Development of Work Plan for Reducing SLCPs from MSWM in Cebu, Philippines

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IGES Institute for Global Environmental Strategies

CLIMATE & CLEAN AIR COALITION

OFFICIAL SEAL CITY OF CEBU

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1. Introduction

The Climate and Clean Air Coalition (CCAC) is one of the global efforts that unites governments, civil society and private sector, committed to improving air quality and protecting the climate by reducing the Short Lived Climate Pollutants (SLCPs) across different sectors. It was launched on 14 June 2011 by the governments of Bangladesh, Canada, Ghana, Mexico, Sweden and the United States, along with the United Nations Environment Programme (UNEP) and currently have 51 national governments, 16 International and Bilateral Agencies and 45 Non-Governmental Organizations (NGOs) are working together to address short-lived climate pollutants (SLCP) by raising awareness of short-lived climate pollutant impacts and mitigation strategies, enhancing and developing new national and regional actions, including identifying and overcoming barriers, increasing capacity, and mobilizing support, promoting best practices and showcasing successful efforts, and improving scientific understanding of short-lived climate pollutant impacts and mitigation strategies[1].

Under the coalition, 11 initiatives have commenced work thus far. One of these initiatives is the Municipal Solid Waste Initiative (MSWI), aimed at reducing SLCPs created by municipal solid waste. The CCAC-MSWI has completed its Phase 1 (establishment of infrastructure and initial assessment of the MSW initiative) activities and currently underway in Phase II (Implementing on the ground action with cities and informing the long-term framework of the initiative) and Phase III (implement on the ground action with cities towards long-term feasible solutions and scaling up beyond the initial targets). Under this initiative, Cebu City, Philippines undertook a Rapid City Assessment and Action Plan development. The city action plans for SLCP emissions reduction included: implementation of waste separation at source and collection; promotion of material recovery facility (MRF) and composting (medium and larger-scales) to recycle the organic waste; improvement of the final disposal site (sanitary landfill); and preparation of a long-term plan for achieving zero landfill status. Following on from the above, this work plan comprises the following sections:

1. Work plan for the implementation of waste separation at source and collection.
2. Work plan for the promotion of material recovery facility (MRF) and composting facility (medium and large-scale) for organic waste.
3. Work plan for the improvement of the final disposal site (sanitary landfill) and prepare a long-term plan for achieving zero landfill status.
4. Build partnership for implementation of integrated solid waste management (ISWM) plan to achieve the SLCP emissions reduction.

[1] For more information about the CCAC and its initiatives see http://www.ccacoalition.org/en

A multi-stakeholder participatory approach was used throughout the project implementation. The study conducted field visits, sample data collection, training, workshops and meetings with different stakeholders at barangay, city, province and national level. Two barangays (barangay Apas and Kalunasan) were selected in consultation with Cebu City to pilot survey and project implementation. The findings of the pilot barangays later used for discussion with other barangays and city in developing the work plans. The study first conducted a primarily qualitative baseline study to relevant SWM stakeholders based on the Republic Act 9003 (RA 9003) through a series of key informant interviews and Focus Group Discussions (FGD) with Force Field Analysis. Strengths, Weaknesses, Opportunities and Threats (SWOT) Analysis and a Stakeholders Mapping of each pilot site were also administered. The results of the baseline study became basis for the steps undertaken and all activities henceforth were documented and monitored based on the work plan.

Figure 1: Stakeholder meeting with barangay officials in Cebu. Source: Authors, 2016

Figure 2: Group discussions on developing work plans. Source: Authors, 2016

2. Background

2.1. City Context

Cebu City is the most highly urbanized centre in the Central Philippines and the second largest growth centre in the Philippines, next to Manila[2]. As of 2015, Cebu City has a total population of 923,000 and increase of 6.5% since 2010 making it the fifth most populated city in the country[3]. 85% of the population live in urban barangays with the average population density of 2,204 persons per sq. m. It is located in the central eastern part of the Cebu Island, bounded by Mandaue City in the North and Talisay City in the South. On the East is Mactan Channel and on its West is the municipality of Balamban and Toledo. The information and communication technology (ICT) and tourism sections lead the economic growth in the city. It is one of the major hubs for the business process outsourcing (BPO) in the Philippines.

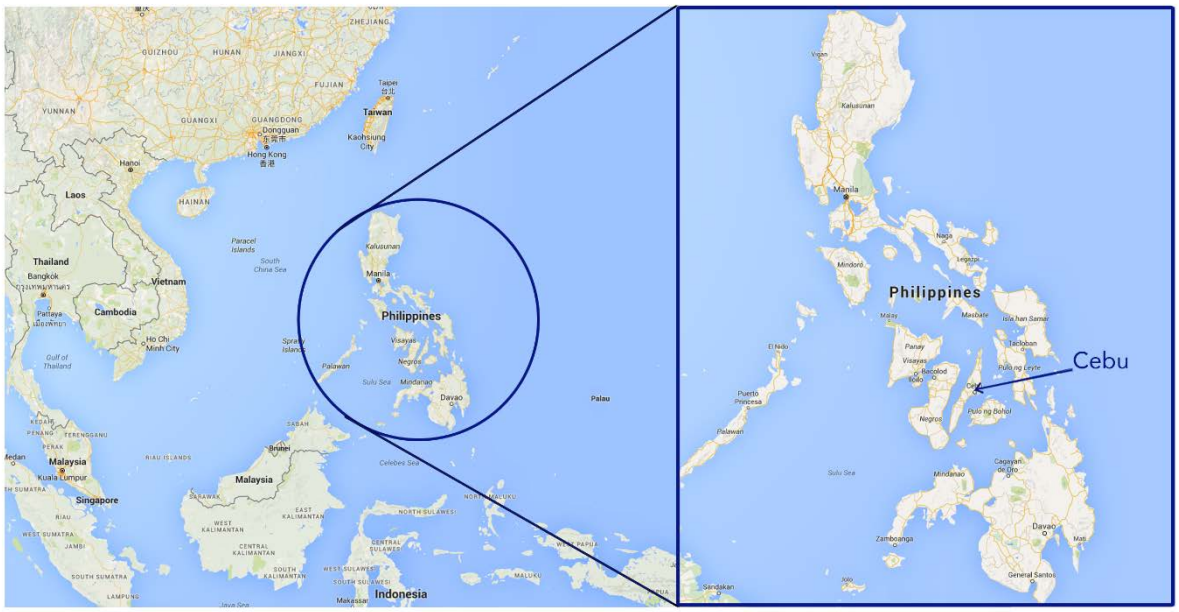

Figure 3: Location of Cebu City. Source:www.google.co.jp

According to the Constitution of the Philippines, the local governments enjoy local autonomy and in which the Philippine president exercises general supervision. Congress enacted the Local Government Code of the Philippines in 1991 to provide for a more responsive and accountable local government structure instituted through a system of decentralization with effective mechanisms of recall, initiative, and referendum, allocate among the different local government units their powers, responsibilities, and resources, and provide for the qualifications, election, appointment and removal, term, salaries, powers and functions and duties of local officials, and all other matters relating to the organization and operation of local units[4]. The city of Cebu was established under the City Charter granted by the Commonwealth Act

[2] City of Cebu (2007): City Profile, the City Planning and Development Office, Cebu City
[3] "Region VII (CENTRAL VISAYAS)". Census of Population (2015): Total Population by Province, City, Municipality and Barangay (Report). PSA. Retrieved 20 June 2016.
[4] Government of Philippines (1991): Local Government Code of Act 1991, http://www.lawphil.net/statutes/repacts/ra1991/ra_7160_1991.html

No. 58 of 1934. Currently, the city functions are operated under the Republic Act No. 3857, otherwise known as the Revised Charter of the City of Cebu was approved on June 10, 1964. The city is governed by the mayor (executive) and legislative (ordinances and resolutions enacted by the legislatures). Further, there are 21 departments in a city to provide mandatory services to its citizen[5]. The city is further composed of 80 barangays, 50 urban and 30 rural. According to the Local Government Code of 1992 of the Philippines, barangay or barrio is the smallest political and administrative unit of the city. Urban area shares 24% of the city's total land area (78.09 sq. km) while the rural area shares 76% (248.01 sq. km). In terms of topography, the coastal areas accounting to about 15% of the city have a relatively flat terrain while 85% has elevations ranging from 40 to 400 m above sea level[6].

2.2. Municipal Solid Waste Management (MSWM)

According to the RA 9003, Municipal Solid Waste (MSW) refers to wastes produced from activities within local government units, which include a combination of domestic, commercial, institutional and industrial wastes and street sweepings[7]. Cebu City also estimated that most of the MSW comes from households or domestic, which constitutes about 54%. Commercial sources, which include commercial establishments and public or private markets contribute 25% while institutional sources such as government offices, educational and medical institutions account for about 21%.

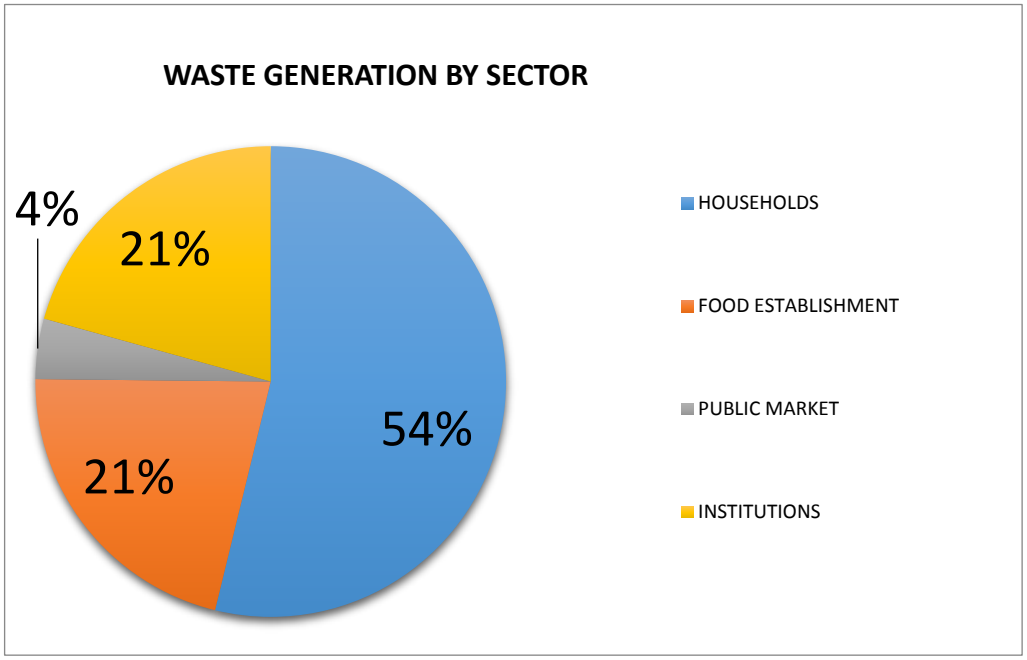

Figure 4: Waste generation by sector. Source: Cebu City, 2012

[5] http://www.lawphil.net/statutes/repacts/ra1964/ra_3857_1964.html
[6] Cebu City, 2012
[7] DENR Administrative Order No. 2001 – 34 December 20, 2001 Implementing Rules and Regulations of Republic Act 9003. http://emb.gov.ph/wp-content/uploads/2015/12/DAO-2001-34.pdf

There is no accurate data available on the waste generation in the city. In this regards, it was estimated that Cebu City produces about 630 tonnes of MSW per day considering the average per capita waste generation of 500 grams/person in the provincial capitals based on the national calculation of the Philippines[8]. Among the total waste generation, Cebu City produces mostly organic waste (about 67% of the total waste generation in the city). Recyclable waste is estimated at about 21% (plastic, paper, metal, and glasses) and the rest (12%) is hazardous and residual waste.

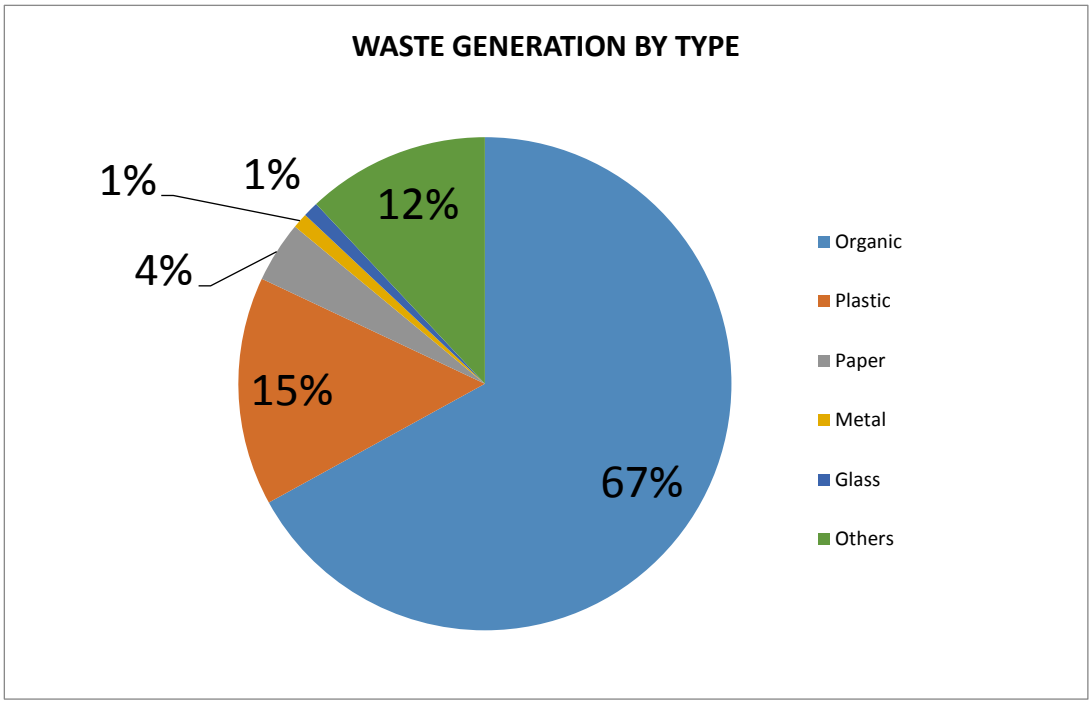

Figure 5: Waste generation by type. Source: Cebu City, 2012

The waste collection in the city is the responsibility of both city government and barangays. The Department of Public Services (DPS) is the principle office of the Cebu City responsible for collecting waste within the city specially from the commercial, institutional and the households in the main access roads, whereas each barangay is responsible for collecting waste within their respective administrative units using their own trucks or the trucks that provided by the city. Two popular collection methods are practiced for waste collection: (i) the communal method where common waste receptacles are strategically located in public places and (ii) household collection, which is carried out by garbage trucks. The above two methods are supplemented with private initiatives, which collect MSW from commercial establishments such as shopping malls. According to the data provided by the DPS, the average waste collection of the city was about 460 tonnes/day in 2015. According to city data, MSW collection coverage is 100%. It can be estimated that the balance of generated waste (160 tonnes/day) is recycled by the both formal and informal recyclers throughout the waste management system.

[8] http://119.92.161.2/portal/Portals/38/Solid%20Wastefinaldraft%2012.29.15.pdf

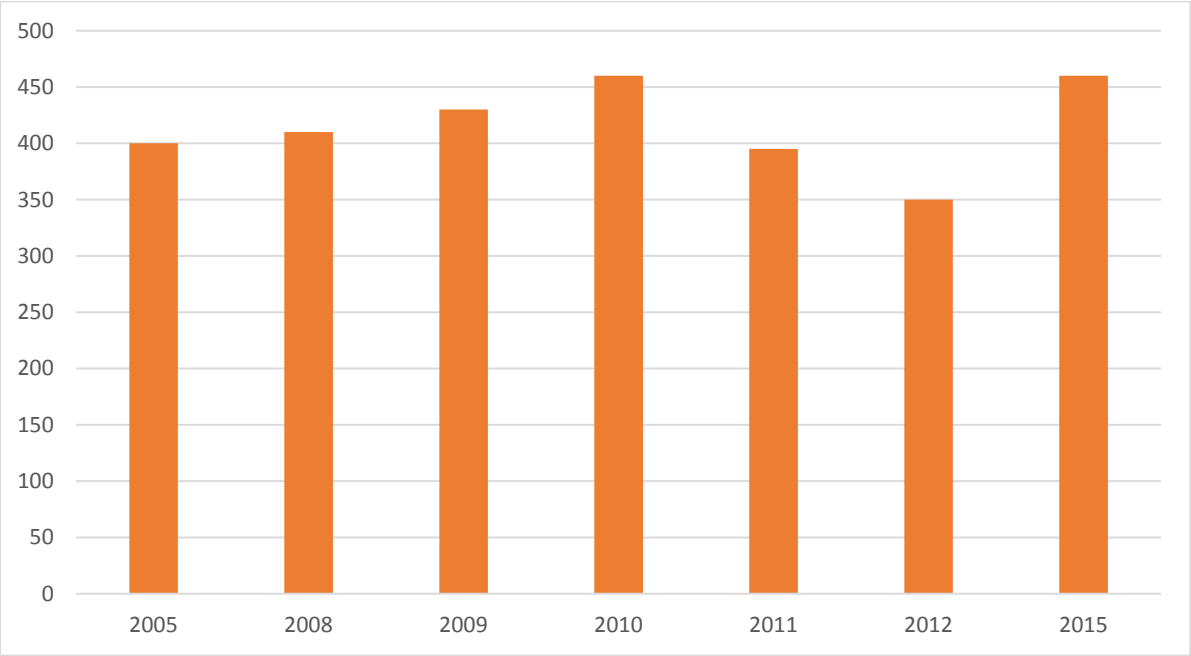

Figure 6: Average Waste Collection (tonnes/day). Source: Cebu City

The DPS has a total of 54 vehicles allocated for garbage collection in the city. Among them, 37 units of which are operational when the study was conducted in April 2016. In addition, 13 units are under repair and 4 units are beyond economical repair**.** The DPS has a total of 601 personnel for the operation of waste management services. This includes 140 permanent staff, 423 casual staff and 38 job order staff. The total annual budget allocation for the waste management in 2016 was 303m pesos. In addition to DPS, each barangay is responsible for collecting waste within their respective administrative units using their own trucks or the trucks that provided by the city. A total 140 trucks are owned by the barangays and used for waste collection within the barangays.

The city has involved in promoting waste separation at source and recycling, though the success of these activities is still very limited. About 58 barangays of the 80 barangays in the city has their own MRF, though there is a high level of disparity in effectiveness. The barangay MRFs are engaged in various recycling and material recovery projects. For example, in barangay Luz, over a hundred unemployed mothers also get a livelihood by using the recycled garbage coming from industries in their barangay to produce bags, fashion accessories, rosaries, summer hats and even wine and ball penholders.

There are number of local policies, by-laws were established by the City of Cebu for governing MSW in the city, and some of them are listed in the table below:

Table 1: A List of Local Policies and Bylaws for Waste Management

Ordinance	Date Passed	Purpose
No. 1361	October 6, 2004	Established garbage collection system and imposed fees
No. 2017	October 6, 2004	Creation of the Cebu City Solid Waste Management Board
No. 2013	November, 2004	Mandating garbage segregation at source. Categorization of waste. Establishment of fines.
No. 2234	April 16, 2010	Creation of the Cebu City Environmental and Natural Resources Office (CCENRO)
No. 2243	June 23, 2010	Declaration of policy to preserve and protect the sources of life - the trees, soil and water - and to focus on sustainable development. Mandated the submission by business establishments of their respective Environmental Sustainability Action Plan (ESAP) when securing or renewing Business License or Mayor's Permit.
No. 2343	December 12, 2012	Prohibits the use of plastic shopping bags as primary packaging on Saturdays
No. 2031	November 10, 2014	Declaration of adoption of a systematic, comprehensive and ecological solid waste management system

Source: Cebu City, 2016

3. Gaps and Issues

3.1. Reported

(a) Waste separation at source and collection

Five years since its implementation, Cebu City is yet to perfect the implementation of its segregated garbage collection system. Barangay residents continue to mix biodegradable with their non-biodegradable wastes. In order to understand the key challenges and opportunities in the implementation of effective waste separation and collection system at the barangay level, SWOT (Strengths, Weakness, Opportunites and Threats) analysis workshops were conducted in two pilot barangays, including Apas and Kalunasan. The findings of the workshops were summarised in the table below.

Table 2 – SWOT Analysis in Barangays Apas and Kalunsan

Apas	Kalunasan
Strengths	
• Strict Implementation SWM • Active Means of Knowledge Drive on SWM • Barangay has a Materials Recovery Facility (MRF) for composting	• Barangay officials are united • Plans are very supported • Barangay holds regular meetings

• Barangay is active in most waste disposal programs	• Officials and *tanods* roam and monitor the areas • Cooperation in the barangay is observed
Weaknesses	
• Strict Implementation may upset members in the community • Police enforcers take too long to respond when violations occur that need apprehension • Lack of personnel for garbage collecting vehicles • Lack of honorariums for garbage collectors due to the city's new administration • Many residents still do not cooperate in practicing waste segregation	• Lack of garbage collecting vehicles • No apprehension of violators • Irregular attendance among committee members during meetings • Lack of strict enforcement and laws on apprehending violators • Lack of cooperation among the residents, especially when their garbage is not collected due to their failure on segregating • Lack of honest cooperation from garbage collectors such as not following orders or cases of accepting trash that are not segregated
Opportunities	
• Most residents are willing to cooperate due to a common goal of cleanliness. Some residents reprimand others and follow the rules and programs of keeping the barangay clean • Opportunities to cooperate with neighbouring barangays for the implementation of solid waste management, thus furthering the program • Barangay has support and cooperation from the Central Command (CENTCOM), one of the stakeholders of the Barangay SWM and they were also provided the land lot for the construction of the barangay's MRF	• Garbage collectors and barangay officials can enforce cleanliness within the community • Barangay officials hold regular meetings to discuss matters on cleanliness
Threats	
• Cancellation of honorariums for garbage collectors by the new city government, discouraging garbage personnel from doing their jobs	• Lack of a landfill or a dumpsite • Lack of support from the current city administration, including finances and vehicles

• There is no cooperation when garbage becomes too excessive, especially when it is not segregated properly by the residents	

Source: Authors, 2016

(b) Promotion of material recovery facility (MRF) and composting facility (medium and large-scale) for organic waste.

About 58 barangays out of a total 80 barangays have MRF and composting facilities, but their operation is not satisfactory due to a number of issues, such as no waste separation at source, financial constraints, technical capacity and lack of management skills. Model composting projects have been established by the city in partnership with different stakeholders at different levels. Small-scale barangay composting facilities have been established in 9 selected barangays. These composting facilities have a receiving capacity of less than one tonne per day and rely on segregated waste collected from local community. Methods employed vary and include vermicomposting (special organisms such as red worms, African night crawler and the European crawler) and the Takakura Method (a simple windrow composting method with the Native Microorganisms has been introduced by the experts of Kitakyushu City). Compost products are mainly used as fertilizers for beautifying the barangays or sold within the barangay. However, customers are generally limited to the personal networks of the waste collectors and core members of the community based organisations (CBOs) in the barangay. This scheme encounters a number of challenges such as cooperation level of residents, suitable location, bad odour complaints by nearby residents due to vermicomposting facilities, and the lack of capacity, interest and willingness of barangay officials and staff to tackle these issues.

Figure 6: Barangay composting facility in operation. Source: Authors, 2016

In addition, one central composting facility was established by a private company called Bio Nutrient Waste Management Inc., near the Inayawan landfill to treat about 10–20 tonnes per day of organic waste collected from shopping malls and public markets in the city. This plant started its operation in 2014 applying a simple windrow composting method. According to the company, there is demand for their compost products from the middle and large scale farmers in the Metro Cebu area. In addition, they have received an income from tipping fees that received from the city. However, there are two significant challenges with the compost plant operators: (i) the current plant is located in rental land very close to the landfill site. The city has ordered the ceasing of operations in this area and finding another suitable location under the city's new development plan to the area and (ii) lack of a regular and long-term contract with the city due to the budget limitation within the city and the buyers to the short-term contract system with waste treatment facilities. During 2014, the plant has successfully processed 8,500 tonnes of organic waste from the market under the contract with the city. However, since 2015 there has been no contract with the city with all market waste being transported to the landfill site.

Figure 7: Compost facility operates by the private owner at Inayawan. Source: Authors, 2016

(c) Final disposal site (sanitary landfill)

The Inayawan Sanitary landfill is located 10 kilometres south of the city and remains the only final disposal site available. The site started operations in September 1, 1998 and is equipped with a mechanized sorting facility and an incinerator. However, manual sorting operations commenced following the malfunction of the sorting facility and scavengers grew in number through the years. The incinerator stopped operations with the enactment of Republic Act 8749, which is interpreted as prohibiting the incineration of waste. There was also originally a PhilBio biogas reactor for collecting sewage and leachate. However, due to

technical problems, the reactor was closed. Since then the leachate treatment pond has served as an impounding basin, discharging untreated leachate into the surrounding areas, causing land and water contamination issues. Previous studies analysed the bio-physicochemical characteristics of leachate and groundwater in Inayawan landfill site identified that the higher concentrations of TDS (Total Dissolved Solids) and TSS (Total Suspended Solids) in all sample sites regardless of seasonal variation exceeded national regulations of the Philippines.

The landfill has thereby steadily become an open dumpsite due to the lack of adequate expertise in utilising and maintaining the equipment and facilities, insufficient financial resources for operation and maintenance coupled with the increasing volume of MSW being disposed in the landfill daily. Although its lifespan was planned to be limited to seven years only, the Cebu City Government continued to operate the landfill by using a compactor machine. Former Mayor Michael Rama ordered the landfill's partial closure in 2011 and full closure in 2015, leading to the conversion of the landfill into a waste transfer station with final disposal being at a private landfill facility in Consolacion 30 kilometre distance from Cebu City. However, the present Mayor, Tomas Osmeña, ordered the re-opening of the landfill site in Inayawan in June 2016. This was subject to legal challenge with the Court of Appeals ordering the permanent closure of the Inayawan Sanitary landfill until it is fully rehabilitated on 15 December 2016. The Mayor claimed that he was unable to continue with disposal at Consolacion due to improper procurement of services by the previous administration and lack of funds. The city then started open dumping at an alternative site, as the punishment for this was considered less severe than ignoring the judgment. As of the time of writing (January 2017), the city had enacted emergency procedures to re-commence disposal in Consolacion but a long-term solution has yet to be agreed.

Figure 8: Final disposal site in Inayawan. Source: Author, 2016

(d) Partnership for implementation of integrated solid waste management (ISWM) plan to achieve SLCP emissions reduction.

As required by law, Cebu City has established the Cebu City Solid Waste Management Board (CSWMB) under the City Ordinance no. 2017. Members of the CSWMB include Cebu City Mayor as Chairperson of his/her representative; Chairperson of the Committee on Environment as Vice-Chairperson; President of the Association of Barangay Councils (ABC) in the city; Chairperson of the Sanggunian Kabataan Federation ; A representative from NGOs; A representative from religious groups; A representative from the recycling industry; A representative from the manufacturing or packaging industry; and A representative of each concerned government agency. In addition, Cebu City has requested each barangay to establish its Barangay Solid Waste Management Committee (BSWMC). However, the study in pilot barangays found that the establishment of BSWMC is still under formulation by each barangay though there are other barangays who have formulated the committee beforehand. There are no available records yet since this is under finalization of its members. Further, Cebu City has not yet finished in getting the approval of the National Solid Waste Management Commission (NSWMC) of the Department of Environmnet and Natural Resources (DENR) for their 10-year plan and with the SWMB yet to be convened, the barangays are left with no clear trajectory for SWM. The BSWMC formed in the barangays have no office to report to. The issues they face which can be documented in barangay sessions and reports have nowhere to go to.

3.2. Perceived

(a) Waste separation at source and collection

According to city data, MSW collection coverage is 100%. However, the observations found that uncollected garbage is left to pile up on city streets, in the interior of barangays and even left floating on

water bodies. Based on the experience of the project pilot sites and the outcomes of the baseline study, most solid waste managers and stakeholders lack the knowledge and complete understanding of solid waste management. The traditional idea is simply the method of collection and dumping. The failure of solid waste management as identified on the pilot sites can be summarized as follows:

- Lack of an insitutional body to implement and enforce SWM
- Less capacity and lack of knowledge to implement SWM
- Less access to funds for manpower and purchase/acquisition of facilities and equipment for SWM
- Less access or lack of initiative to collect SWM related information in the barangay
- No further trainings and/or workshops conducted by the barangay that is responsive to the needs of its SWM staff
- No efficient means of information, education and communication (IEC)

Using the concept of the problem tree analysis, both sites were able to determine the root cause of this which is not a lack of local ordinances adopting the RA 9003 but the ineffective form of education, communication and information drive in the community. The pilot sites are dependent to the IEC materials the city provides which do not encourage a change in behavior in the community due to poor design. Before the project, solid waste managers in pilot sites showed poor understanding of how effective IEC can contribute to the solving of problems.

Moreover the structure of collection may not be optimal. Currently waste is accepted at the landfill site daily within two time frames; 5 p.m. to 12 midnight, and from 12 midnight to 7 a.m. The reason given is to avoid traffic and inconvenience to the travelling public. However, the two pilot barangays found that this is inconvenient due to the need to keep trucks waiting after barangay waste collection in the morning until night to transport to the landfill site. The pilot barangays suggest the landfill should be open in the daytime, most probably from 8:00 – 18:00. In this way, even though barangay has one truck for waste collection, they can operate 2 trips to landfill. It is suggested that waste collection route and time should be decided by each barangay based on their resources (vehicles and staff) and the distribution of premises.

Aiming to practice segregation and avoid collecting mixed wastes from sources, Cebu City has recently introduced a separated waste collection system, including (a) biodegradables - Monday, Wednesday, Friday and Saturday; (b) non-biodegradable wastes and residuals are collected every Tuesday, Thursday and Sunday. Collection of special wastes separately is yet to be announced. The pilot barangays propose an alternative system for separated waste collection, such as (a) biodegradable and residual wastes – Monday, Wednesday and Friday; and (b) non-biodegradable (recyclable) and special waste – only Thursday, reducing waste collection staff working days.

(b) Promotion of material recovery facility (MRF) and composting facility (medium and large-scale) for organic waste.

Most barangays are unable to construct and run MRF and composting facilities due to lack of funds and capacity to manage. In the case of Barangay Apas, the establishment of an MRF is perceived to be in large part due to a donation from the Regional Office (EMB 7) of the DENR. Most MRFs appear to be mere composting center that do not serve the barangay, as in the case of Kalunasan, or a very unsustainable practice that entails more costs in operation than its output yields. Barangays lack the ability to locate suitable land or the funds for construction or land purchase. Nimbyism is also a common problem when discussing potential MRF sites.

Furthermore, in the experience of the two pilot sites, there is lack of an institutional body that would serve as framework in the barangays for the implementation of the law. And on top of that, there is less capacity and knowledge in the barangay officials regarding the implementing rules of the RA 9003. Without an institutional arrangement, key components necessary in project implementation are absent such as enforcement, monitoring and evaluation hence the activities formulated as part of the environmental development plans do not address the solid waste problems and are not made with the consensus of the general public.

A further issue is the effect of the MRFs on the informal local junkshop owners and buyers. Due to the lack of a formalised system a system of informal recycling, buying and selling of non-biodegradable waste has sprung up and constitutes a common form of livelihood for the urban poor. If an MRF is established, it would greatly affect the source of livelihood for this small junkshop owners which could result to less support or cooperation of some sectors in the community for the project.

(c) Final disposal site (sanitary landfill) and Partnership for implementation of integrated solid waste management (ISWM) plan to achieve SLCP emissions reduction

There were no further issues perceived by the implementers beyond what was reported.

3.3. Summary

Solid waste management within Cebu City is substantially constrained at all levels due to a lack of waste separation and the proper construction and management of MRFs and the landfill. This issue is compounded by a lack of a clear agreed framework and funding.

4. Planned Scope of Activities

The following activities are recommended for Cebu City to assist with improvements to their MSW

4.1. Waste separation at source and collection.

Despite repeated efforts, waste separation at source and collection remains deeply problematic. Cebu City should support barangays activities to deepen engagement with communities as well as consider collection day change towards more efficient waste collection.

Activity	Outcome
(1) Strictly enforcement of the separated waste collection	• Develop an alternative system for separated waste collection system and timing, such as (a) biodegradable and residual wastes – Monday, Wednesday and Friday; and (b) non-biodegradable (recyclable) and special waste – only Thursday should be developed in consultation with barangays. • Separated waste collection should also be introduced to the private establishments like fast food chains, some food establishments, big hotels and malls. • Regulate the waste collection from commercial enterprises by the private sector based on generator pay principle and introduce proper systems to monitor its operation such as a manifesto system • At the MRF, non-bio and special waste need to be separated and prepare in accordance with the segmentation of recycling material commercial markets • Strictly enforce the 'No Segregation, No Collection' policy in the city • Introduce some incentive systems both Barangay Environmental Officers (BEOs) and barangays to motivate strictly implement the separated waste collection system, for example an annual city award for best BEO and barangay. • Brief report submitted to the city for consideration of the alteration of landfill

	opening as well waste collection days towards greater collection efficiency.
(2) Development of awareness, and barangay training course and manual	• Continuing efforts such as the regular conduct of seminars in the barangays and community units are necessary to introduce the new waste collection system. • Awareness programmes should aim to arouse a sense of solidarity and encourage cooperation in communities, through the specific activities such as supervision of segregation and discharging activities by rotation among residents, systems and capacities of communities are developed. • At the same time, there is a need to establish a wider coordination body, such as an area-wide organization, such as Barangay Solid Waste Management Committee (BSWMC) to coordinate and monitor the progress of implementation • Development of barangay level training materials and curriculum to raise awareness amongst staff and spread good practices.

4.2. Promotion of material recovery facility (MRF) and composting facility (medium and large-scale) for organic waste.

The proper establishment and operation of MRFs is currently problematic and composting facilities small scale or non-existent. Assessment should lead to recommendations clearly outlining a pathway to establishment of effective facilities and the cost of both establishment and on-going operation clearly described.

Activity	Outcome
(1) Comprehensive Assessment of barangays and their capacity to establish and operate the MRFs	• Assessment of all barangays of (i) current status of MRFs; (ii) funding requirements for proper operation; (iii) potential MRF sites for

	new MRFs if current site is considered impractical • Categorise MRFs into self-operated; city assistance required; and cannot operate. Where MRF cannot operate, the reason should be given. • Allocate city funds to barangays who need external support to establish MRFs. This budget can later recover from the savings of payments for transport and tipping fees due to reduction of waste to be landfilled. • As not all barangays have sufficient land (especially in urban barangays) to establish and operate their own MRF, Cebu City can establish a central MRF clustering the nearby barangays. • BEOs have also been tasked to take responsibility of monitoring the MRFs as to what cluster they belong to. For the successful operation of the recyclable materials in the MRF, barangays should have a proper marketing strategy. In addition, barangay should study an alternative technology to turn collected waste into resources.
(2) Assessment of Potential for Establishment and operation of Composting Facilities	• Assessment of current composting systems in barangays and evaluate their technical and economic feasibility and identify most economically viable scale. In addition, it is recommended to have a proper training programme for the workers who are responsible in operating the composting programme. • Assessment and improvement of current mechanisms to compost the organic waste collected from shopping malls and public markets based on the experience of the Bio

	Nutrient Waste Management Inc., which has already an experience of operating 20-30 tonnes/day organic waste from the commercial premises and city's market. • Needs to guarantee a long-term contract and efficient tipping fees to motivate private companies to introduce new technologies for composting • Establish new legislation to reduce food waste generation in the city. In order to promote reduction of the food waste, Cebu City can introduce the new laws for promotion of recycling and related activities for the treatment of cyclical food resources. Currently, some of the OECD countries including Japan, USA, EU, South Korea, etc. have enacted similar laws to reduce the food waste and lessons that be learned

4.3. Final disposal site (sanitary landfill)

Cebu City's current situation regarding its landfill constitutes an environmental emergency to which a solution must be rapidly found. In the first instance, an alternative landfill must be located and waste delivery services recommenced. During this time, the landfill at Inayawan must be rehabilitated. As Inayawan is now at the end of life, an alternative sanitary landfill be constructed and consideration given to the permanent closure of Inayawan. In both cases, sufficient funding must be found.

Activity	Outcome
(1) Immediately close the operation of the open dumping in Inayawan landfill and find an alternative landfill site to dispose the city waste for short term	• Requires finding an alternative landfill site for proper disposal in short-term. Cebu City can look at the potential of existing landfill sites in nearby cities as an alternative.
(2) Enhancement of current landfill site in Inayawan as a controlled disposal site	• Work undertaken at the landfill in concert with DENR in order to bring the landfill into the minimal requirements for re-opening

(3) Development of the final disposal site with sanitary landfill standards obligated by the RA 9003.	• Report on new landfill detailing potential sites and costs involved of establishment and operation • The financial plan should be developed to understand the potential funding partners and funding mechanisms
(4) Implementation of environmental closure of Inayawan landfill	• Report detailing steps required for the proper closure of the Inayawan landfill and costs involved
(5) Proper management of medical and special waste	• Introduce a proper collection and environmental friendly treatment of medical and special waste according to the relevant laws stopping their disposal in the landfills
(6) Potential Introduction of Appropriate Technology of "Waste-to-Energy (WTE)	• Considering the increase of waste generation in the city and difficulties in finding suitable lands for waste disposal due to limited land availability within the city limit, the feasibility of appropriate treatment options such as WTE (Biogas, Refuse Derived Fuel (RDF) can be studied and piloted while potential application of Incinerator is still in a policy dialogue

4.4. Partnership for implementation of integrated solid waste management (ISWM) plan to achieve SLCP emissions reduction

Current partnerships are fractured and necessary barangay committees broadly absent. Considerable efforts are needed to establish the necessary governance structure.

Activity	Outcome
(1) Institute the operation of CSWMB	• Appointment of new members to the board; allocation of necessary budget for activities; monitoring of the implementation of the Municipal Solid Waste Management Plan
(2) Establishment and strengthen the operation of Barangay Solid Waste Management Committees	• Establishment of BSWMCs; assistance with capacity building as detailed above.

(3) Development of the 10 Year Solid Waste Management Plan	• Cebu City should quickly finalise its 10 Year SWM plan consistent with the national solid waste management framework in consultation with wider stakeholder involvement. The SWM plan should be placed primary emphasis on implementation of all feasible re-use, recycling, and composting programs while identifying the amount of landfill and transformation capacity that will be needed for solid waste, which cannot be re-used, recycled, or composted. • In addition, it shall be get approvals from the National Solid Waste Management Commission (NSWMC) of DENR and reviewed and updated every year by the city's municipal solid waste management board