This final report on City Assessment of Municipal Solid Waste in Yangon City has been prepared by AIT RRC.AP. It is a product of the CCAC-Municipal Solid Waste Initiative Project [SSFA 2015-SLP-5070-2J03-1111], with funding support from CCAC-MSWI under Sub-programme: Climate Change. The content of this report include the waste generation and characterization of waste; and current waste management system in Yangon City in Municipal Solid Waste Management and gaps therein. The content of this draft document does not necessarily reflect the views, or opinion of PCCD/YCDC, relevant agencies in Yangon, UNEP, CCAC-MSWI and AIT RRC.AP.
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SUMMARY

This report presents the assessment of Yangon city in terms of solid waste management (SWM). Yangon city is the largest city of Myanmar and it is comprised of 33 townships. The population of Yangon city is 5.2 million (5,209,541) which represents 70.8 % of the entire population in Yangon region. The average population density is 5,363.6 per square kilometer. Since Yangon has got the largest population, the demand for proper solid waste management is much higher compared to the other cities (Shoyama, 2014). Generally in Yangon city, 1,690 tons by day (TPD) of municipal waste is generated from the households, commercial centres, institutions, and industries, with a rate of 0.396kg per capita per day. In the composition of the solid waste generation, 76 % of the solid waste is organic, 10 % is plastic, 4 % is textiles and papers and another 10 % is wood, rubber, leathers, metals, glasses, crockery and stones (IGES, 2014). In relation to collecting the data, there is no systematic data collection method so far. The waste is measured by the volume, not by the weight. There is a high potential to mitigate SLCPs with the current rate of Yangon City’s organic waste composition.

In case of recycled waste in Yangon city, 86 TPD out of 1,690 TPD could be recycled, which is only 5% of the total waste. Among the recycled waste, glasses are mostly recycled and cardboard and paper are the second highest recycled items.

Moreover, Pollution control and cleansing Department (PCCD), in charge of solid waste management (SWM) for Yangon City, cannot run by their revenue because the fees they charge for the services are quite low and are not enough to finance all the officers and labours, thus it has to depend on the regional government’s subsidy. The sources of solid waste are mainly from households, industrial, health care, commercial establishment, institutional organizations, garden, and street sweeping, while the waste from demolition and workshop (oil, sewage) is excluded.

In spite of having written laws and regulations, the relevant department and ministry are weak in enforcing them. Furthermore, all the six final dumping sites in Yangon city are open, and there has not been proper solid waste management including the leachate. Based on the findings, PCCD lacks transfer station s, wrapping plant, anaerobic digestion, treatment of the waste, and incineration plant. Even though PCCD cannot run composting and fertilizer plant on its own, PCCD is one of the partners of SWM2 project (Environmental protection and sustainable development: building local capacities on solid waste management in Myanmar) which has initiated composting and producing fertilizer project in Shwe Pyi Thar Township since 2014.
ABBREVIATIONS AND ACRONYMS

3Rs  Reduce, reuse, recycle
FDS  Final Dumping Sites
FY   Fiscal Year
GDP  Gross Domestic Products
GNI  Gross National Income
km   kilometre
MEET Myanmar Enhancement to Empower Tribal
MOECAF Ministry of Environment Conservation and Forestry
MSW  Municipal Solid Waste
PCCD Pollution Control and Cleansing Department
PPP  Public Private Partnership
SLCPs Short Live Pollutants
SLORC State law and order restoration council
Sq.km Square kilometre
SWM  Solid waste management
SWM2 Environmental protection and sustainable development: building local capacities on solid waste management in Myanmar
TPD  Ton per day
YCDC Yangon City Development Committee
1. Introduction

In Myanmar, there are three development committees in three cities (Yangon, Mandalay, and Nay Pyi Taw) and 285 township developing committees dealing with solid waste management in Myanmar (U Mann & Ohnmar Myint, n.d.). Among these committees, this report will only focus on the solid waste management (SWM) in Yangon city where pollution control and cleansing department (PCCD) under Yangon City Development Committee (YCDC) is the major stakeholder in dealing with SWM. There are altogether seven sections in this report.

In the first section of this report, the city profile, such as the geographical information, demographic features, climate, and economic status of Yangon city will be described. The following section will mainly explain the methodologies of the report which includes the types of solid waste, sources of solid waste, data source and data collection method, study limitations, observations, and the quality control in Yangon city. In the third section, waste generation by the city dwellers per day and the composition and characteristics of solid waste are primarily highlighted.

The fourth section emphasizes the existing solid waste management system in Yangon, which includes the collection and segregation of the waste, the process from the sources of the dust to the final dumping sites (FDS), recycling, composting, and how the awareness of SWM is extended to the public.

Section five elaborates more about the institutional and financial aspects of SWM in Yangon which covers the structure of the relevant department, human resources and their capacity, the services the department gives, SWM short and long-term plan of the department, the stakeholders in SWM, the budget allocation and expenditure, the income generation of the department, and the laws and regulations in line with SWM. In the next section, the report will discuss the major problems and issues of SWM in Yangon city at the national level, at the source of generation, and the issues of the existing SWM practice. The final section will include the conclusion and recommendations. This report of SWM in Yangon city is carried out during June to August 2015.
Figure 1: Map of Yangon City
Source: (MIMU, 2015)
1.1 CITY PROFILE

This section will narrate the brief history of Yangon city, make a comparison between Yangon city and Yangon region, and describes the composition of the roads in Yangon city. Following this, it also shows the geographical information, demographic features, climate, and economic status of Yangon city.

Yangon city was originally a small fishing village named Dagon, which later grew into Yangon, a city centred around the Shwedagon Pagoda. In 1755, King Alaungpaya conquered Dagon, renamed it "Yangon", which means 'end of strife'. During the Second Anglo-Burmese War, the British seized Yangon and all of Lower Burma by a proclamation on 28th December 1852 (YCDC, 2015).

The British constructed a new city, based on the design by army engineer Lt. Alexander Fraser, on a grid plan on delta land, bound to the east by the Pazundaung Creek and to the south and west by the Yangon River. In 1885, after the Third Anglo-Burmese War, the British captured Upper Burma and since then Yangon became the capital of the country. In 2005, Nay Pyi Taw became the administrative capital of Myanmar. Yangon city is situated in Yangon Region and it is the largest city of Myanmar. In Yangon region, there are 45 townships, while there are 33 townships in Yangon city (YCDC, 2009). The comparison between Yangon city and Yangon region is shown in Table 1.

Table 1: Yangon City and Yangon Region

<table>
<thead>
<tr>
<th></th>
<th>Yangon city</th>
<th>Yangon Region</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population</td>
<td>5.2 million</td>
<td>7.55 million</td>
</tr>
<tr>
<td>Township</td>
<td>33</td>
<td>45</td>
</tr>
<tr>
<td>Area</td>
<td>961.28 sq.km</td>
<td>9,804.09 sq.km</td>
</tr>
</tbody>
</table>

Source: (UNDP, 2015)

In the case of transportation, the six-lane road is the shortest road (125 km), which is 1% of the total transportation road, while the one-lane road is the longest road (6339 km), which is 64% of the total transportation road. The composition of the roads is illustrated in Figure 2.
1.2 **Geographical Information**

Thirty-three townships, 630 wards, and 54 village tracts form Yangon city, which fully covers eastern and western districts of Yangon, while partly covering the northern and southern districts of Yangon. This means that only the townships under the administration of Yangon City Development Committee (YCDC), are part of the city. Therefore, the 33 townships in the city are labelled as ‘YCDC townships.’ Among the four districts, only the western district is exclusively composed of wards without any village tracts. The total area of the entire Yangon city is 961.28 sq.km which is 9.9% of Yangon Region. (Local Governance Mapping the state of local governance: trends in Yangon (UNDP, 2015). The geographical information of Yangon city can be seen in Table 2.

**Table 2: Geographical information of Yangon city**

<table>
<thead>
<tr>
<th>Location</th>
<th>In Myanmar, Southeast Asia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coordination</td>
<td>16° 48'N 96° 09' E / 16.8' N</td>
</tr>
<tr>
<td>Time Zone</td>
<td>MST (UTC + 6:30)</td>
</tr>
<tr>
<td>Area</td>
<td>961.28 sq.km</td>
</tr>
<tr>
<td>Area Code</td>
<td>1,80,99</td>
</tr>
</tbody>
</table>

Source: (YCDC, 2009)
1.3 Demographic Features

The population of Yangon city is 5.2 million (5,209,541) which represents 70.8% of the entire population in Yangon Region (Myanmar Population and Housing census, 2014). Among the 33 townships in Yangon city, Pabedan has the highest population density at 53,615.6 per square kilometre, while Dala has the lowest at 755.2 per square kilometre. The average population density is 5363.6 per square kilometre (IGES, 2014). The demographic feature of Yangon city is shown in the following table 3.

Table 3: Demographic feature of Yangon city

<table>
<thead>
<tr>
<th>Total Population</th>
<th>5,209,541</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male population</td>
<td>2,468,725</td>
</tr>
<tr>
<td>Female population</td>
<td>2,740,816</td>
</tr>
<tr>
<td>Households</td>
<td>1,093,200</td>
</tr>
<tr>
<td>Population density</td>
<td>53,615.6 per sq.km</td>
</tr>
</tbody>
</table>

Source: (Population and housing census of Myanmar: Provisional Results, 2011)
1.4 CLIMATE

Yangon has a tropical climate with three seasons. The hot and dry season is from March to May and the rainy season starts in June and ends in October. This is then followed by the cool and dry season which runs from November through February.

Table 4: Seasonal Climate in Yangon city

<table>
<thead>
<tr>
<th>Seasons</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rainy</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Winter</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: (Facts about Yangon city development committee)

The average temperature for the year in Yangon is 27°C. On the average, the hottest month is April with an average temperature of 37°C. The coolest month, on average, is January with an average temperature of 17.9°C.

Table 5: Maximum, minimum and average temperature in Celsius in Yangon city

<table>
<thead>
<tr>
<th>Month</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max</td>
<td>32</td>
<td>35</td>
<td>36</td>
<td>37</td>
<td>33</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>Min</td>
<td>18</td>
<td>19</td>
<td>22</td>
<td>24</td>
<td>25</td>
<td>25</td>
<td>24</td>
<td>24</td>
<td>24</td>
<td>24</td>
<td>22</td>
<td>19</td>
</tr>
<tr>
<td>Ave</td>
<td>25</td>
<td>27</td>
<td>29</td>
<td>31</td>
<td>29</td>
<td>27</td>
<td>27</td>
<td>27</td>
<td>27</td>
<td>28</td>
<td>27</td>
<td>25</td>
</tr>
</tbody>
</table>

Source: (“Rangoon, Yangon Climate & Temperatures,” 2015)

Heavy rain usually falls from May through October, where August has the highest rainfall with 602 millimetres.

Table 6: Precipitation in millimetre in Yangon city

<table>
<thead>
<tr>
<th>Month</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Annual</th>
</tr>
</thead>
<tbody>
<tr>
<td>Precipitation</td>
<td>5</td>
<td>2</td>
<td>7</td>
<td>15</td>
<td>303</td>
<td>54</td>
<td>55</td>
<td>602</td>
<td>36</td>
<td>20</td>
<td>60</td>
<td>7</td>
<td>2681</td>
</tr>
</tbody>
</table>

Source: (“Rangoon, Yangon Climate & Temperatures,” 2015)

In terms of humidity, the highest percentage is in August with 87 percent while the average annual humidity is 74.4 percent.

Table 7: Humidity in percentage in Yangon city

<table>
<thead>
<tr>
<th>Month</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Annual</th>
</tr>
</thead>
<tbody>
<tr>
<td>Humidity</td>
<td>62</td>
<td>66</td>
<td>69</td>
<td>66</td>
<td>73</td>
<td>85</td>
<td>86</td>
<td>87</td>
<td>85</td>
<td>78</td>
<td>71</td>
<td>65</td>
<td>74.4</td>
</tr>
</tbody>
</table>

Source: (“Rangoon, Yangon Climate & Temperatures,” 2015)

1.5 ECONOMIC STATUS

Yangon is the country’s main centre for trade, industry, real estate, media, entertainment and tourism. The city alone represents about one fifth of the national economy. According to official statistics for fiscal year of 2010–2011, the size of the economy of Yangon Region was 8.93 trillion kyats, or 23% of the national GDP (Newswire, 2015)
2. **Study Methodologies**

This second part of the report will mostly explain the methodologies used in the report covering the types of solid waste, sources of solid waste, data source and data collection method, study limitation, observation, and the quality control in Yangon city.

2.1 **Types of Solid Waste**

Myanmar has defined its own definition for Municipal Waste as “Municipal Waste is that which comes from human and animal activities and is normally solid, discarded as useless and unwanted”. It is all-inclusive encompassing the heterogeneous mass disposed from urban community as well as the more homogeneous accumulation of agricultural, industrial and mineral waste (Borongan & Okumura, 2010).

Generally, solid waste is segregated publically into two: wet and dry. Wet waste such as kitchen waste, left-over food, and flowers are discarded with blue bags every day. Dry waste such as paper, cork, plastic, broken toys, pieces of metal, pieces of wire are discarded with green bags twice a week on Wednesdays and Sundays (“Yangon City Development Committee,” 2015).

2.2 **Sources of Solid Waste**

The sources of solid waste are mainly from households (kitchen waste, left-over food, flowers, etc.,) industrial (packaging of components, used raw materials), health care, commercial establishment (shopping malls, hotel, and restaurants, street markets), institutional organizations (school, medical healthcare, prisons, government offices, NGOs, and INGOs), garden (leaves, grasses), and street sweeping (mainly leaves).

2.3 **Data Sources and Data Collection Method**

The sources were mainly primary and secondary. Primary source of data and information were collected through field visit and by interview. Some data are not available in written yet such as the annual budget and the annual plan. Therefore, two representatives from YCDC were interviewed during the field survey visit by RRCAP as well during the Stakeholders Workshop on CCAC-MSWI Southeast Asian Cities to collect the required data and information. Secondary source: Secondary data and information were collected from internet and from the PCCD office, and from IGES publications. The officers at PCCD measure the weight of the waste by size of vehicle. The bigger the size of the transport truck, the higher the weight. There is no digital weighing system yet.
2.4 Study Limitation

The study could only focus on Yangon since it is quite hard to obtain data at the national level. Moreover, this study could only cover municipal solid waste. Due to time constraint, primary data cannot be collected since it takes time, so the study is mainly carried out and analyzed from the secondary data. Currently, there is no systematic data collection method in Yangon City, the waste is measured by the volume, rather than by the weight. In addition, data from the government is also very difficult to obtain since there is very little work on it. The core limitation of the study is the difficulty in collecting data.

2.5 Observation

The solid waste that can be collected is 97% formally and 3% disposed illegally. In the composition of the solid waste, 76% of the solid waste is organic, 10% is plastic, 4% is textiles and papers and another 10% is wood, rubber, leathers, metals, glasses, and crockery and stones. The positive aspect is that the highest composition is organic which is biodegradable, however, the negative aspect is that there is no composting system yet.

2.6 Quality Control

In order to control the quality of the data, it is cross-checked between the primary data and secondary data collected from the internet. Moreover, the data is then verified by two technical officers from PCCD/YCDC. In order to control the quality of the report, some data was not used, as it seems to contradict with the other data and is unreliable.
3. Solid Waste Generation and Physical Characteristics

In this section, waste generation by the city dwellers per day and the composition and characteristics of solid waste are primarily highlighted.

3.1 Waste Generation per Day

In the city of Yangon, normally 1690 tons of waste is generated by the people, which is 0.396kg per capita per day (IGES, 2014). Unfortunately, the solid waste composition has not been separated into domestic, institutional, and commercial waste since all the waste is not collected separately. The waste is collected together and carried by the waste trucks without segregation. Despite the fact that the waste is segregated into dry and wet initially, it is finally mixed on the truck and disposed to the final dumping sites (FDS) together. Therefore, there has not been any segregation of domestic, institutional, and commercial waste. The waste generation per day is shown in Table 8.

Table 8: Waste Generation per day in Yangon city

<table>
<thead>
<tr>
<th>Waste Generation per capita per day</th>
<th>0.396kg/capita/day 7.5 % of city population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waste Generation per day</td>
<td>1,690 tons</td>
</tr>
</tbody>
</table>

Source: (IGES, 2014)

3.2 Waste Composition and Characteristics

In the composition of the solid waste generation, 76 % of the solid waste is organic, 10 % is plastic, 4 % is textiles and papers and another 10 % is wood, rubber, leathers, metals, glasses, and crockery and stones. The waste composition and characteristics can be seen in Figure 3.1.

Figure 4: Waste composition and characteristics in Yangon

Source: (IGES, 2014)
4. EXISTING SOLID WASTE MANAGEMENT SYSTEM

This section will go into a bit more detail into the collection and segregation of the waste, the process from the sources of the dust to the final dumping sites (FDS), recycling, composting, and how the awareness of SWM is extended to the public.

4.1 COLLECTION AND SEGREGATION

Since 97% of the municipal waste is collected formally and 3% is disposed illegally, therefore it can be noted that the waste is collected well. Regarding the non-formal collection, there are itinerant waste buyers, child waste pickers, and junk shops. Therefore even though 3% of total waste is illegally disposed, some of them finally goes to the waste buyers and the junk shops. In collecting the waste, 1550 TPD is collected by PCCD, while 86 TPD of recyclable waste is collected from households, 30 TPD is collected in Kantawmin area – a small park in Dagon Township which exists in the central business district, and 24 TPD is collected illegally, which means that this waste goes to itinerant waste buyers, child waste pickers, and junk shops. From the industries, the waste is collected on call system and about 109 TPD is collected by PCCD. In addition, the waste from health care centres is normally burned, while the sharp waste is buried deeply in the ground. All the services are provided by PCCD and normally 1TPD waste is generated from the health care centre (Thaung, 2015).

4.2 PRIMARY DISPOSAL TO THE DUST BINS AND BRICK TANKS

The people primarily dispose their waste to the dust bins provided by YCDC and to the brick tanks near the sidewalk. There are 3472 dust bins and 617 brick tanks where people can dispose their waste (IGES, 2014). Regarding the brick tanks, there are specific times allocated for waste disposal. People can dispose their waste during 6-10am in the morning and 18-23pm in the evening. Conversely, people can dispose their waste to the dust bins at any time. The backward situation of Yangon city in SWM is that there is not any single transfer station. Therefore, the
waste cannot be filtered as recyclable and non-recyclable waste in between the sources of the waste and final dumping sites (FDS).

4.3 Final Transportation and Disposal Methods

There are currently six FDS in the city of Yangon, of which Htein Bin and Htawe Chaung are the two largest dumping sites. The major weakness of all the dumping sites is that they all are opening dumping sites. Since the waste is not buried, there is high emission of SLCPs which would surely affect the health of the people living at surrounding area of the dumping sites. The six final dumping sites are shown with their total area in Table 9.

Table 9: List of final dumping sites (FDS)

<table>
<thead>
<tr>
<th>Final Dumping Sites (FDS)</th>
<th>Constructed Year</th>
<th>Total Area/Used in Acre</th>
<th>Ton of Waste/Day</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Htein Bin</td>
<td>2002</td>
<td>150/70</td>
<td>847 tons per day</td>
<td>Open dumping</td>
</tr>
<tr>
<td>2. Htawe Chaung</td>
<td>2001</td>
<td>55.77/47.4</td>
<td>612 tons per day</td>
<td>Open dumping</td>
</tr>
<tr>
<td>3. Shwe Pyi Thar</td>
<td>2005</td>
<td>1</td>
<td>50 tons per day</td>
<td>Low landfill temporary site</td>
</tr>
<tr>
<td>4. Mingalardon:</td>
<td>2003</td>
<td>0.91</td>
<td>25 tons per day</td>
<td>Low landfill temporary site</td>
</tr>
<tr>
<td>5. Dala</td>
<td>2003</td>
<td>1.3</td>
<td>10 tons per day</td>
<td>Low landfill temporary site</td>
</tr>
</tbody>
</table>
6. Seikkyi Khanaungto
2003
0.25
5 tons per day
Low landfill temporary site
Source: (IGES, 2014)

4.4 RESOURCE RECOVERY METHODS: RECYCLING

In terms of recycling, 86 tons out of 1690 tons of waste could be recycled, which is only 5% of the total solid waste. Among the recyclable waste, glasses are recycled the most, followed by cardboard and paper. Copper, leather, and lead are the least recycled waste by less than 1% each of the total

Figure 7: Htain Bin FDS
Source: (RRC.AP, 2015)

Figure 8: Composition of recyclable waste in Yangon city
Source: (IGES, 2014)
recycled waste. (IGES, 2014). PCCD itself is running a small-scale plastic plant which produces green and blue plastic bags from the plastic waste, however PCCD does not get any revenue from recycled plant since their products (plastic bags and bins) are used by themselves for the waste collection process. The composition of recyclable waste can be seen in Figure 8.

### 4.5 Composting

To date, though PCCD could not launch a composting system to produce fertilizer on its own, it is one of the partners of the European project in producing fertilizer from the organic waste by composting system. The project is entitled as “Environmental protection and sustainable development: building local capacities on solid waste management in Myanmar” which is also called SWM2 in short.

The project has already initiated composting the solid waste and producing fertilizer in Shwe Pyi Thar Township in 2014. Initially, the SWM2 project is being run by four partners: PCCD-YCDC, Cesvi (an Italian NGO), Itacha (Information Technology for Humanitarian Assistance, Cooperation and Action), and City of Torino (International Cooperation and Peace Department). However, in this composting and producing fertilization project, SWM2 is working together with the local organization called MEET (Myanmar Enhancement to Empower Tribal). MEET is a charity centre for children and youth. For this project, Cesvi provides the technical skills and requisite facilities, MEET prepares the land for the production and investigation, and PCCD supports the green plastic bags for collecting the organic waste and dumping bins for storing the waste.

Regarding the initial products from this projects, it is agreed that MEET will use them in their cultivation field to upgrade the production rate of their crops, to feed the children and the youth what they harvest from the field, and to sell to the nearby markets if they cannot consume all the crops. There is a market called Nawarrat near MEET and the project could collect about 90% of the organic waste from that market every day. The project set a standard for a pile of waste by weight. By October 2014, the project has got two piles of organic waste for composting and producing fertilizer. Besides, in order to promote the awareness of composting and producing fertilizer system, Cesvi delivered training to the staff of MEET every month (SWM2, 2015).

### 4.6 Special Waste Management

Medical waste and clinical waste is collected separately and burned by PCCD. The charge for using incineration plant is collected by PCCD. The sharp waste from the hospitals and clinics are buried deeply in the ground. Normally, one ton of waste is collected from the health care centres in a day.
4.7 Public Awareness and Community Mobilization

In order to extend the public awareness of SWM in the community in Yangon, the SWM2 project has four activities: distributing calendars, trainings, awareness campaign, and Lan Thant (clean street) pilot project. In 2014, the project produced 6,000 copies of illustrated campaign/awareness raising on recycling and segregation and distributed to the schools and markets. Similarly, the same type of calendars were distributed to markets and schools in January 2015. In addition to calendars, the project distributed pamphlets which highlight the practise of 3Rs (Reuse, Reduce, Recycle), good practices on waste management and city clean and waste segregation when people dispose their waste. In November 2013, 11,000 copies of pamphlets were published and distributed (“Solid waste management in Yangon city,” 2015).

Secondly, trainings to industries of the industrial zone were organized in November 2014, in January 2015, and in April 2015. The first session was delivered on the title of “Waste typology and classification practical tools for private companies to identify their waste and the degree of risk in managing it”. The training was mainly delivered on environmental issues related to industrial production, legislative environmental framework and industrial sector, industrial solid waste and waste water, environmental protection costs and taxes. In January 2015, the second part was delivered on the same title emphasizing on waste identification and classification; identification risk waste management, benefits for private sector which can gain by doing systematic SWM; environmental analysis- identifying the processes and environmental impacts; improvement plan and related key performance indicators (KPIs) for evaluating the efficacy and techniques of waste disposal with lower environmental impact. The final session of the training was delivered in April 2015 on the topic of “Environmental standard – different kinds of certification and practical steps for private companies to apply for”.

During December 2013 to January 2014, community awareness campaigns were conducted by the project in Myitta Nyunt Ward Tarmwe Township, 25th Ward in Thingangyun Township and Kyan Sit Thar Housing compound in Hlaing Thar Yar Township. In the second year, community awareness campaign was organized in a similar style to the first year of the project and held in Kyar Kwet Thit Ward-Tarmwe Township, 16/4 ward-Thingangyun Township and 16th ward-Hlaing Thar Yar Township in the last week of December 2014. These campaigns were organized with the collaboration of Pollution Control and Cleansing Department, Yangon City Development Committee. Local people from the ward, Mother and Child Care Association members, and Women Affair Association’s members participated in the awareness campaign activities.

In January 2015, Lan Thant (clean street), the pilot project started with workshop activity. It promoted integrated solid waste management, including the main stakeholders PCCD, Ward
administration and Citizens by facilitating between these groups. To date, workshops have been conducted twice (Union, 2015).
5. INSTITUTIONAL AND FINANCIAL ASPECTS

This section elaborates more about the institutional and financial aspects of SWM in Yangon which covers the structure of the relevant department, human resources and their capacity, the services the department provides, SWM short and long-term plan of the department, the stakeholders in SWM, the budget allocation and expenditure, the income generation of the department, and the laws and regulations in line with SWM.

5.1 ORGANIZATIONAL STRUCTURE OF PCCD

In the department of PCCD, there is only one head of department and two deputy heads for East and South and for North and West. Currently, there are altogether 4789 officers and staff in PCCD, including the labourers. Among them, 39 are officers, 1040 are in other rank, and the rest 3800 are labourers.

![Organizational Chart of Pollution Control and Cleansing Department](image)

**Figure 9: Organisation chart of PCCD**

*Source: (IGES, 2014)*
5.2 Human Resources and Capacity

At PCCD, there are 4879 persons who are dealing with the solid waste: 39 are officers, 1040 are in other rank, and 3800 are labourers. Regarding the capacity at the workers level, their responsibilities are normally sweeping the street; collecting the waste from households, commercial establishments, institutions, industries, and gardens; and transporting them to the FDS. Even at the FDS, there is no proper and systematic facility and infrastructure for disposing, as waste is disposed where ever there is space. Therefore, for the labour workers’ level, there is not much capacity needed to build up to handle the tasks so far. However, as PCCD is planning to run waste-energy projects at the two biggest dumping sites: Htein Bin and Htawe Chaung, the skill and capacity of the staff and labour workers are needed to be built up accordingly. At Htein Bin, PCCD is planning to launch an incineration plant in collaboration with a Korean company called Chasson Co. Ltd. to implement waste-to-energy projects. Similarly, at Htawei Chaung, PCCD is considering to install a waste-to-energy incineration plant in collaboration with a Korean company called Zeya Co. Ltd.

5.3 SWM Service Arrangements

Pollution control and cleansing department (PCCD), under YCDC, plays the key role in providing the facilities, man power, and finance for SWM. There are almost 5000 people dealing with SW. In terms of the facilities, PCCD provides 294 trucks for carrying the waste to the final dumping sites, 617 brick tanks for collecting the waste, and 3472 dust bins for segregating and holding the waste (Institute for global environmental strategies, March 2014). From PCCD, the main service that is provided is the brick tank system - evenings (6 - 11 pm) and mornings (6 - 10 am); dumping bins- people can discard their waste any time in the bins; bell ringing system- waste is collected by a bell ringing truck and cart on the designated date and time after negotiation with ward supervisors; and they dispose the waste in green and blue bags designated by Committee and tie safely waste bags. And then discard waste bags with the above 3 systems. Here it must be noted that the waste must be kitchen waste (“Yangon City Development Committee,” 2015).

5.4 SWM Short-term, Mid-term and Long-term Plan

There are two types of plan for Yangon city in line with SWM: the master plan drawn by PCCD-YCDC and the other plans recently proposed by U Saw Win Maung and U Tun Tun Thaung from the workshop organized by Regional Research Centre for Asia and Pacific (RRC.AP) in Bangkok Thailand in July 2015.

The master plan till 2040 regarding SWM is drawn by PCCD-YCDC with the support of JICA, Nippon Koei Co., Ltd., NJS Consultants Co., Ltd., Engineering Co., Ltd., YACHIYO International
Development Center of Japan Inc., Asia Air Survey Co., Ltd., and ALMEC Corporation. The vision of the master plan is to create a city with a sound material cycle through 3Rs policies and its execution. There are three basic policies in this master plan: 1) a controlled and sound solid waste stream in sanitary manners, 2) Restraint of waste generation and 3Rs (waste reduction, waste reuse, waste recycling), and 3) Application of feasible methods of waste management in terms of environment, society, economy and technical aspect.

The master plan includes three goals and effect indicators:
1) solid waste is collected from the living environment of all people and business entities. The collected amount of municipal waste: 14,000 ton/day,
2) the operation of 3R policies and necessary actions are monitored by YCDC and the monitoring result is shared with stakeholders. The diverted recyclable material from the municipal waste stream: 7,000 ton/day, and
3) hazardous waste is collected and treated appropriately. The treated hazardous industrial waste: 500 ton/day, Infectious waste: 20 ton/day.

There are four development strategies in the master plan:
1) controlled sound solid waste stream in sanitary manners,
2) public 3R policies and organizational reinforcement
3) cooperation and coordination with stakeholders, and
4) fair cost allocation and promotion of Public Private Partnership [PPP].

The first development strategy highlights procurement and regular replacement of vehicle and equipment for waste collection, facility development in accordance with Urban Planning (sanitary landfill, transfer station, treatment facility), capacity development for maintenance of vehicle and equipment, and environmental monitoring. The second development strategy focuses on enhancement of coordination among departments of YCDC, promotion of community activity, and environmental education.

The third one includes promotion and regular update of policies of solid waste management, 3R promotion such as Recycling Act Preparation (RAP), monitoring and update of the integrated solid waste management plan (facility development, revision of management system etc.), capacity development of personnel, and improvement of data management. The final development strategy emphasizes privatisation of collection and transportation, landfill management, operation of treatment facility; review and update of waste fee system; and cost sharing to promote and support 3R (promotion of recycling industry, extended producer responsibility) (JICA, 2013)
In addition, there are two long term plans and one short term plan emerging from the workshop organized by RRC.AP on July 15-16, 2015 at Amari Watergate Hotel, Bangkok, Thailand. According to technical staffs at PCCD/YCCD, building incineration plants at Htein Bin and Htawe Chaung, building transfer stations in four districts, building composting plants to produce fertilizer near the biggest final dumping site, and burying the waste in the final dumping sites are also the long-term plan of PCCD in Yangon.

Another long-term plan drawn at the workshop by PCCD/YCCD is to deliver quarterly training to the staffs of PCCD in four districts (East, West, North, and South). The expectation from this program is that the staff will be equipped with knowledge and build up their technical capacity though the training. As a result, they would be able to segregate the recyclable and non-recyclable by the help of the department in providing facilities and will manage the waste better at the dumping sites as well, which will surely reduce SLCP emission. Moreover, some of the staff would be able to operate the incineration plants which are going to be run at Htein Bin and Htawe Chaung landfills.

The short-term plan is to provide public awareness on solid waste segregation to the household level through media and providing the two types of bins for recyclable and non-recyclable at the households so that the public will also practice it and there would be no need to segregate again at the FDS.

5.5 **Actors Involved in SWM**

The main stakeholders in SWM is PCCD under YCDC. It plays the key role in planning the projects, hiring the workers, implementing all the projects including collecting charges for the services. In doing research, IGES (Institute for Global Environmental Strategies) is taking the major role, while in writing the master plan for SWM, PCCD-YCDC is being done in collaboration with JICA (Japan International Corporation Agency), Nippon Koei Co., Ltd, NJS Consultants Co., Ltd., Engineering Co., Ltd., YACHIYO International Development Centre of Japan Inc., Asia Air Survey Co., Ltd., and ALMEC Corporation (The Project for the Strategic Urban Development Plan of the Greater Yangon: Final Report I, 2013). Now, PCCD is planning to operate incineration plants in corporation with the two Korean companies called Chasson Co. Ltd. and Zeya Co. Ltd (interviewed with technical staffs from PCCD/YCCD). To date, all these companies and organizations are the stakeholders involved in SWM in the city of Yangon.
5.6 Allocation of Budget and Expenditures

In relation to budget and expenditure, PCCD is totally funded by Yangon regional government and there is no aid and support from the international organization, except writing the master plan mainly by JICA and conducting research by IGES. According to PCCD/YCCD, the total budget allocated for PCCD in 2013-14 was about $8.2 million.

5.7 Revenue from SWM Service Charges

There are three layers in collecting the charges for SWM services: central business district, sub-urban, and satellite. The charges collected in the city centre are higher compared to the outer part. Even though it is higher, in the central business district, the charge is only $0.6, which is still quite low in order to be able to run the whole service. Therefore, PCCD should charge more (proper rate) for collection service to change the mind-set of the public that they will take into account and discipline in discarding the waste. Moreover, it would be really helpful for the department to run better and to provide necessary equipment to the labourers.

Table 10: Revenue from SWM service charges

<table>
<thead>
<tr>
<th>Collection</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>$0.6 per month from central business district</td>
</tr>
<tr>
<td></td>
<td>$0.45 per month from each sub-urban</td>
</tr>
<tr>
<td></td>
<td>$0.3 per month from satellite</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Transportation</th>
<th></th>
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</thead>
<tbody>
<tr>
<td></td>
<td>$30 per trip for government organizations from on call system</td>
</tr>
<tr>
<td></td>
<td>$35 per trip for private organizations from on call system</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Disposal</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>For expired medicines,</td>
<td></td>
</tr>
<tr>
<td>For incineration process, the fee is $10 kyat for an hour.</td>
<td></td>
</tr>
<tr>
<td>If burning time exceeds one hour, the fee is $2.5 for every fifteen minutes.</td>
<td></td>
</tr>
<tr>
<td>For embedding process, the fee is $5 for one Square feet.</td>
<td></td>
</tr>
<tr>
<td>If the volume exceeds one Square feet, the fee is $4.5 extra one Square feet.</td>
<td></td>
</tr>
<tr>
<td>For Business, minimum of $0.5 to maximum of $550 for business</td>
<td></td>
</tr>
<tr>
<td>For Hospital/ clinic, minimum of $1.5 to maximum of $300</td>
<td></td>
</tr>
<tr>
<td>For Hotel, Motel, Inn, Guest house, minimum of $4 to maximum of $300 (“Yangon City Development Committee,” 2015)</td>
<td></td>
</tr>
</tbody>
</table>
5.8 SWM Acts and Regulations

There are mainly three written acts regarding SWM and regulations drawn by PCCD. The three written acts are:

1) The Environmental Conservation Law (The Pyidaungsu Hluttaw Law No. 9 / 2012),
2) The City Of Yangon Development Law (1990) by the State Law and Order Restoration Council Law No. 11/90, and

The Environmental Conservation laws mainly describe about the roles and responsibilities of the Ministry of Environment Conservation and Forest (MOECAF) to protect the environment and to manage the solid waste in collecting, transporting, treating, disposing and recycling. Obviously, the relevant ministry and department of solid waste management are undoubtedly weak in enforcing the laws and policies they issued. Despite the fact that MOECAF has issued the environment conservation law which includes prescribing environmental quality standards, including standards on emissions, effluents, solid waste, production procedures, processes and products for conservation and enhancement of environmental quality, in practical they cannot set the standards. Likewise, PCCD also sets some prohibitions for pollution control and cleansing, but people do not even know what rules and regulations are there to follow. Therefore, it is conspicuous that the relevant ministry and department are weak in enforcing their laws and regulations. The three laws and prohibitions drawn by PCCD are shown in Table 11.

Table 11: Laws and Regulations

<table>
<thead>
<tr>
<th>1. The Environmental Conservation Law (The Pyidaungsu Hluttaw Law No. 9 / 2012)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chapter 4: Duties and Powers relating to the Environmental Conservation of the Ministry</td>
</tr>
<tr>
<td>Article 7. The duties and powers relating to the environmental conservation of the Ministry are as follows:</td>
</tr>
<tr>
<td>a. implementing the environmental conservation policies;</td>
</tr>
<tr>
<td>b. planning and laying down national or regional work plans relating to environmental management;</td>
</tr>
<tr>
<td>c. laying down, carrying out and monitoring programmes for conservation and enhancement of the environment, and for conservation, control and abatement not to cause environmental pollution;</td>
</tr>
<tr>
<td>d. prescribing environmental quality standards including standards on emissions, effluents, solid waste, production procedures, processes and products for conservation and enhancement of environmental quality;</td>
</tr>
<tr>
<td>e. submitting proposals to the Committee for economic incentive mechanisms and terms and conditions which may not affect the environment or cause least environmental affect for sustainable development in addition to legal affairs and guidelines relating to environment;</td>
</tr>
<tr>
<td>f. facilitating for the settlement of environmental disputes and if necessary forming bodies to negotiate such disputes;</td>
</tr>
<tr>
<td>g. specifying categories and classes of hazardous waste generated from the production and use of chemicals or other hazardous substances in carrying out industry, agriculture, mineral production, sanitation and other activities;</td>
</tr>
</tbody>
</table>
h. prescribing categories of hazardous substances that may affect significantly at present or in the long run on the environment;

i. promoting and carrying out the establishment of necessary factories and stations for the treatment of solid waste, effluents and emissions which contain toxic and hazardous substances;

j. prescribing the terms and conditions relating to effluent treatment in industrial estates and other necessary places and buildings and emissions of machines, vehicles and mechanisms;

k. negotiating, cooperating and implementing in respect of international, regional and bilateral agreements, instruments and programmes relating to matters of environment;

l. implementing the international, regional and bilateral agreements accepted by Myanmar for environmental conservation and enhancement of environmental quality in accord with the guidance adopted by the Union Government or the Committee;

m. causing to lay down and carry out a system of environmental impact assessment and social impact assessment as to whether or not a project or activity to be undertaken by any government department, organization or person may cause a significant impact on the environment;

n. laying down guidance relating to the management, conservation and enhancement of environment for the matters of protection of ozone layer, conservation of biological diversity, conservation of coastal environment, mitigation and adaptation of global warming and climate change, combating desertification and management of non-depleting substances and management of other environmental matters;

o. managing to cause the polluter to compensate for environmental impact, cause to contribute fund by the organizations which obtain benefit from the natural environmental service system, cause to contribute a part of the benefit from the businesses which explore, trade and use the natural resources in environmental conservation works.

Chapter 7: Environment Conservation

Article 13. The Ministry shall, under the guidance of the Committee, maintain a comprehensive monitoring system and implement by itself or in co-ordination with relevant Government departments and organizations in the following matters:

a. the use of agro-chemicals which cause to impact on the environment significantly;

b. transport, storage, use, treatment and disposal of pollutants and hazardous substances in industries;

c. disposal of waste come out from exploration, production and treatment of minerals, industrial mineral raw materials and gems;

d. carrying out waste disposal and sanitation works;

e. carrying out other necessary matters relating to environmental pollution.

Article 14. A person causing a point source of pollution shall treat, emit, discharge and deposit the substances which cause pollution in the environment in accord with stipulated environmental quality standards.

Article 15. The owner or occupier of any business, material or place which causes a point source of pollution shall install or use an on-site facility or controlling equipment in order to monitor, control, manage, reduce or eliminate environmental pollution. If it is impracticable, it shall be arranged to dispose the waste in accord with environmentally sound methods.

Article 16. A person or organization operating business in the industrial estate or business in the special economic zone or category of business stipulated by the Ministry:
<p>| | |</p>
<table>
<thead>
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<tbody>
<tr>
<td>a.</td>
<td>is responsible to carry out by contributing the stipulated cash or kind in the relevant combined scheme for the environmental conservation including the management and treatment of waste;</td>
</tr>
<tr>
<td>b.</td>
<td>shall contribute the stipulated users charges or management fees for the environmental conservation according to the relevant industrial estate, special economic zone and business organization;</td>
</tr>
<tr>
<td>c.</td>
<td>shall comply with the directives issued for environmental conservation according to the relevant industrial estate, special economic zone or business (MOECAF, 2012).</td>
</tr>
<tr>
<td>1.</td>
<td>The City Of Yangon Development Law (1990) by The State Law and Order Restoration Council Law No. 11/90</td>
</tr>
<tr>
<td></td>
<td>Chapter 3</td>
</tr>
<tr>
<td>a.</td>
<td>carrying out works for sanitation;</td>
</tr>
<tr>
<td>b.</td>
<td>carrying out works for public health (SLORCL, 1990)</td>
</tr>
<tr>
<td></td>
<td>Section 111</td>
</tr>
<tr>
<td></td>
<td>For the purpose of collecting, treating and removing rubbish and offensive matter, the Corporation shall provide public receptacles, depots and places for the temporary deposit or final disposal thereof:</td>
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<td></td>
<td>Provided that the President of the Union may prohibit such final disposal in any specified placer or manner (“The city of Rangoon municipal act ( 1922 ),” 1922)</td>
</tr>
<tr>
<td>3.</td>
<td>Prohibition for pollution control and cleansing</td>
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<tr>
<td></td>
<td>a.</td>
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<td>b.</td>
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<td>h.</td>
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<td></td>
<td>i.</td>
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This section analyses the major problems and issues of SWM in Yangon city at the national level, at the source of generation, and the issues of the existing SWM practice.

6.1 **Problem and Issues at on Data and Information**

To date, the government and the relevant departments and organizations of solid waste management have not implemented yet a proper data collection and research at the national level. There are mainly three committees which are dealing with solid waste in three cities: Yangon (YCDC), Mandalay (MCDC –Mandalay Community Development Committee), and NPTDC (Naypyitaw development committee) in Myanmar. Among them, even the most active one, PCCD/YCDC is still struggling to provide the detailed data of solid waste on a monthly basis, because they normally collect data from two main FDS (Htein Bin and Htawe Chaung); whereas they do not collect from the rest FDS on a monthly basis.

According to Saw Min Aung, the deputy head of PCCD, if data on the district base in Yangon city has been collected, it would be able to sum up the total number of tons from all four districts (East, West, North, South). The total amount of waste generated per day could be calculated for Yangon city. This is the reason that the total number of tons collected on a daily basis was unavailable. Even in the capital Nay Pyi Taw and Mandalay city, proper data collection on SWM has not been done yet. As a result, the data has not been available at city level and country level. This is the major issue in doing this report.
6.2 Problems and Issues at the Source of Generation

In the city, though the department provides separate bins for wet and dry waste in some places, it cannot provide them everywhere in the city of Yangon. Moreover, people do not hesitate to throw their trash, litter, left-over food, plastic, and other waste especially on the roads and on the sidewalks. This is also one of the major issues at the source of generation. In addition, since the department does not provide separate bins for recyclable and non-recyclable waste, all are mixed up, which gives the workers more work.

6.3 Problems and Issues of the Existing SWM Practice

There are two conspicuous problems with the existing SWM practice in the city of Yangon. All the dumping sites are open and uncontrolled landfill. Moreover, there is no single management regarding the leachate from the waste as well. The leachate flowing to the river would indirectly deteriorate the health of the public and decrease the quality of the environment as well. In addition, since the dumping sites are open, the waste covers more space than it should. In the long run, the SLCP from the dumping sites will directly impact the health of child waste pickers and the people who are living around this area, in a negative way.

Another problem is that although some waste is segregated as wet and dry at the source, the workers combine them all on the truck and transport to the FDS together. This is because the department does not provide separate vehicles for different waste. All these are the current issues in SWM practice.
7. CONCLUSIONS AND RECOMMENDATIONS

The final part consists of conclusions and recommendations. In the conclusion, the findings are summarized, while there are comments and guidelines given for the next study in the recommendation.
7.1 Conclusions

On the whole, in Yangon, 1690 tons of waste per day are normally generated from the households, commercial centres, institutions, and industries, which sums up to 0.396kg per capita per day. In terms of collecting the data, no systematic data collection method is used till today. And the drawback situation in Yangon city is that there is limited of data on waste generation and classification as well as no accurate data and information on the municipal solid waste (MWS) generation. Currently in Yangon, there is no methodology used in the quantification of MWS. Therefore, the data cannot be assumed confidently as accurate.

In case of recycled waste in Yangon, 86 TPD out of 1690 TPD could be recycled, which is only 5% of the total waste. Though more than three-quarters of the total waste are organic, the recycling rate is quite low since the composting system is not in place yet. Among the recycled waste, glasses are mostly recycled and cardboard and paper are the second highest recycled items.

Moreover, in Yangon, PCCD (Pollution control and cleansing department) cannot run by the revenue they get from the fees and charges for the services because the fee they charge for the services are quite low and cannot finance to all the officers and labourers. Therefore, Yangon regional government has to subsidise the rest of the expenses to support all the activities and projects, including the management expense, although they do not get back the capital and investment spent on the projects. Since they cannot cover enough finance from the services, there are negative impacts on their performance as well. In spite of having a small-scale recycling plant, it cannot make any income for the department, as mostly the products are utilized by the department itself.

The sources of solid waste in Yangon are mainly from household industrial, health care, commercial establishments, institutional organizations, gardens, and street sweeping. In this solid waste data, the number of waste from demolition and workshop (oil, sewage) are excluded.

Regarding the FDS (final dumping site) in Yangon, there are currently six altogether in Yangon city, of which Htein Bin and Htawe Chaung are the two largest dumping sites. All FDS are open and there is no proper management of the waste and the leachate there. In case of public awareness, a project called “SWM in Myanmar” is being implemented by PCCD supported European Union. However, it cannot spread to the grassroots level of the country yet.

The relevant ministry and department of solid waste management are weak in enforcing the laws and policies they issued. Despite the fact that MOECAF has issued the environment conservation law which includes prescribing environmental quality standards including standards on
emissions, effluents, solid waste, production procedures, processes and products for conservation and enhancement of environmental quality, in practical they cannot set the standards. Likewise, PCCD also sets prohibitions of pollution control and cleansing, but people do not even know what rules and regulations are there to follow. Therefore, it is conspicuous that the relevant ministry and department are weak in enforcing their laws and regulations. Furthermore, there have not been acts or laws issued by PCCD itself, though it declares some prohibitions. Hence, laws or acts should be issued by PCCD in line with solid waste management and it is necessary to enforce the laws at the same time.

7.2 RECOMMENDATIONS

In relation to this report, the work cannot be accomplished without the collaboration of the local government in providing the data and the information needed. Some data which are not publicly distributed are not available without the help of the relevant agency. Therefore, in the further work, collaboration from the local government would be greatly helpful in providing the data and information to find out what really are the gaps and the drawbacks; and what intervention should be done.

Concerning the data and information, they are supported not only by PCCD/YCCD during field visit and CCAC-MSWI workshop as primary data, but are obtained from IGES report. However, the amount of waste generation, officers, vehicles, brick tanks, and dumping bins could have changed within one year. Thus, the data should also be updated by the department (PCCD).

Regarding to the laws and regulations, the relevant ministry and department of solid waste management are weak in enforcing the existing laws and policies. Moreover, PCCD has not issued any laws or acts by itself in line with solid waste management. PCCD should issue its own laws and policy regarding solid waste and should enforce them widely at the same time.

For building the capacity, exchange field visit program is really beneficial to the the officers in PCCD responsible for solid waste management and it should be held frequently. The participants can exchange their knowledge about what they are doing and what they should do next. For those who have started any projects, this would be the initial point to start the project and the learning place for new environmentally sound technology.

Furthermore, the officers and the labourers at PCCD greatly need capacity building to be able to use the methodology in collecting accurate data, to calculate the emissions rate of SLCP, and to manage the waste at the dumping sites. With the current rate of Yangon City’s organic waste composition of 76% in MSW, there is a high potential to mitigate SLCPs.
According to the findings, PCCD lacks a waste management infrastructure, such as a transfer station, wrapping plant, proper management of the leachate at the landfill (sanitary landfill), fertilizer plant, anaerobic digestion, treatment of the waste and incineration plant. Among the above projects, PCCD is planning to run incineration plants in collaboration with Korean companies.

Apart from that, PCCD should launch its own composting and fertilizer plant at the landfill, since more than three-quarters of the total waste are organic. From this plant, PCCD could generate income that would help the sustainability of PCCD. Moreover, PCCD should focus on treatment of the sewage from the industries and the leachate from the landfill which flows into the river. Without treating them, the quality of the environment will be deteriorated and it would badly affect the health of the public.
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