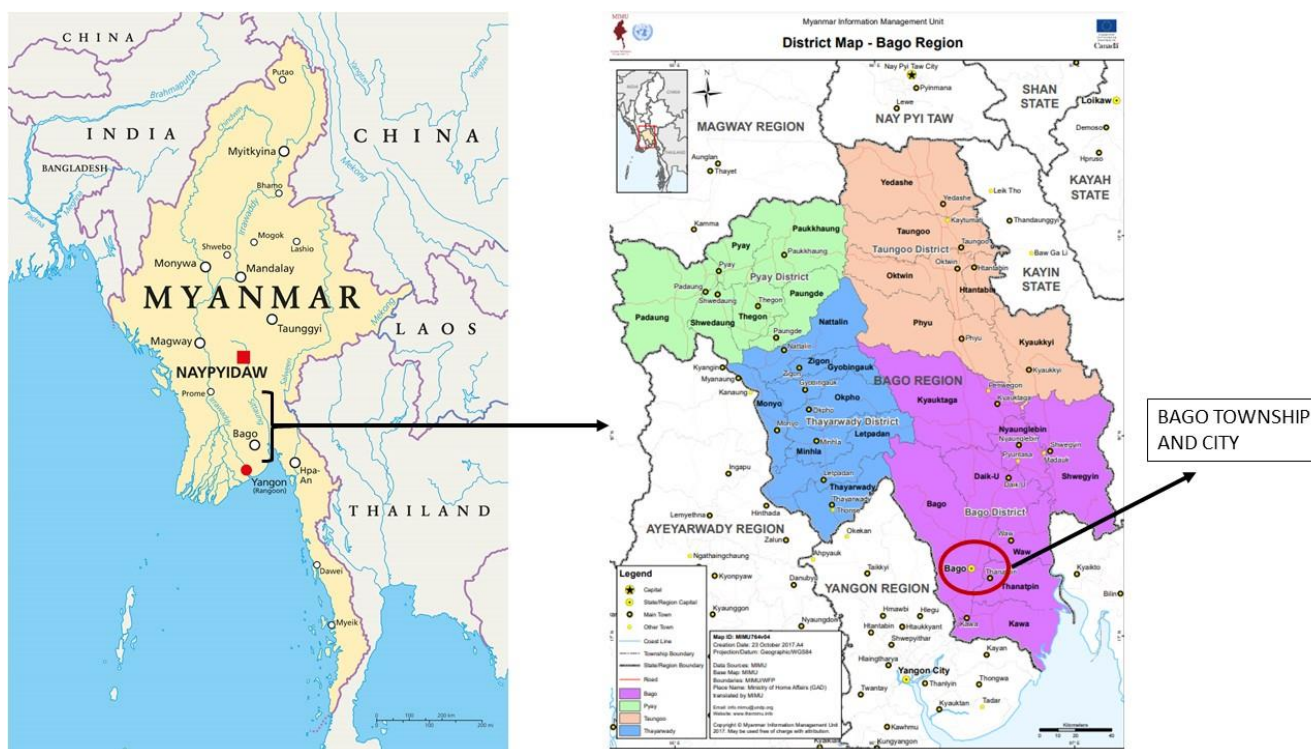
**Bago City** is located relatively close to Yangon and is the administrative and economic centre in Bago Region. The city is a major driver of economic development in the district.

#### **Public services, industries and religious centres in the township:**

- **Schools and higher education institutions:** There are ten universities and colleges in Bago Region, with the main universities Taungoo University, Pyaya University, and Bago University. There are 3972 primary schools, 227 middle schools and 10 high schools.
- **Monasteries:** In Bago Township there are around 200 monasteries.
- **Hospitals:** There are 76 hospitals in the Bago Region, including 28 general hospitals and 46 health clinics. The hospitals include among others: Bago general hospital; Zebra Eye hospital; Ayemyathanyar hospital.
- **Main industries** The industrial activity level is rather low. In 2014, there was a total of 124 registered factories in the township and an estimated 32,000 small industries in the Bago Region overall (JICA 2014).

<sup>20</sup> After the 2015 election, the Bago township, in collaboration with Members of Parliament, put allocated funding for a drainage system in Bago Region, and rebuilt the drains in the Bago township, which has contributed to lessening the occurrence of floods since 2018 .

<sup>21</sup> Bago District includes the townships Bago, Kawa, Tha Nat Pin, Waw, Daik-U, Nyaung Le Bin and Shwegyin.



**Figure 5.1:** Map of Bago Region, the Bago District, Bago township and Bago City (source: left, PeterHermesFurian 2016, right, Myanmar Information Management Unit 2017).

## 5.2 Governance and waste management in Bago

The governance system in **Bago Region governance** is similar to other states and regions in Myanmar and follows the 2008 constitution.

**Bago Region Union level governance:** In total 32 Union departments associated with 19 Ministries have offices in Bago Region (Tun et al. 2017; see Appendix 2). Most of these offices are sector-focused, reporting to their Union ministers and State Region Departments. A few core departments are multisectoral departments as the DRD, GAD, DAO. These departments serve as key providers of local services. The following union level departments have relevance for waste management:

**Environmental Conservation Department (ECD) Bago Region office** – is responsible for environmental matters in the region, including for waste awareness raising. The ECD office hosts the Environmental Conservation Committee (ECC). There are regularly meetings in the Committee every three months. Waste policy development and implementation are discussed in these meetings. The Bago ECD district office has in recent years taken part in several waste collection campaigns in Bago Region.

**Education Department Bago office** – is responsible for education in the region and then also for including knowledge on waste and the impact of different types waste on the environment in the curriculum.

**Department of Rural Development (DRD) Bago office** – is responsible for local infrastructure projects. As the DRD has an important role in rural areas it has a potential role regarding waste management in rural areas.

**Forestry Department Bago township office** – The Forestry Department has a role in revegetation and reforestation after waste clean-up activities.

**Irrigation and Water Utilization Management Department Bago office** – is responsible for cleaning waste from channels to reduce flooding.

**Directorate of Water Resources and Improvement of River Systems** – the office is responsible when waste dumps along rivers are removed.

**Township General Administration (GAD) office** – has a key role in coordination across the township. The GAD administrator and their deputies play an important role in every township committee. While the GAD administrator does not have a particular role in waste management, the GAD plays a role in the setting of norms and agendas and as a coordinator of activities.

*The Bago Region government* represent decentralised regional governance and comprises legislative, executive, and judicial branches (established according to the 2008 Constitution). It consists of a Chief minister appointed by the president, and six ministers (Table 5.1). The Bago Region government partakes in policy-making with relevance for the region on the national level, and it is responsible for policy decisions on the regional level. The budget for implementing policies is financed by means of regional taxes and transfers from the Union level. The Bago Region government is directly responsible for waste governance in Bago Region.

**The MONRFEC** and the **Development Affairs Office (DAO)** minister is directly responsible for environmental conservation including waste control and management. Chairing the Environmental Conservation Committee (ECC) is an important role for the MONRFEC Minister.

**The Bago Region Hluttaw** includes 57 MPs. The Bago Hluttaw has no formal role regarding waste governance or management, but the MPs can be important for awareness-raising on environmental issues. Several Bago Regional MPs are active and important for awareness-raising on waste management.

**Table 5.1** Overview of Bago Region Ministers

<b>List of Ministers in Bago Region</b>
Chief Minister
Minister of Security and Border Affairs
Minister of Planning and Finance
Minister of Agriculture and Livestock and Irrigation
Minister of Natural Resources, Forest and Environmental Conservation (MONRFEC) and of Development Affairs and Social Welfare
Minister of Kayin Ethnic Affairs
Minister of Industry, Electricity and Transport

### 5.2.1 Bago Township waste management

Bago Township DAO does not have in place a policy or guideline on waste management (interview with the EO of Bago township DAO, August 2020).

**The Bago Township DAO** is the leading body for providing urban services, including road construction, construction and maintenance of sewage and sanitation systems, water supply and waste. The DAO is largely self-financed and the revenue base is relatively small, relying primarily on the sale of business licenses and minor transfers from the state/regional government.

The DAO include an executive officer (EO) and four operating units (offices): i) a cleaning unit, ii) a tax department, iii) a finance department, and iv) an engineering department. The DAO EO is a member in the Bago Township Development Committee (TDC). The DAO owns infrastructure for waste collection and its cleaning unit was the sole responsible institution for waste collection in all urban areas prior to the private public partnership with the private waste collection company MJT (see more below). The DAO **cleaning unit** collects waste from: 1. Some households areas, 2. Waste bins in public areas, 3. from informal dump spots, from hospitals, from industry and from schools. The DAO cleaning unit collects often irregularly, when the pressure comes from township and ward administration and local MPs (personal communication Bago township actor, 2020).

### **Township committees**

In Myanmar, committees play an important role in coordinating work between departments. A committee typically includes representatives from several departments and governance levels. Committees exist at all levels of government, from the the state/region down to district, township, ward and village tract levels. Bago township has four committees, among them the TDC. The Bago TDC is described below, however, local actors report that since the coup in February 2021, the TDC has not been fully operational (interviews, Dec 2021).

**Up until February 2021<sup>22</sup>, the Bago Township Development Committee (TDC)** consisted of a board of 5 representatives: 3 elected persons, the EO of the DAO and GAD township administrator. The TDC held a unique position among the committees as it included elected representatives. The purpose was to reflect public priorities and ensure successful project implementation. The TDC met regularly on a weekly basis. The TDC is directly accountable to the Region government and to the Development Minister. Decision-making within the TDC tends to be consensus based with the township DAO EO playing a central role. It is possible for CDC and TDC to promulgate local policies and bylaws aimed at establishing a legal basis for action related to environmental conservation. The TDC meets and coordinates with the three other township level committees – particularly in relation to the prioritisation of local development funds allocated directly to the townships. A strong coordination between the TDC and the DAO office is therefore needed.

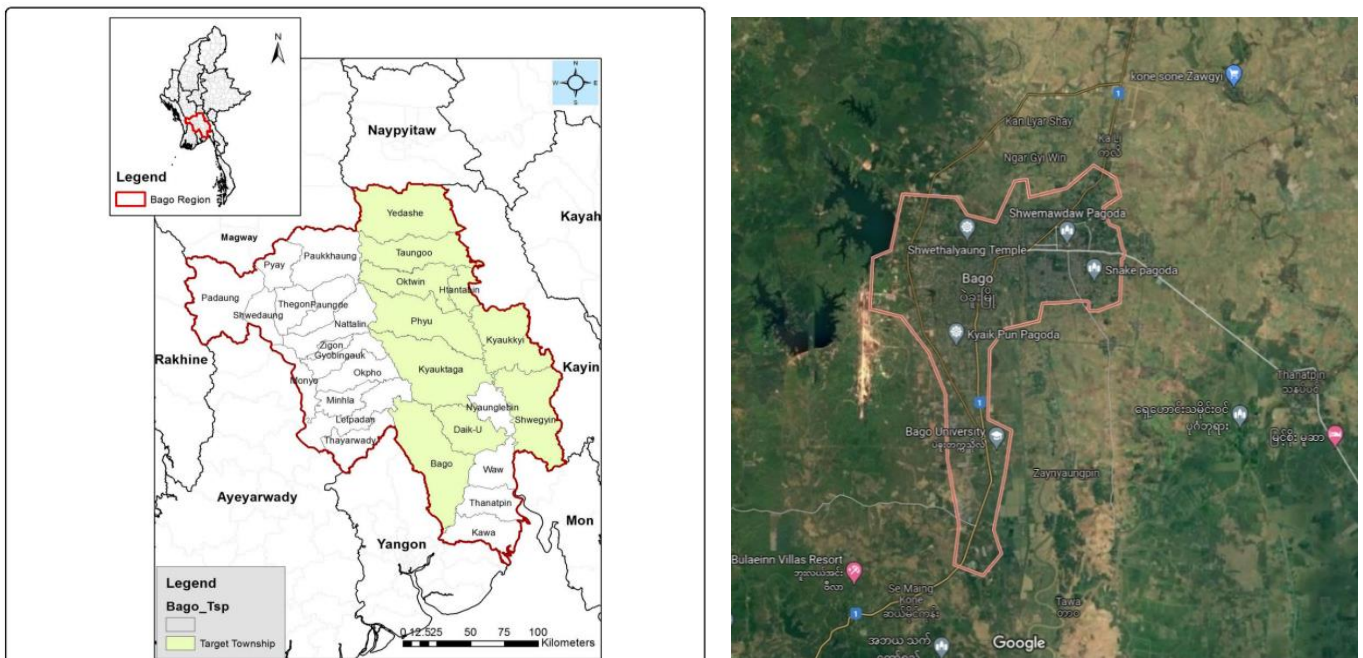
The Bago TDC has held the formal responsibility for overseeing the management of waste collection, water, sewage, urban road maintenance and urban electricity in Bago City according to the Municipal law 2016-17 since 2017-18<sup>23</sup>, and according to legislation, strategies and action plans developed on national level<sup>24</sup>. The Bago TDC is thus responsible for ensuring the financing, planning and delivery of urban services related to waste management, such waste collection, providing appropriate infrastructure such as waste bins and collection of payment. Since 2019, TDC has contracted waste collection from households in Bago City areas to the private waste collection company MJT.

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<sup>22</sup> Local actors in Bago township reported in December 2021 that since the coup February 2021, the DAO has not operated waste collection. The TDC is also no longer operational, because the of abolition of chapter 3 and 5 of municipal law of Bago Region. The township municipal EO is directly responsible to regional municipal department.

<sup>23</sup> TDC was established in 2017 according to Municipal law 2016-17, a new law in Bago Region.

<sup>24</sup> Municipalities are primarily accountable to regional parliaments rather than central government. This means that TDCs (DAOs) are relatively free to experiment with new policies and development initiatives (within the confines of Development Affairs Laws passed by sub-national parliaments (Møller, 2020)).



**Figure 5.2** Showing Bago Region and township  
(Source: Than et al.,2017).

### Waste management and practices in Bago township

In Bago Township, the TDC outsourced waste collection in urban areas to the private company MJT in 2019. The collaboration between TDC and MJT is a formal public-private partnership specified by a 30-year contract signed in 2019. The contract specifies: (i) MJT's responsibility for waste collection from households in the Bago city within the Bago township, (ii) the right to collect waste from markets, industries and hospitals, and other urban areas in the township (iii) the right to collect fees from households and other actors for this purpose, and (iv) the responsibility for operating the landfill established for the Bago city area. For this right, MJT must, according to the contract, pay 150 lakhs every third month (50 lakh per month) to the township DAO (Interview with MJT December 2021). The contract has been agreed between the TDC and MJT, only awaiting TDC signature (MJT, December 2021). It can be noted that while the contract is between TDC and MJT, the contract includes a clause that if there is an issue of discussion associated with the MJT's responsibility for waste collection and management, the Bago Region DAO Minister will decide on the issue of discussion. The content of the contract needs to be agreed by the Bago Region chief minister and by the Bago Region DAO minister.

#### Collection by MJT in Bago City area

**Household waste** – Bago township includes three urban areas: the Bago City area, the Phayargyi town and Inntagaw town, altogether constituting more than 800 streets and an estimated 107,132 households (Figure 5.2). MJT collects domestic waste directly from households in the Bago City, more specifically from about 32,000 households in the urban wards of Kamanat, Oo Bo, Ka Dwin Chan. MJT has the right to collect in the whole township, but has no duty to collect outside of the Bago City area. In 2021, MJT had four three-wheeled trucks (thonebane) and 15 large open-bed trucks (naut-pwint).

In December 2021, it was roughly estimated that MJT collects 140 tonnes per week mostly from household waste, equalling to 480 tonnes a month and 44.000 tonnes a year, based on collection happening days a week (Interview with MJT, 2021). Household waste is collected regularly twice a week and pick up is announced through the means of the Waste Tax Collector app and on Facebook<sup>26</sup>. Waste is placed outside households in plastic bags for pick up by the MJT truck. Small households pay 1500 MMK per month, while the majority pays 2000 MMK per month and some households pay 3000 MMK for waste collection (numbers from December 2021). The price is decided by the TDC and depends on the size of the household.

Coordination between the DAO/Cleaning unit and MJT regarding waste collection is generally regarded as insufficient. Regarding the situation after the coup, MJT has been undertaken the majority, if not all of the waste collection in the township (MJT interview December 2021).

### **Waste from markets, monasteries, public and private sector**

MJT collects waste from hospitals, restaurants and industries in the township. There are an estimated 4 hospitals, 9 government offices, 14 monasteries, 23 000 small scale industries in the township. Out of these, MJT collects three times a week from 20 large-scale industries, and infrequently from additional 16 industries upon phone call requesting collection of waste. The industry and restaurants pay depending on the volume of waste disposed of, typically between 50 000 to 100 000 MMK per month for waste collection. There are about 200 monasteries in the Bago township, of these MJT collects waste regularly every week from five monasteries, and infrequently, based on call from most of the other monasteries.

While the DAO cleaning unit also collects waste within the urban area from industries and hospitals, there is incomplete information about the degree to which waste is regularly collected by this unit. The information received in 2021 indicates that after the military coup, there has been little capacity for waste collection.

### Segregation and recycling of waste in Bago township:

In general, there is no system in place for source segregation of waste at the collection points or in other parts of the Bago Region (discussion with municipal committee of Bago Region Hluttaw, 2020). Recently, however, some developments can be observed. Infrastructure enabling segregation of waste such as plastic and organic matter is placed at the Phyzay market and at five monasteries in Bago City. Infrastructure, different colour waste bins for organic waste and plastic waste has been provided for by MJT<sup>27</sup>. At the Myoma market in the Bago City, since December 8<sup>th</sup>, 2021, organic waste, fruit and vegetable waste has been collected by MJT from a section within the market. Organic waste is collected daily from about 500 shops in this area in the morning and in the evening. This amounts to almost 3 tonnes of organic waste daily. Each shopkeeper pays 200 MMK per day for the service. The right to collect waste from the market is specified in the agreement between TDC and MJT, while the negotiated fee to be paid by the shop keepers has only recently been agreed upon in negotiations between the Myoma market committee, the DAO and MJT. The DAO cleaning unit also collects waste from the market. It is however expected that much of the waste was previously disposed of in the Bago River. MJT also approaches restaurant owners, tea shops and small shops directly to acquire items of value (e.g. pet bottles, cans) and purchases them according to market price.

Source segregation of waste for recycling occurs at the landfill area. MJT has engaged approximately 130 waste pickers to collect recyclable waste from the landfill. This engagement is renewed every month and provides the right for the waste picker to access the landfill to collect waste against a monthly fee of 26.000 MMK. The engagement is checked and verified by taking a picture of waste picker by MJT and display of the fee paid by the waste picker. The waste pickers collect waste at the landfill and sell segregated waste to MJT at the MJT recycling shop. The price paid by MJT for this segregated waste varies daily. Waste pickers can typically earn about 150.000-200.000 MMK per month. Metals are usually the most valuable material, followed by PET bottles and other material categories including plastic, aluminium, organic waste, cardboard and paper. As part of the agreement with the waste pickers, each of them is expected to collect almost 1 kg of plastic at the landfill. MJT then uses some of this plastic waste, especially the unrecyclable components, to make plastic bricks<sup>25</sup>.

The agreement with the waste picker is typically negotiated with the man in the family, however in the work other family members also contribute i.e. the wife/parents as well as older children from 13-years and above.

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<sup>25</sup> Plastic bricks are compressed of unrecyclable polyethylene (high and low density), to be used for construction activities afterwards.



### **Box 1. The Bago Waste Project in Myanmar: Bago monasteries as case studies for promoting the practice of waste segregation**

Monasteries in Bago have been identified as cases by the Bago Waste project for promoting segregation of waste for recycling and reuse – where the overall objective is reduction of litter, both in terrestrial and marine environments. Monasteries in Myanmar are important institutions for education in society, both for men and women, and therefore suitable locations for awareness-raising on waste management. Furthermore, the selected monasteries are autonomous: waste management and practices are decided by the monks within each monastery.

The approach towards promoting responsible waste management involves step-wise activities carried out in a participatory and iterative manner:

- Research to understand waste volumes, type and systems in place
- Provision of infrastructure for effective waste segregation;
- Awareness-raising activities for increased recycling and reuse of waste and reduced littering;
- Monitoring of change of practices for waste segregation;
- Monitoring of collected waste.

The premise of the case studies is that the provision of infrastructure enables segregation and effective collection of waste, while awareness-raising activities are important as incentives and for education about the harmful impact of unmanaged waste, and in particular plastic waste. Increased recycling rates and reuse of waste will result in reduced waste volumes in dumping sites, landfills and in the environment. Activities include group discussions on waste-related issues, regular monitoring, informal conversations and surveys to understand causes of possible issues and challenges. The informative activities are followed by adapted systems and monitoring.

By the end of 2021, seven monasteries were established as project cases. In each monastery, initial meetings were held with deputy monks to inform about the project objectives and strategy, and to inquire about interest to be involved. Following the planning stage, informal conversations and surveys were conducted to better understand the situation at each monastery, including infrastructure and awareness gaps. Equipment and facilities such as waste bags and bins have been distributed to the monasteries, and segregated waste is regularly collected by waste collection company MJT.



**Photos:** *Left*, Meeting year 2020 with monks by the Bago project cooperating partners and authorities; *Middle*, introduction meeting with nuns regarding involvement of monastery as case in the project year 2021, *Right*, waste bins for segregation of waste, green for organic waste, blue for plastics, black for hazardous and medical waste (Source: Bago waste project Myanmar co-operating partners).

**MJT recycling shop:** MJT has established and operates a recycling shop at the landfill area as a trading point for people to come and sell recyclable waste, which is sold in bulk to industries. Waste pickers engaged by MJT to work on the landfill, and other actors such as restaurant owners, tea shops and small shops use this recycling shop as trading point.

The weight of the traded materials determines its price, but the value of different waste categories fluctuates based on regional and global material price changes. There is an online portal to follow prices in real time, and online platforms such as Facebook are commonly used for trading recyclable materials.

#### Bago township small recycling companies

There are an estimated 50 small recycling companies in Bago township (Interview, November 2021, Bago City). Most of these are not formally registered and can be categorised under the informal recycling sector. These companies are typically household businesses, which make items out of recyclable materials. There is a large degree of manual labour involved, for example in the separation of different types of plastics in a product, and they usually specialise in the processing of one material, such as steel or aluminium. There seems to be a trend that the number of small recycling businesses are increasing in the area recent years. The reasons for this are assumed to be increased consumption, increased urbanization and under the Covid-19 situation and political instability, decreased formal employment (Interview, November 2021, Bago city).

#### Larger recycling companies

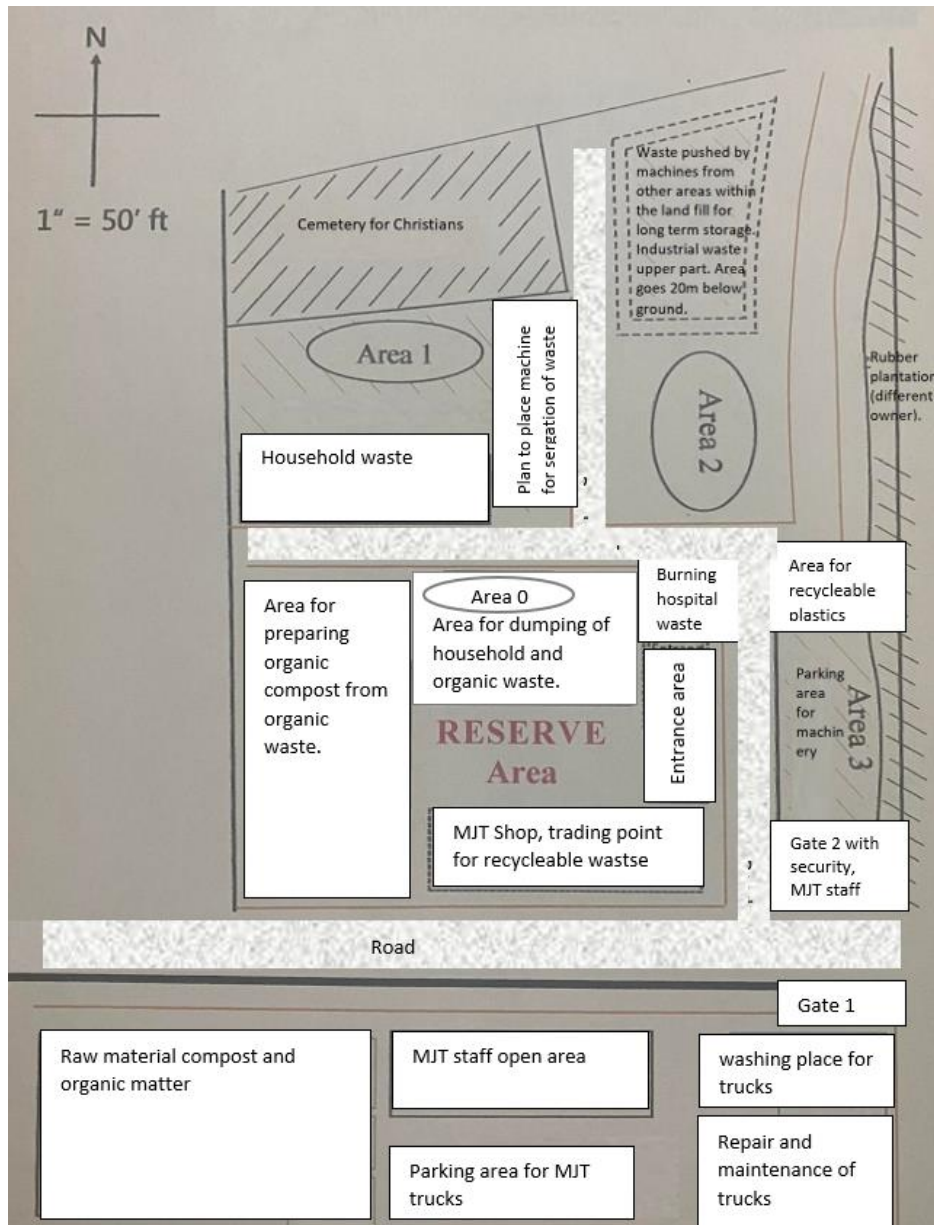
There are a few larger reselling companies in Bago, but most of them are in Yangon. In comparison to the smaller recycling companies, larger recycling companies use relatively less manual labour and as such, employ less people. In addition to selling waste to larger factories in Myanmar, segregated waste is also sold to factories internationally, for example in Malaysia and Thailand, but also to EU markets. The EU market has gained significant in the value chain for recycled plastic in Myanmar because of regulatory requirements in the EU that demand certain plastic products, including PET bottles, to have a higher share of recycling content in the final product. Factories purchasing waste from the larger recycling companies are often owned by companies based in Europe, such as France or Germany.

#### Disposal of waste

MJT operates and manages the open dump landfill site in the Bago City through a contractual agreement with the TDC, namely the *Sin Phyu Kwin* (white elephant field) (Figure 5.4). The landfill was established around 2012 and covers about 12 acres. There is also another landfill in Bago township in Phayargyi ward administered by the ward administration.

The landfill area is organised in different sub-sections for different functions (Figure 5.4). After entering the landfill there is a gate for security purposes, i.e., there is no open access to the landfill. When entering the landfill area, space is separately allocated for parking, washing and repairing of machines. Associated with this area, there is an open area for gathering of MJT staff where instructions for work are given in the morning. There is an area where the MJT recycling shop is located. Area 0, is the area where trucks first dump household and specified organic waste. Subsequently, household waste is moved to Area 1, while organic waste for preparation of compost is moved to another area. Industrial and some hospital waste are directly dumped at Area 2, this area includes a lot of plastics. Hygienic hospital waste is burned in a hole in the ground (Figure 5.4). The waste pickers primarily collect waste from Area 0 and Area 1, but also from other area of the landfill.

*Recycling within the landfill area - development of compost from organic waste:* MJT is testing recycling of organic matter to develop compost for sale. The system involves mixing vegetable, fruit, fish waste with wood powder, and branches by excavator to prepare a pile of organic waste. Then a microbial inoculant solution (Maple EM solution) is poured onto this pile by MJT staff. After mixing, the pile is covered for 30 – 40 days, and the compost is ready. The compost is planned to be sold in bags of 30 and 50 kg. This project is currently still in the testing stage.



**Figure 5.4** Schematic of overview of the Sin Phyu Kwin landfill in Bago (Source, adapted from MJT 2022).



**Photos:** Upper left and right, key transport equipment used for waste collection by MJT (source: Ye Htun Aung (MJT), 2020). Middle left, from the Sin Phyu Kwin landfill where organic compost is being prepared, middle right, from the MJT shop at Sin Phyu Kwin (source: Ye Htun Aung (MJT), 2021). Lower left and right, transport equipment and a compactor, ownership the TDC / DAO (Source: Bago township development committee, 2018).

## Box 2. The Bago Waste Project in Myanmar - an illustrative example of capacity building and waste management



**Figure and photos:** Illustration of project approach (above), Drone footage along Bago River showing a collaborative cleaning and restoration effort at a monastery in Bago ( Source: Bago Waste co-operating partners, 2021).

The Bago Waste Project organised in 2020 several formal and informal meetings with key governmental stakeholders in Bago to understand the local context, and to provide a participatory platform for engagement. A key outcome of these activities was the setting up of a committee, named *Bago Waste Group*, headed by the then MONFREC and DAO minister for the Bago Region Dr. Saw Nyo Win. A formal meeting was organised October 2020 after an inception phase to integrate project work with local governance arrangements and jointly prioritise and plan waste management activities. The attendees at the meeting composed of the MONFREC and DAO minister, the Bago Region Forest Dep., the Environmental Conservation Dep., Irrigation Department, Directorate of Directorate of Water Resources and Improvement of River Systems, the township DAO and TDC, in addition to private and civil society actors. This meeting represented the first time all of these representatives formally met to discuss waste management coordination and planning. It was a trust-building exercise that provided a foundation stone for project work. The project approach, drawing on participatory action research (Reason and Bradbury, 2001), was presented at this meeting, and the project plan to establish model sites for clean up and site restoration was discussed. Central public places in the Bago township including market areas along side the Bago River and tributaries were selected as model sites. The private waste collection company MJT, the TDC and the DAO in addition discussed these issues in several bilateral meetings during the year. The approach can be summarised as following a *chain feedback loop* composed of planning, research, co-ordination with actors, awareness-raising, cleaning of model sites, followed by installation of infrastructure and linked construction activities and finally follow-up by regular monitoring.

During the year 2020 two model sites in the Bago City, the Phayazay market area, and an area along side the Kyaw Khat Wine monastery were developed as part of joint work with local actors (*pre coup*). MJT and Justice for All, in addition to local MPs, monastery representatives, local neighbourhood groups, government and local authorities were all involved, the outcomes of which are visible through the restoration of site that was formerly a waste dump site (photo, this box). The purposes of this work are multifold: encouraging public participation, awareness raising but also providing infrastructure and trialling systems of waste disposal and segregation that are attuned to local conditions.

## 6 Emerging trends in waste management

The discourse around municipal waste management has changed significantly in the past 40 years, progressing from linear waste management systems aiming to remove and deposit wastes in landfills, to a greater awareness of the need for systemic changes to improve resource use and reduce waste (Wagner 2022). This chapter introduces some key concepts in the reassessment of waste management on the global policy scene, before elaborating on common policy approaches to drive the shift towards greater circularity. However, shifting to a circular economy can prove particularly challenging in emerging economies with little to no existing formal waste management infrastructure and requires different strategies (Pew Charitable Trusts and SystemIQ 2020; Preston et al. 2019). The discussion therefore evolves to how public-private partnerships can be utilised to improve capacity and waste management, while acknowledging the important role of the informal sector as providers of waste management services. Finally, the chapter elaborates on environmental education as the last piece of the puzzle to improve awareness of plastic pollution and drive behaviour change towards more sustainable management of plastic wastes in the general population.

### 6.1 Circular economy and Zero Waste

The advent of the circular economy is a response to the clear limitations of traditional linear waste management approaches (EC DGRI, 2019). Current linear systems result in pressure on natural systems due to reliance on virgin raw materials, energy consumption and land for disposal of waste, as well as pollution from production processes and mismanagement of waste. While linear systems rely on constant inputs of new materials and disposal after use, the circular economy is a closed and regenerative loop (EMF, 2015). The premise being that products, materials, and resources are maintained in the economy at the highest utility and value, for as long as possible, while minimising waste generation by designing out waste and hazardous materials (EMF 2016). In other words, products and materials are reused, repaired and recycled, and waste from one industrial process can be a resource in another (Preston et al., 2019). The ideal system would ensure infinite reuse and recycling of materials without degradation in quality or value. While it is not possible in the short-term to achieve such an idealised system, moving towards circularity can contribute to curtail resource use, greenhouse gas emissions, waste and costs of producing new products – contributing to safeguarding human and environmental wellbeing (UNEP 2016).

Moving towards greater circularity is particularly emphasised in relation to plastic waste. The main goals for a circular economy in the plastics sector, as summarised by the Ellen MacArthur Foundation (EMF 2016), refer to:

- (i) improving the economic viability of recycling and reuse of plastics;
- (ii) halting the leakage of plastics into the environment, especially waterways and oceans;
- (iii) and decoupling plastics production from fossil-fuel feedstocks, while embracing renewable feedstocks.

Shifting to a circular economy requires a paradigm shift in governance, policymaking and planning – requiring action from governments, private business, civil society and citizens (EC 2019). Local governments can contribute to a circular economy through measures such as implementing green procurement practices, local bans and taxation of disposable goods, subsidies of reusable products and supporting circular business initiatives through start-up grants. Meanwhile, businesses have incentives towards circular approaches as circularity is intended to limit waste and improve effective use of resources. Circular business models can contribute to both limit environmental impacts on the

environment, and reduce cost, whether it is by no longer providing free single-use plastic items, offering wholesale products or giving discounts to customers who bring their own reusable packaging (Vilella 2020). At a larger scale, industry can benefit from circularity through greater material efficiency and the possibility to get back materials after end-of-life, reducing costs of raw materials.

Yet, despite the many potential benefits of circular approaches, the transition to a global circular economy is in its infancy. Barra et al. (2018, p12) identify twelve barriers to transitioning to a circular economy in the plastics sector:

- Existing linear plastics production infrastructure creates lock-in and makes it costly to change;
- High up-front investment costs and risks when changing to the circular model;
- Complex international production and consumption supply chains;
- Lack of support for scaling up circular models, especially for small and medium-sized enterprises;
- Difficulties in business-to-business cooperation, including transactions costs;
- Resistance to change among product manufacturers, potentially caused by lack of knowledge;
- Uncompetitive circular products because subsidies encourage linear production and use models;
- Inadequate knowledge and capacity for implementation;
- Limited consideration of plastics in key legislation;
- Unfavourable regulations and lack of standards;
- Inadequate monitoring and reporting on plastics data, especially in developing countries; and
- Lack of consumer awareness or enthusiasm and reluctance to accept recycled products.

Overcoming these barriers requires significant policy and regulatory support to foster innovation, increase the competitiveness of the circular business models and create a demand-pull for circular plastic products. It also requires working with the private sector to catalyse change, as well as with the public to encourage changes in societal behaviour and create consumer demand for circular plastic products (Ranta et al. 2018).

The discussion of a circular economy has to some extent not considered the unique conditions in emerging economies with poorer institutional capacity for the systemic shifts required to move towards greater circularity (Preston et al. 2019). Major economies such as the EU and China have in place policy frameworks, financial and institutional support to drive change – for instance through the EU Circular Economy Action Plan and 2008 Chinese law identifying the circular economy as a development goal for the Chinese economy (Matthews and Tan 2011). Preston et al. (2019) highlight the importance of considering the unique structural and political circumstances in developing countries which must be accounted for in shaping developing-country circular economy pathways. They further propose three actions to catalyse the shift towards circularity: 1) Aligning the circular economy with existing policy priorities in developing countries. 2) Investing in the fundamentals to support the transition to the circular economy in developing countries. 3) Supporting an inclusive global circular economy agenda that promotes partnership with collaboration.

One example of a regional initiative to promote the circular economy is the Regional 3R Forum in the Asia and the Pacific, which in 2014 adopted the Ha Noi 3R Declaration, a framework for development towards waste limitation and greater circularity. An overview of the latest initiatives launched, and efforts made in Myanmar in addressing each of the underlined goals of the Ha Noi 3R Declaration is

provided in the Country 3R Progress Report prepared by the Government of Myanmar as an input for the 10th Regional 3R and Circular Economy Forum in Asia and the Pacific in 2020.

A noteworthy initiative is the Circular Action Hub with the aim “to support and scale-up local circular economy projects around the world, [by] catalysing innovative finance to reward and incentivise local circular economy action on plastics and other recyclable materials” (Circular Action Hub, 2020a). The Circular Action Hub works under five different capacities:

- Connecting service providers with clients through an online platform;
- Facilitating access to finance impact investment, blended finance instruments, grants, and credits.
- Hosting a global registry of circular projects accessible to investors and donors to ensure transparency.
- Professional support in contract design, monitoring and negotiations for both clients and suppliers of environmental services.
- Capacity building through facilitating knowledge sharing and exchanging local solutions.

Other examples of circular initiatives in Myanmar are Myanmar Recycles which is one of few projects in Myanmar to prioritise the collection and recycling of post-consumer plastic film waste which is particularly challenging to collect and sort, and therefore is often not collected and recycled in conventional systems (Circular Action Hub 2020).

The transition towards Circular Economy in Myanmar is supported by the EU SWITCH-Asia Programme which has been in place in Myanmar since 2013. The SWITCH-Asia Programme supports the national SDP and aims to improve management of natural resources and the environment (EU SWITCH-Asia, 2020). The programme has funded a project, “Prevent Plastics”, launched in 2020, which focuses on: (i) waste management in industrial zones; (ii) increasing the likelihood and attractiveness of adopting more sustainable options for packaging by working at the MSMEs level in cooperation with the retailer's association and identifying green finance possibilities; and (iii) raising awareness for young consumers, heads of home and producers, supermarkets and other retailers (Prevent Plastics 2021).



Figure 6.1. The Zero Waste Hierarchy. Source: [zerowasteurope.eu](http://zerowasteurope.eu)



Simultaneous with the growing discourse around circular economy, a concomitant concept of “Zero Waste Cities” has emerged. Zero Waste refers to *“the conservation of all resources by means of responsible production, consumption, reuse, and recovery of products, packaging, and materials without burning and with no discharges to land, water, or air that threaten the environment or human health”* (ZWIA 2018). Spearheaded by the Zero Waste Alliance since 2002, the Zero Waste movement provides guidelines and toolkits for reducing resource use and waste generation. The Zero Waste Hierarchy identifies seven steps in solid waste management (see Figure 6.1)

The Zero Waste approach has gained increasing recognition and is widely acknowledged in Europe (Simon et al. 2020). On the Asian continent, China is currently piloting zero waste initiatives in 11 pilot cities across the country, ranging from urban to peri-urban and rural (MEE 2019). Zero waste is also championed by national networks, such as the Indian Citizen Consumer and Civic Action Group, who have produced an extensive guidebook to urban decentralised waste management in line with Zero Waste principles (Shekhar and Kapivalai 2020), the Korea Zero Waste Movement Network and the Philippine Mother Earth Foundation (Gaia 2021; MEF n.d). Zero Waste can be understood as one component contributing towards the circular economy, guided by three principles: Reduce and reuse, design for circularity and separate collection and close the loop (Simon et al. 2019). Zero Waste Networks provide extensive examples<sup>26</sup> of how local bodies can utilise zero waste approaches to reduce the amount of waste that goes to unregulated landfills, are dumped, subject to open burning or in other ways mismanaged.

One such example is RecyGlo (2021)<sup>27</sup>, a Myanmar company built on a circular economy and zero-waste model. They provide a platform for trading unwanted items to both private and institutional buyers. The company reports to have more than 400 000 users in Myanmar (French Myanmar Chamber of Commerce & Industry, 2021), though their primary income is derived from business-to-business operations in which businesses sell recyclable goods to recyclers.

## 6.2 Policies, strategies and regulations targeting plastics

Growing awareness of the threat of plastic pollution has resulted in an increasing number of policies aiming to reduce plastic littering and improve the management of plastic products throughout their lifecycle (James 2019; Syberg 2021). In particular, the call of the United Nations Environmental Assembly in 2017 for national action plans to tackle plastic pollution and marine litter has accelerated the implementation and development of such national action plans in many countries (Raubenheimer and Urho 2020). This sub-chapter addresses selected global trends in policies, strategies and regulations addressing plastic pollution and waste.

### Single-use plastic products

As of July 2018, 127 countries had imposed regulations on single-use plastic bags (UNEP 2018). Bangladesh was one of the first states to ban plastic bags in 2002 (Conti 2021). Most commonly observed are bans of provision of single-use plastic bags by retailers, either through a general ban on imports and manufacturing, or by requiring fees or charges to the consumers. Such policies had been implemented by 83 countries by 2018 (UNEP 2018). Other measures include restrictions on manufacturing, distribution, use and trade of plastic products, financial instruments such as taxes or levies, or regulations on disposal and management at the end-of-life (Xanthos and Walker 2017).

<sup>26</sup> see for instance: <https://www.no-burn.org/tools-resources/> , <https://zerowasteurope.eu/resources/library/> and <https://www.cag.org.in/resources>

<sup>27</sup>More information can be found here: <https://www.recyglo.com/>

A growing number of states are also regulating other single-use plastic products (SUPP) such as plastic cups, plates, and cutlery. Perhaps most widely known is the EU Single-use Plastics Directive (Directive (EU) 2019/904) which banned ten categories of SUPP from June 2021 and imposed regulations on several more categories. In countries without national legislation on SUPP, many states, cities and municipalities have independently implemented local bans on products (Karasik et al. 2020).

The efficacy and success of such bans have varied and is difficult to assess (Dikgang, Leiman and Visser 2012, Conti et al. 2021). In their review, Karasik et al. (2020) found that in the short term both regulatory bans or economic instruments such as taxes or levies resulted in significant reductions in the consumption of plastic bags in the short term, but with greater uncertainty in the long term. Xanthos and Walker (2017) found that the success of bans may be dependent on the availability of appropriate alternatives, public monitoring and enforcement of bans, and public awareness, though more research is needed and bans must be implemented alongside education, outreach and awareness-raising activities.

### **Extended producer responsibility**

For products that lack appropriate, affordable and accessible alternatives, extended producer responsibility (EPR) mechanisms offer an alternative. To date, EPR schemes typically only regulate packaging wastes, yet there a growing number of schemes tackling other product categories such as car tires and electronic waste (Gupt and Sahay 2015). EPR is modelled on the polluter pays principle, based on the idea that the producers should be held responsible for the waste generated from the products they enter into a market (OECD 2019). The purpose of EPR schemes is threefold, to increase the recovery and recycling of products, reduce contamination and develop markets for materials that are difficult to recycle (Cassel et al. 2020). EPR mechanisms have become increasingly common since the 1990s, originally implemented in the EU for packaging through producer responsibility organisations (PROs) such as PRO Europe which hosts the Green Dot (Cassel et al. 2020). The Green Dot is a label which shows if the producer of a product is making a financial contribution to a national packaging recovery company.

There are several types of EPR mechanisms, ranging from high-level mechanisms such as the Green Dot to more hands-on mechanisms such as take-back or deposit-return schemes targeting specific materials or producers. According to Cassel et al. (2020), the most successful EPR schemes tend to place full responsibility on producers for ensuring the results of the scheme yet leave sufficient scope for municipalities to collect additional recyclable materials and educate residents.

Deposit-return schemes operate on the basis that consumers pay a deposit for the packaging which is returned when they return the packaging after use. Such schemes may require cooperation between producers to generate economies of scale for the solutions. For instance, in Norway most soft drinks producers and retailers are members in *Infinitum*, a PRO which organises the soft drink deposit return scheme in which all producers charge the same deposit fees, ensuring a level playing field. The programme has resulted in an estimated 98 percent return rate of soft drink bottles in 2019 (Infinitum 2021).

In Asia, reverse vending machines are not yet common, however there are signs of expansion: Singapore recently tripled the number of reverse vending machines to 50 machines across island (Green Queen 2020) in which aluminium cans, plastic bottles and plastic containers can be returned in exchange for vouchers. Similar schemes have been introduced in Hong Kong (ibid.), Malaysia (Eco-Business n.d.) and Japan (Sumito Corporation n.d.). However, these employ a different business model than the Scandinavian example. While Norwegian retailers charge a fee at purchase, the examples

from Asia all operate with coupons, rebates or vouchers for returning waste. These products are financed with cooperating businesses who use it for advertising and increasing the uptake of their products.

### 6.3 Public-private partnerships

Municipal solid waste management in developing and emerging economies face a significant hurdle of large investment and infrastructure costs associated with designing, setting up, operating and expanding waste collection and treatment services (Kaza et al. 2018). Consequently, alternative models wherein the private sector brings in finance, expertise and capacity through public-private partnerships (PPPs) have become increasingly common in Myanmar and beyond (ADB 2017a; Asian Foundation 2019; see Hodge et al. 2018 for a brief history of PPPs). A PPP can be defined as “a long-term contract between a private party and a government entity, for providing a public asset or service, in which the private party bears significant risk and management responsibility, and remuneration is linked to performance” (PPP Knowledge Lab 2017: 1).

Globally, more than 30 percent of waste management services are estimated to be provided through such partnerships (Kaza et al. 2018). PPPs can contribute to overcome some of the challenges of public service provision by mobilising sources of funding and financing for infrastructure; enhance project selection by requiring private interest in participation; while performance requirements can ensure the private operator and public authority have aligned priorities throughout the project. In other words, well-designed PPPs can in the right circumstances foster efficiency gains, though in other circumstances, such as when a PPP is implemented due to the limited capacity of the local government, the PPP may not be the most cost-effective solution, but can contribute to ensuring service provision is in place, albeit at a potentially higher cost (PPP Knowledge Lab, 2017). It is therefore key to recognise that PPPs cannot remedy all infrastructure challenges and performance problems, and poorly managed and designed PPPs can indeed result in greater costs to the public with the taxpayers liable to cover the costs and risks of failed projects (see for instance Estache 2005 or Leruth 2012).

In Myanmar, PPPs for solid waste management have been implemented in locations across the country since 2015. Møller (2020) provides an overview of several approaches taken to incorporate the private sector into solid waste management in both urban and rural communities, with varying degrees of success. While some DAOs have succeeded with long-term outsourcing of waste collection services, for instance in Taunggyi, there are also cases of DAOs reverting to public services over time such as in Pyan-Oo-Lwin and Monywa (Møller 2020). The nascent introduction of PPPs in Myanmar is reflected in the current weak regulatory framework for PPPs (World Bank and PPIAF 2018). A key characteristic of solid waste management PPP structures in Myanmar is therefore their diversity because of the lack of a national policy and regulations to guide their design and implementation (JICA 2016). Such regulations provide institutional and financial security to private actors and improve the chances of successful private sector inclusion in solid waste management (Kaza et al. 2018). The lack of such regulations means that local government bodies lack direction and support when aiming to implement a PPP structure in waste management – resulting in a range of different constellations and institutional setups.

More specifically, outsourcing of waste management through PPPs can take different forms according to the needs and capacity of the local government. PPP models can be differentiated along three axes: the type of asset covered by the contract; functions transferred; and payment source (PPP Knowledge Lab 2017).

- **Type of asset:** Type of asset refers to whether the infrastructure is new or existing. Many PPPs involve new infrastructure where the private contractor may be involved in the financing, construction and management of a new asset such as a waste treatment plant, landfill or transfer station. However, the PPP may also involve existing infrastructure. For instance, in concession agreements where the private contractor may provide waste collection services relying on existing infrastructure.
- **Functions transferred:** The functions transferred refers to which phases of the project the private contractor is responsible for. In some cases, the PPP only covers the design and construction of infrastructure, while in others it can extend to finance, maintenance and operations of infrastructure or a service.
- **Payment source:** The payment source may be either directly from the government, from the users or a combination of the two. In some cases, the private contractor may pay the government a sum in exchange for being able to charge user fees to the end users of services, as is the case in Taunggyi, Myanmar (Møller 2020). There the private operator Mhwe Taunggyi Group of Companies took over waste and sewage collection in the urban wards of the city and paid a monthly fee of approximately 2000 USD to the municipality, while collecting fees from the public. The scheme has been in operation since 2015, and up until 2020 was successful in expanding waste collection coverage and frequency of collection from 50 to 75 percent of the city, while maintaining a stable price level (Møller 2020).

The different characteristics of PPP contracts can be conceived of as a continuum with increasing responsibility and risk transferred from the public to private sector in the provision of infrastructure and public services (PPP Knowledge Lab 2017). In the waste management sector, PPPs generally take the form of management or concession contracts for collection, treatment and disposal with contracts typically lasting less than 10 years. However, for services such as landfill operations and other fixed assets, about a third of contracts have a duration in excess of 10 years (Kaza et al. 2018).

Despite the variety of PPP models and setup, the determinants for success of PPPs can to some extent be generalised. Hodge and Greve (2017) elaborate on how PPP success may be considered along axes of both political and economic performance, while Osei-Kyei and Chan (2015) found that while there is no one definition of a successful PPP, the five most common factors identified were appropriate risk allocation and sharing; strong private consortia; political support; community/public support and transparent procurement. In other words, successful PPPs are typically well-structured, with sound governance, contracts and technologies (ADB 2019). The ADB (2017a) summarise PPP success with three Ps: Project, Partner and Process. That is, the project must be suitable for a PPP model and have sufficient scope for innovation, efficiency gains and performance indicators which can be incorporated into the contract in order to measure progress. The partners must be qualified and identified through a competitive process, have enough financial and technical skills and access to finance. Finally, the right process is needed to ensure a level playing field, in which the regulatory process is effective, binding and enforceable.

However, these determinants of success set high requirements to the capacity and knowledge of both the local government and the private sector actors. In many cases, transitioning from public to private service provision therefore requires a “substantial increase in tendering and contract management skills” in the public sector (ADB 2017c). Successful PPPs may therefore require national level reform to improve capacity (ADB 2017a), which at present may be challenging in Myanmar considering the political situation.

#### 6.4 Recognising the informal recycling sector

Informal recycling sectors in developing countries have conventionally been portrayed by small-scale, unqualified and unskilled waste picking activities, providing a livelihood source for poor, disadvantaged and vulnerable societal groups (Moreno-Sanchez and Maldonado 2006; Wilson et al. 2006). In recent years, a growing body of literature has begun to challenge this view of the marginalised and unorganised informal recycling sector, towards recognising informal actors as key in providing waste management services across less developed countries (see for example, UNEP et al. 2019). Informal recycling actors are increasingly valued as entrepreneurs and micro-businesses which are highly skilled within their occupations (ESCAP 2019). For example, in Myanmar, Møller (2020) portrays informal waste pickers as under-used resources, whose valuable experience is connected within existing formal and informal waste management structures. From a circular economy perspective, informal collection and recycling of waste increases material recovery rates at reduced costs for the municipalities, while reducing the amount of unmanaged or inadequately managed waste and its consequent health and environmental impacts. Yet it is important to note that the informal recycling sector primarily participates in municipal solid waste management when there is value to be derived from recyclables. Therefore, problematic single-use plastic products of low value which require highly technological and costly recycling solutions, such as plastic packaging and multi-layered plastics, are often not collected or are discarded by informal actors because there are no economic incentives for collection. Formalization has commonly been promoted as a strategy to integrate informal recycling actors in municipal waste management systems (Aparcana 2017). In practice, this has typically been approached by employing informal waste pickers as workers for municipal or private sector waste management services. However, the development and implementation of formalisation initiatives have often been applied in a top-down manner, not recognising the informal actors' voice, autonomy, and network structures, and may therefore foster unintended and sub-optimal socio-economic and environmental consequences. It is thus key to include informal actors across the entire recycling chain when looking to develop increasingly sustainable waste management strategies.

Empowering livelihoods and improving working conditions amongst informal recycling workers is crucial to ensure their sustainable inclusion in waste management strategies and solutions. Key socio-economic issues of concern include occupational safety and health, social marginalisation, and gender roles. Field observations from Yangon and Mandalay have noted the importance of considering the **occupational safety and health** of workers at waste transfer stations (Premakumara et al. 2019:230). Beyond health hazards from manual segregation of waste without adequate personal protection equipment, the informal recycling sector commonly faces **social stigma** due to their occupational association with waste. A comprehensive review study highlighted a general tendency of informal stakeholders being subject to harassment and exploitation by government officials and exclusion from the wider society (Aparcana 2017). While the societal benefits of the informal recycling sector have been recognised across a broad spectrum of sources (from waste-related regulations to the academic domain), it has been argued that decision makers in the political and legal sphere are not defending informal actors' interests (Gunsilius et al. 2010; Aparcana 2017). A Yangon-based study reaffirms that informal sectors actors face negative stereotypes and prejudices, and highlights instances where informal waste buyers pay bribes to the police to prevent waste pickers from getting caught as waste picking is illegal (Constant et al. 2020:22-23).

**Gender roles** within waste-picking activities differ between countries, and the kind of work done is influenced by gendered societal norms (Krishnan and Backer 2019). Women tend to be concentrated in lower-earning and more time-consuming roles such as recycling collectors ('waste pickers'), or in

the sorting and separating of waste (Constant et al. 2020). Informal waste activities frequently involve **families working with children**, who can be observed picking waste in the streets and working at dumpsites. Women tend to deal with competing demands from domestic and childcare responsibilities, resulting in children often participating in waste recycling activities with their mothers (Chen 2016). In addition to the health hazards women and children face by exposure to contaminated waste, children waste pickers face significant risks related to physical development and loss of education (Kaza et al. 2018). In Hlaing Tharyar, Yangon, a study found that children may become involved in waste picking from a very young age (Constant et al. 2020). Accordingly, both boys and girls accompany their parents in waste picking activities, but boys tend to start operating without their parents from around the age of 12. Then they mostly operate in pairs or groups of three or four. The interviewed children in the study reported an income of 3,000-4,000 MMK individually per day or 8,000-10,000 MMK in pairs. The study also found that waste buyers feel a protective role towards the children who pick waste and feel like they have no other choice than to support their families. We can observe similar long-term relationships between informal waste buyers and informal waste pickers and collectors in India and Indonesia, which has been especially brought to light with the socio-economic insecurities driven by Covid-19 (INOPO 2021).

Supporting informal and small- and medium recycling businesses to enter new service agreements for carrying out collection, recycling, composting and waste treatment in partnership with townships and civil society organisations, could contribute to improve health and safety practices while supporting livelihood security in the informal recycling sector (Premakumara et al. 2017). Providing waste pickers and informal recyclers with protective gear and regular health checks, as well as accessible education within these communities, are key steps towards better working conditions and empowering livelihoods (Akenji et al. 2019).

## 6.5 Environmental education and awareness raising initiatives to reduce plastic pollution

Environmental education combines knowledge from a range of disciplines and generally refer to efforts and initiatives that teach people about the environment, ecosystems, and sustainable practices. It has been on the global agenda for several decades, underlined by the sustainable development goals (SDGs), specifically target 4.7 on “education for sustainable development and global citizenship”, which emphasises the need to enhance the contribution of education in the fulfilment of commitments to human rights, peace and responsible citizenship from local to global levels, including gender equality, sustainable development and health by 2030. The need for advancing knowledge, skills, values and attitudes through education for sustainable development (ESD) and global citizenship education (GCED) are focal areas under the United Nations Educational, Scientific and Cultural Organization (UNESCO). The ESD approach aims to empower learners of all ages with the knowledge, skills, values and attitudes to address the interconnected global challenges we are facing, including climate change, environmental degradation, loss of biodiversity, poverty and inequality, while GCED focuses on responding to these challenges as global (not local) issues through educating active promoters of more peaceful, tolerant, inclusive, secure and sustainable societies.

Studies suggest that improved knowledge about an environmental issue allows individuals to make informed decisions and be encouraged to adopt more environmentally sustainable behaviour (Wi and Chang 2019). For example, it is expected that increased awareness makes respondents value the environment higher, and thus willing to adopt greener practices and pay more for environmental services (Latinopoulos et al. 2018, 154). However, changing practices is a time consuming and stepwise process which requires different tools and approaches. While traditional perspectives often privilege environmental awareness-raising through formal contexts, such as educational programmes and

campaigns, meaningful environmental learning may also occur daily, through every day and incidental experiences that people encounter in the course of life (Ardoin and Heimlich 2020). Recognising that environmental stewardship may be encouraged beyond isolated events within school-based settings, encompassing individuals' connections and everyday life experiences with the natural environment, can facilitate learners to connect with environmental issues, possibly leading to greater interest in and action for engaging in sustainable living (Heimlich et al. 2017: 118).

In the context of waste management and pollution challenges, environmental education and awareness may target individuals, businesses, and industries. For example, education and awareness raising campaigns can encourage consumers to play an active role in waste management, by reusing, recovering and recycling goods to minimise or avoid waste, as well as learning about waste segregation and composting practices at the household level. Amongst producers, raised awareness and education can include rethinking design and composition of products and production processes, moving towards increasingly circular and sustainable alternatives. To harness the benefits of increased awareness and behaviour change, adequate waste collection, segregation and recycling systems and infrastructure must be in place and made available to the consumers on a local level. Moreover, from a governance perspective, ensuring high levels of awareness and building motivation can be especially important in advance of major changes in practice, for example, before introducing waste charges or levies on waste generators, information of impending changes is key to secure high levels of compliance.

In Myanmar, low levels of public awareness about waste management has been identified as a key challenge to tackle waste at a local and national levels (ECD and MONREC 2018). Awareness-raising is thus seen as critical to motivate the population to comply with waste management regulations and contribute to waste segregation at the source (ECD and MONREC 2017). Although some cities have conducted public awareness and environmental education programmes for local residents and businesses to mobilise their support for waste reduction and recycling, the successful implementation of these activities remains limited and ad-hoc (ECD and MONREC 2018). The National Waste Management Strategy and Action Plan for Myanmar (ECR and MONREC 2018) was launched in 2018 to increase the coverage of awareness raising programs and the number of schools that have established environmental education programs for their students to 100 percent in the townships. The Plan proposes several actions to improve awareness and environmental education in Myanmar, including developing curricula for environmental education in schools and universities, conducting training needs assessments, and developing corresponding training modules. However, limited information exists about the on-the-ground implementation of the plan since 2018, and few stakeholders knew about its existence (Interview, November 2021, Bago City). Putting these proposed changes into action is likely to face further challenges and set-backs due to the political instability caused by the military takeover in February, as well as Covid-19 induced uncertainty, making environmental education and awareness raising a lower priority in comparison to meeting basic human rights and needs.

Yet up until 2021, a number of important initiatives have actively worked to raise awareness of the importance of combating plastic pollution and unmanaged waste, including more local, bottom-up and community driven initiatives. Nationally, Mandalay and Yangon stand out. For example, the Mandalay City Development Committee has prohibited the production, trading and use of thin plastic bags in its administrative area, and has since 2009, promoted alternative bags such as string bags, leaf boxes and baskets (ECD and MONREC 2018). Beyond Municipal governments, civil society and non-government organisations (CSOs and NGOs) are also considered key players for raising awareness, disseminating information and providing technical guidance (ECD and MONREC 2018). For example,

the community level campaign “Straws Suck” was launched by a group of bars and restaurants in Yangon to cease the practice of serving customers single-use plastic straws. The initiative which started in 2017 involved providing reusable, biodegradable alternatives, generated interest and was adopted beyond the initial community (ECD and MONREC 2018). Art may also be used to communicate environmental education and generate awareness. For example, ahead of the Beat Plastic Pollution Day in 2018, an art installation made of plastic bottles and bags displayed a “wave of pollution” flowing into waterways (Thant Myanmar 2018). Another example is Trash Hero Myanmar, which arranges regular clean-up events in different cities and beaches across Myanmar and engages in education and awareness raising, particularly targeting children (Trash Hero Myeik 2019). According to their Facebook page, they have arranged 429 clean-up events as of August 2020, involving 27 000 volunteers and collecting 85 000 kg of waste (“Trash Hero Myanmar” n.d.). Social enterprises, including Doh Eain, Zero Plastic, ChuChu and Thant Myanmar, periodically host events focused on reducing the use of plastics, such as the event “A lifetime of a Plastic Consumption, 25 Years Ago and Today”, combining arts with education (Myanmar Times 2019).

Private companies and businesses may also contribute to environmental education and awareness raising, as seen when the supermarket chain City Mart started the campaign “No plastic bag day” in 2013 as part of their environmental responsibility strategy. For two fixed days every month, City Mart did not hand out plastic bags and encouraged customers to bring their own bags. Customers could also buy plastic bags for a 100 MMK fee, which would go to the Forest Resource Environment Centre and Conservation Association (Huisman, Breukelman, and Keesman 2017). A few years later, Coca Cola launched its ‘Tan Bo Shi Tal’ campaign in Myanmar in 2017 (Chan 2018). The nationwide recycling awareness campaign translates to ‘it has value’ or ‘it’s worth it’, and aimed to encourage action amongst consumers and private actors to segregate and recycle aluminium cans and plastic bottles. Local businesses may also contribute to raise public awareness, by promoting ethical, sustainable, and environmentally friendly alternatives products to plastic products (Akenji et al., 2019:64).

Social media is also becoming a powerful tool to raise awareness and environmental education, particularly amongst the younger segments of the population. The sustainability consultancy, *Conyat Create*, uses the social media campaigns ‘break up with plastic’ to spread awareness and education about plastic pollution and SUPP reduction measures in Myanmar. The French/Myanmar ‘think and do tank’ Green Lotus, also uses social media such as Facebook and twitter to educate and raise public awareness of the impacts of plastic pollution and possible reduction tools.

In recent years, there has been an uptick in education and awareness raising initiatives to reduce plastic pollution, from reduction and reuse measures, to encouraging recycling and repurposing plastic wastes, as well as clean-up campaigns targeting existing plastic pollution. However, as previously underlined, political instability and Covid-19 induced uncertainties have further hampered the continuation and development of these.



## 7 Concluding remarks and way forward

Myanmar's development status as an LDC, yet rapidly growing economy, is reflected in the increased aggregate waste volumes in the country. For instance, while per capita volumes of MSW remain low in international comparison, the generation of MSW has been growing rapidly in recent years. Similarly, shifts in consumption and production patterns have led to changes in the composition of waste. Plastic waste generation has increased considerably, especially its SUP component. The economically significant construction industry, retail sector, food service industry, and e-commerce industry are major contributors to plastic waste generation at the national level. It may be noted that while the trends in waste generation are clear, and tally with observations from various studies, there is uncertainty around the precise waste volumes, composition, recycling rates and volume of unmanaged releases into the environment. This holds true for the local, regional and national level and warrants further attention to improve methodologies for data collection and gather appropriate information on waste flows across Myanmar.

It comes as little surprise that societal actors in Myanmar have been increasingly concerned about the nature and growing impact of mismanaged waste on the environment and human health. This concern found expression domestically through the increasingly active role that civil society actors and NGOs, as well as authorities, have assumed to work on waste management issues. Internationally, multilateral institutions (e.g. UNDP, the ADB and the World Bank), bilateral donors and INGOs (International NGOs) became increasingly involved in and supported various segments of civil society and government departments. Collaborating with Myanmar-based actors, these institutions have provided technical resources, advice and policy-input which have led to a slew of reports, regulations and guidelines that concern themselves with different aspects of the waste management system. Noteworthy initiatives of recent years that have been drafted, or are in the process of being implemented, for example, are the National Waste Management Strategy and Master Plan (2018-2030), the Master Plan for Hazardous Waste Management in Myanmar (2019), the Rules on Hazardous Waste Management (proposed in 2019) and the Plastic action roadmap plan (drafted and proposed). However, the coup of 2021 puts into question the status of these national strategic plans and regulatory frameworks, as well as the capacity and priority of the present regime to implement and pursue them.

Existing governance mechanisms concerning waste management receive general direction and strategic input at the national level in a historically centralised system of governance. However, each state/region defines regional and local needs and operational requirements contextually. The division of responsibility from regional level passes up and down the chain of departments and ministries through a complex web of formal and informal governance arrangements which involve local bodies, such as the TDC (and its units, such as the cleaning department) as well as the DAO ministry and representatives at regional and local level. In a Bago township context, it is the TDC and DAO that assume key tasks and responsibilities for waste management. In some cases, such as in Bago township, waste collection activities from households are outsourced to private actors, in this case MJT. Rural areas rely largely on ad hoc systems (usually at the household level) for waste management, with limited or no formalised systems for collection, separation and disposal of waste. Waste collection from, the industry, small scale enterprises, markets and public institutions seems largely insufficient.

Both the evidence gathered by our local partners' fieldwork and other studies, showed the informal recycling sector significantly contributes to waste management in Myanmar and must be recognised for their contributions as key stakeholders in a waste value network.

In Bago township, as we show, the private waste management company is operating a nascent PPP model and is experimenting with a variety of technological (e.g. apps), infrastructural and economic

tools to meet its waste management objectives under contractual obligations with the local and regional government (TDC and DAO), as well as ensuring operational sustainability (profit). The long-term viability of the PPP model in Bago township remains to be assessed.

The PPP model presents an interesting case study that can inform and provide insights into the trend in Myanmar (and abroad) to introduce PPP models in waste management. These have shown mixed results with success depending on a variety of interdependent variables ranging from technical expertise, availability of capital, regulatory frameworks as well as participation of public, service and industrial sectors.

The case of Bago township illustrates how the interplay between private waste operators, regulatory actors, informal sector and international actors (here the Bago Waste project) operates over a period of intense change and uncertainty. It also highlights the importance of an in depth understanding of local conditions, and how waste management responses need to be formulated to transcend a silo approach, which only tackles one aspect of the waste management system, as well as the value of experimentation and iterative learning from experience.

Bago township's waste management system is still fragmented, but has seen several initiatives in the past two years (i.e. from 2019 onwards). Moving forward, the township requires replacing and translating the current initiatives on the part of national planning, the local authorities, civil society and private players with cohesive, integrated and strategic planning. Ultimately, this needs to involve strategic communication and translation of guidelines from national to local level, especially focusing on the role of the TDC/DAO. There is further important to recognize the role of, and coordinate with the private sector identification of incentives/capacities. Resource constraints and lack of technical know-how and capacities will nevertheless remain constraining factors for the time being. For instance, compactors are needed in addition to transport infrastructure and sorting machines - which require significant capital input. It is questionable if current fee collection rates can cover such capital investments in various stages of the local infrastructure and leave sufficient funds for the national waste management strategy to be adopted at local level.

Empirical evidence showed that industrial solid waste is handled and treated together with municipal solid waste, with no evidence of waste segregation practices being in place on the ground. The exception is the hospital waste stream, which is to be sorted according to a waste collection procedure, formulated by the ECD, though information indicate that the degree that this indeed practice vary among places. The different types of industrial waste not currently covered by collection and segregation schemes call for additional efforts from both industries representatives, local authorities/waste operators and policy makers.

There is a burgeoning industrial sector in Bago city and its outskirts. While this has not been closely examined in this report, evidence suggests that industrial units do not co-ordinate with authorities on waste disposal but follow autonomous routines that may be based on company policy, ad hoc collection, and loose adherence to national guidelines. This is an important issue which requires further scrutiny given the growing role that industry plays as a waste source, and the potentially hazardous nature of waste generated.

The transition towards a more resource-efficient and circular economy in Myanmar is still in a very early stage, nevertheless, various start-up initiatives and the active support granted by several international collaborative programmes (e.g. EU SWITCH-Asia) represent encouraging signals that more actors and entrepreneurs can commit to 3R practices and engage in overcoming limitations related to insufficiently developed waste infrastructure and low public awareness on the importance sustainable management of plastics and other non-degradable materials that end up in illegal landfills or environment.

## A way forward

Charting a way forward is challenging given the present socio-political situation in Myanmar. Nevertheless, it should be recognised that efforts targeting waste management are important for public health, strengthen environmental sustainability and are continuing at various levels. These efforts include numerous actors, including those from a committed civil society and the private sector. The following suggestions need to be seen in the context of the Bago Township experience, the Bago Waste project and its continuing engagement with Bago Region as well as recent developments in the international discourse around waste management, and responses against plastic pollution:

- **Increased coordination between key actors in waste management:** This implies trust building and domain expertise exchange. Government departments often operate without clear coordination and information about activities that concern waste management. This has also been experienced by the project where, for instance, clean ups along the Bago River require input from various different union authorities with decentralized offices, region / state parliament members, and township authorities and committees. Close coordination and joint work planning is necessary to overcome institutional balkanisation and the subsequent lack of all aspects involved in waste management.
- **Technical expertise, financial capacity and incentives:** Technical expertise and capacity is often lacking. There is a need for national and international support to exchange knowledge, provide access to affordable and locally appropriate technology that may be found in other developing countries (e.g India). Similarly, lack of financial capital at affordable rates often increase start up costs, hamper the access of working capital and impact the sustainability of PPPs. The use of subsidies and tax incentives for starting up operations need to be considered as these presently do not formally recognise the waste management sector.
- **Regulatory frameworks:** At the municipal level no strategic guidelines and technical rules exist for concerted efforts for waste management. This is especially problematic given the planning horizons, institutional silos and absence of clear authority over waste management issues. Extended Producer Responsibility regulations and targeted Single Use Plastic Product bans are potential instruments to be employed by the government.
- **Awareness raising and environmental education:** These may target value systems, behavioural patterns to increase compliance as well motivate public action towards waste management. The use of digital media, organisation of public events, inclusion of relevant information in school and college curricula may all form part of activities, also to identify gaps to ensure that all groups of society are covered by collection services, can demand those and are aware of potential health and environmental implications of mismanaged waste.
- **Infrastructure:** without the ability to physically dispose and separate waste it becomes very difficult for general population to follow guidelines, and act on awareness raising activities. Such infrastructure need not be technologically advanced, but include provisions that allow for easy deposition, collection and monitoring by the waste management responsible.
- **Local contextual understanding is key:** Internationally sponsored interventions (e.g through aid projects) and related models have often failed due to lack of long term engagement that respond to local socio-economic conditions, governance arrangements and technical capacities.
- **More data and standardised methodology:** There is a lack of standardised methodologies and availability of information on waste composition, flows, recycling rates and disposal which hampers targeted action which needs to be addressed through future research efforts.

- **Acknowledgement of the informal sector and circularity:** Improving the economic viability of recycling and reuse of plastics, halting the leakage of plastics into the environment, especially waterways and oceans, and decoupling plastics production from fossil-fuel feedstocks, while embracing renewable feedstocks.
- **Availability of plastic substitutes and alternatives:** Materials made from locally sourced materials or those with a longer life cycle need to be made widely available and supported as alternatives, especially to stem the rising tide of SUPs.
- **Taking advantage of market opportunities:** Recycling, and export to appropriate markets and taking advantage of economic opportunities. For example, the EU has created an expansive and lucrative market for recycled plastics that can act as a valuable export destination for products collected, recycled and processed in Myanmar.

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## Appendix 1. Targets and timeline foreseen in the National Waste Management Strategy and Master Plan.

Own elaboration based on ECD/MONREC (2018)

GOAL	TIMELINE			
	TARGETS	SHORT TERM (2018-2020)	MID-TERM (2021-2025)	LONG TERM (2026 -2030)
<b>A</b> – Extending sound waste collection service to all citizens and eliminate uncontrolled disposal and open burning as a first step towards environmentally sound waste management	<b>T1:</b> Achieve sound waste collection service for all citizens	<b>70%</b>	<b>85%</b>	<b>100%</b>
	<b>T2:</b> Eliminate the uncontrolled dumping and burning in the cities and mandate the operation of environmentally sound disposal facilities	Major City Development Committees (CDCs) to be established in Yangon, Mandalay and Nay Pyi Taw	Coverage of 50% - Township Development Committees (TDCs) in the country	Coverage of 100% Township Development Committees in the country
<b>B</b> - Extending sustainable and environmentally sound management of industrial and other hazardous wastes	<b>T1:</b> Mandate separate collection and sound treatment of hazardous waste including infection medical waste from non-hazardous waste	Major City Development Committees to be established in Yangon, Mandalay and Nay Pyi Taw	Coverage of 50% - Township Development Committees in the country	Coverage of 100% Township Development Committees in the country
	<b>T2:</b> Mandate collection and environmentally friendly treatment of all industrial waste			
<b>C</b> – Substantively reduce waste through 3Rs (Reduce, Reuse, Recycling) and thereby establish a resource circular society	<b>T1:</b> Mandate the development of city waste management strategies and action plans with actual waste reduction targets by all CDCs and TDCs	<b>25%</b>	<b>50%</b>	<b>80%</b>
	<b>T2:</b> Mandate the introduction of targets for diverting the food waste from landfills	<b>15%</b>	<b>35%</b>	<b>60%</b>
	<b>T3:</b> Mandate the separate collection and set waste recycling targets for industrial, medical and other wastes	<b>15%</b>	<b>35%</b>	<b>60%</b>
<b>D</b> - Ensure sustainable financing mechanisms	<b>T1:</b> All City and Township Development Committees conduct full cost accounting for waste service	<b>50%</b>	<b>75%</b>	<b>100%</b>
	<b>T2:</b> All City and Township Development Committees establish cost reflective tariffs for waste management services			
<b>E</b> - Awareness raising, advocacy and capacity building	<b>T1:</b> Increase in the number of townships that have implemented standard awareness-raising programmes for their residents	<b>25%</b>	<b>50%</b>	<b>100%</b>
	<b>T2:</b> Increase in the number of schools in the townships that have established environmental education programmes for their students			
<b>F</b> - Compliance, monitoring, enforcement and recognition	<b>T1:</b> City and Township Development Committees establish benchmark performance indicators	<b>50%</b>	<b>70%</b>	<b>100%</b>
	<b>T2:</b> Increase in the number of successful enforcement actions filed against non-compliant entities by			

	City and Township Development Committees			
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## Appendix 2

State Minister	Corresponding Departments	Union Ministry
Security and Border Affairs	1. Myanmar Police Force 2. Bureau of Special Investigation 3. Prison Department 4. Fire Service Department	Ministry of Home Affairs
	5. Immigration and Population Department	Ministry of Labor, Immigration and Population
Planning and Finance	1. Planning Department 2. Budget Department 3. Myanmar Economics Bank 4. Internal Revenue Department 5. Central Statistical Organization 6. Financial Regulatory Department 7. Myanmar Insurance 8. Pension Department 9. Customs Department 10. MIC	Ministry of Planning and Finance
	11. Consumer Affairs	Ministry of Commerce
	12. Hotels and Tourism Department	Ministry of Hotels and Tourism
	13. Labor Department 14. Labor Relations Department 15. Factory and General Labor Laws Inspection Department	Ministry of Labor, Immigration and Population
	16. Social Security Board	Ministry of Social Welfare, Relief and Resettlement
	17. Stevedoring Oversight Committee Office	
Agriculture, livestock and Irrigation	1. Agriculture Department 2. Agriculture, Land Management and Statistics Department 3. Agricultural Mechanization Department 4. Myanmar Agricultural Development Bank 5. Livestock Breeding and Veterinary Department 6. Irrigation and Water Utilization Management Department 7. Fishery Department 8. Rural Development Department 9. Cooperatives Department 10. Bee breeding Department 11. Small Scale Industries Department	Ministry of Agriculture, Livestock and Irrigation

State Minister	Corresponding Departments	Union Ministry
Development Affairs and Social Welfare	1. Religious Affairs Department 2. Department of Archaeology, national museum and library	Ministry of Religious Affairs and Culture
	3. Department of Information and Public Relations	Ministry of Information
	4. Development Affairs Organization	
	5. Department of Education 6. Higher Education Department	Ministry of Education
	7. Social Welfare Department	Ministry of Social Welfare, Relief and Resettlement
	8. Department of Public Health 9. Department of Rehabilitation 10. Department of Medical Services 11. Sports and Physical Education Department 12. Department of Traditional Medicine	Ministry of Health and Sports
Industry, Electricity and Transport	1. Industrial Supervision & Inspection Department	Ministry of Industry
	2. Electricity Supply Enterprise	Ministry of Electricity and Energy
	3. Road Management Department 4. Myanmar Post & Telecommunication 5. Road Transport Administration Department 6. License & Transport Coordination 7. Directorate of Water Resources & Improvement of Water Systems 8. Department of Urban & Housing Development 9. Department of Meteorology & Hydrology 10. Myanmar Railway (Region) 11. Department of Civil Aviation 12. Department of Marine Administration 13. Department of Marine Administration 14. Department of Inland Water Transport 15. Myanmar Post Office	Ministry of Transport and Communication
Natural Resources, Forestry and Environmental Conservation	1. Forestry Department 2. Myanmar Timber Enterprise 3. Environmental Conservation Department	Ministry of Natural Resources and Environmental Conservation
	4. Myanmar Petroleum Product Enterprise	Ministry of Electricity and Energy
Ethnic Affairs	1. Department of Ethnic Affairs	Ministry of Ethnic Affairs



## Appendix 3 Result framework

### The objectives

- (a) Development of a knowledge base and waste management strategies that build on the current status of waste management in the Bago Township at different levels (domestic, public and private sector)
- (b) Drawing on best practices from other townships in Myanmar as well as from other countries.
- (c) Identification of existing waste management networks, mechanisms, and incentives
- (d) Collaboration Bago selected private sector actors, to establish waste management models that focus on plastic waste and recycling
- (e) Support of local models of promising actions and measures, including establishment of demonstration sites, and evaluate their effectiveness.

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