



# CLEAN CITIES, BLUE OCEAN

## Initial Solid Waste Management Assessment – Philippines



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This assessment was produced for review by the United States Agency for International Development by Tetra Tech under the Clean Cities, Blue Ocean program.

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## **DISCLAIMER**

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Note: This report was developed by Clean Cities, Blue Ocean to inform the program's approach. The report was developed through desk research and represents the best available data accessible to the program.

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## Acronyms and Abbreviations

3Rs	Reuse, Reduce, and Recycle
ADB	Asian Development Bank
AFR	Alternative Fuels and Raw Materials
CCBO	[USAID] Clean Cities, Blue Ocean
DENR	Department of Environment and Natural Resources
DOH	Department of Health
EMB	Environmental Management Bureau
ENRO	Environment and Natural Resources Office
ISWMA	Initial Solid Waste Management Assessment
LGUs	Local Government Units
MEF	Mother Earth Foundation
MMDA	Metropolitan Manila Development Authority
MRF	Material Recovery Facility
NEA	Non-Environmentally Acceptable
NEAP	Non-Environmentally Acceptable Products
NGO	Non-Governmental Organization
NSWMC	National Solid Waste Management Commission
PDMF	Project Development and Monitoring Facility
PENRO	Provincial Environment and Natural Resources Office
PPP	Public-Private Partnership
SWM	Solid Waste Management
SWMO	Solid Waste Management Office of MMDA
SWMP	10-Year Solid Waste Management Plan
TWC	Technical Working Committee
USAID	United States Agency for International Development
WHEELS	Welfare, Health and Sanitation, Education, Environmental Management, Livelihood, and Sustainability

# I. Introduction

On August 28, 2019, Tetra Tech was awarded the Clean Cities, Blue Ocean (CCBO) Program, a five-year contract from the U.S. Agency for International Development (USAID) Bureau of Economic Growth, Education, and Environment's Office of Land and Urban. CCBO is the Agency's flagship program to respond to the global crisis of marine plastic pollution. The objectives of CCBO are to:

- Objective 1:** Promote reduce, reuse, recycle (3Rs) and strengthen local and regional markets for recycled plastics;
- Objective 2:** Build social and behavior change (SBC) for 3Rs and sustainable solid waste management (SWM);
- Objective 3:** Increase capacity and effective governance of SWM and 3Rs systems; and
- Objective 4:** Support international fora, public-private partnerships (PPPs), and multi-stakeholder alliances.

The following report presents CCBO's Initial Solid Waste Management Assessment (ISWMA), covering the program's four "engagement sites" in the Republic of the Philippines: Batangas City, Iloilo City, Las Piñas, and Pasig. The ISWMA is one of CCBO's first steps in its launch of in-field implementation and will support its engagement sites to create improvements that will lead to sustainable, integrated waste management systems that will help restore the region's natural environment, advance urban planning and management, and improve public health. The ISWMA's main objectives are to:

- Identify the existing components of the solid waste management (SWM) systems in each of the engagement sites;
- Assess and determine those areas that are expected to need improvements;
- Identify additional information that is needed to support implementation for improved systems; and
- Provide recommendations which will ultimately inform the program's Year One and subsequent Works Plans.

Due to the coronavirus pandemic and resulting international travel restrictions, CCBO has developed this report through extensive desk research, utilizing the websites of multiple governmental agencies (state, provincial, and city), institutions, non-governmental organizations (NGOs), news media, Google Earth, and other relevant websites. A full list of sources is including in Section 6. When international travel resumes and local lockdowns are lifted, CCBO plans to update and validate data and findings, as needed, to ensure accuracy and obtain the support and validation from its local partners. It should be noted, that because reported data could not be verified directly by the CCBO team, when data from different sources (including governmental agencies) appeared to contradict each other or were, in CCBO's experience, likely inaccurate, it is stated as such in the document.

## 2. Current Status of Solid Waste Management in the Philippines

The Philippines is an archipelagic country in Southeast Asia that is situated in the western Pacific Ocean. The country consists of 7,641 islands that are divided into three groups: Luzon, the Visayas, and Mindanao. These groups are further divided into 17 regions, 81 provinces, 146 cities, 1,488 municipalities, and 42,036 barangays. As of 2018, the Philippines population was estimated at 106.5 million.<sup>1</sup> Figure 1 displays the locations of CCBO’s four engagement sites that are included in the ISWMA.

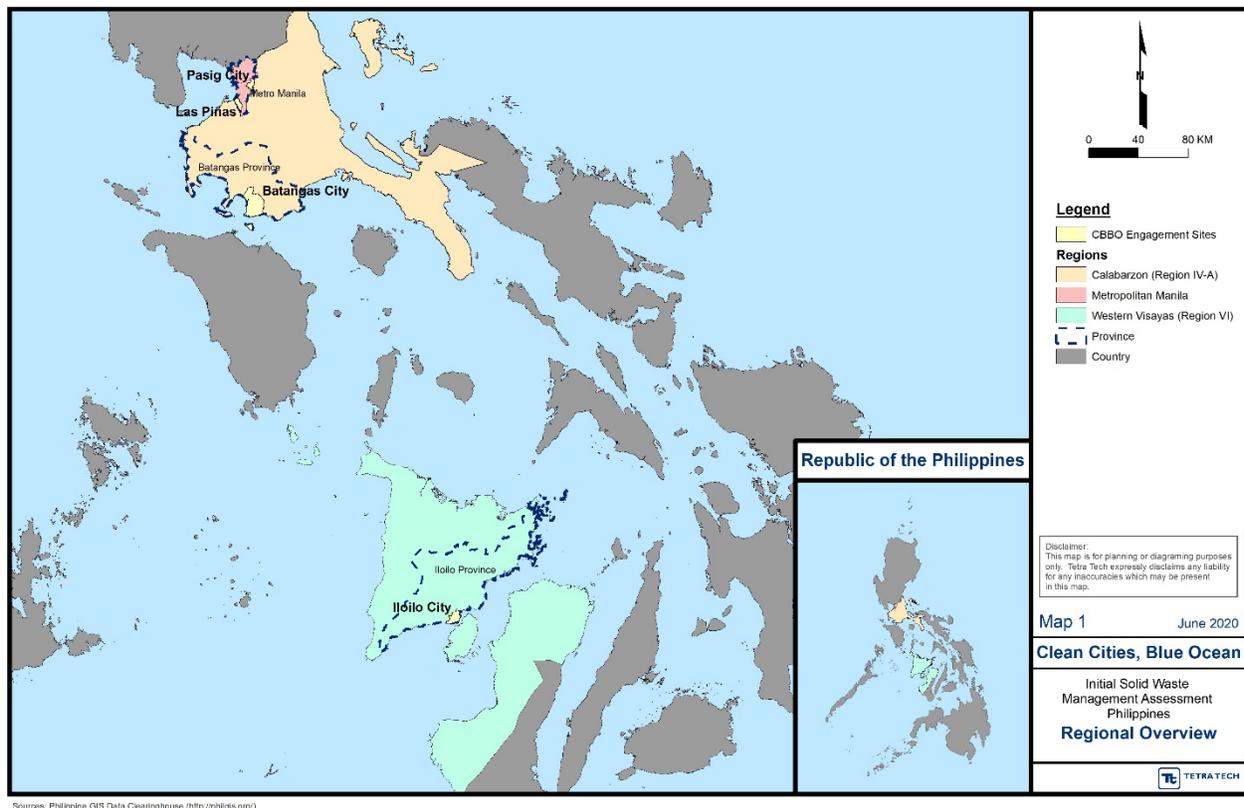


Figure 1. Map of the Philippines and CCBO Engagement Sites

The Philippines has a growing economy and a population that is rapidly increasing. It is the third largest contributor to mismanaged plastics in the ocean – about 1.9 million metric tons per year.<sup>2</sup> The island topography of the Philippines and the country’s high quantities of rainfall increases the likelihood of plastics in the mismanaged waste making their way to the ocean—and the human, economic, and environmental costs of such are mounting. Citizens living adjacent to disposal sites face contaminated water and odors; tourism development is under threat from environmental pollution; and biodiversity is facing serious impacts from the waste in open spaces, streets, rivers, mangroves, bays, and the Pacific Ocean.

<sup>1</sup> National SWM Status Report, 2008-2018.

<sup>2</sup> Jenna R. Jambeck, *Supplementary Materials for: Plastic Waste Inputs from Land into The Ocean*, Science Mag 13 February 2015, Vol 347 Issue 6223.

Because of these impacts, many national and local advocates have been compelled into action, but with the current infrastructure, regulatory environment, and financial system in place, they cannot enact or pay for improved SWM. Financing for improved infrastructure is critical if the Philippines is to shift from the current informal and inefficient environmentally dangerous waste dumping sites to formal and better-managed waste collection, recycling, and disposal systems at the regional level.

## 2.1 National Laws and Regulations Impacting 3Rs and SWM

The Philippine government has a keen interest in bringing the country's 3R/SWM systems to comply with best management practices and has promulgated a variety of laws, presidential decrees and administrative orders to accomplish this objective. To date, the most significant legislation to impact the way solid waste and recycling is managed in the Philippines is the *Republic Act No. 9003 (Ecological Solid Waste Management Act of 2000)*—RA 9003, for short. The initial RA 9003 and the amendments of it that followed, created the necessary institutional mechanisms and incentives to develop sound systems. It also declared certain acts prohibited and provided penalties and funding for system implementation. It is considered the most inclusive act regarding SWM in the Philippines.

CCBO understands that this law was established to create a systematic, comprehensive, and ecological SWM program. It sets forth a very specific set of parameters, roles and requirements that are to be put in place according to a detailed schedule, covering every aspect of the system and its stakeholders. As it pertains to the CCBO project, the more significant goals set by the law are that it requires the:

- Closure of all dumps;
- Establishment of sanitary landfills or the use of advanced technologies to properly manage waste (excluding incineration);
- Prioritization of the 3Rs;
- Source separation of biodegradables and recyclables (including, but not limited to, newspaper, ferrous scrap metal, non-ferrous scrap metal, used oil, corrugated cardboard, aluminum, glass, office paper, tin cans, plastics and other materials as may be determined by the Commission);
- Establishment of every barangay to have an MRF to manage biodegradables and recyclables (or cluster with one);
- Provision of collection, transfer, storage, processing, recycling or disposal of municipal solid waste by every city/municipality;
- Establishment of a 10-year solid waste management plan (SWMP) by every city/municipality, with LGUs having the primary planning, implementation and enforcement responsibility of SWM while encouraging a cooperative effort among the national government, other LGUs, non-government organizations, and the private sector.

Additionally, several Presential Decrees, Republic Acts, and other policies have been passed regarding SWM and other related environmental matters:

- **Republic Act 8749** - Titled the *Clean Air Act of 1999*, this act directs all government agencies to adopt the integrated air quality framework as a blueprint for compliance. Among its provisions are the “polluters must pay” principle as well as the prohibition of the use of the incineration methods.<sup>3</sup>

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<sup>3</sup> National Solid Waste Management Status Report, 2018.

- **Republic Act 9512** - In 2008, the country passed the Environmental Awareness and Education Act of 2008 (RA 9512). The act promotes environmental awareness through environmental education and integrates environmental education in the school curricula at all levels: public or private, barangay daycare and pre-school, and non-formal, vocational, and indigenous learning.<sup>4</sup>
- **Republic Act 9513** - Promotes the development of renewable energy. Section 30 of this act provides for the use of “waste-to-energy” technology subject to requirements of RAs 9003 and 8749. Waste-to-energy technology refers to “systems which convert biodegradable material such as but not limited to animal manure or agricultural waste, into useful energy processes such as: anaerobic digestion, fermentation, and gasification, among others, subject to the provisions of the aforementioned RAs.<sup>5</sup>
- **Republic Act 11292** - The Seal of Good Local Governance Act of 2019 includes among its criteria, compliance with the minimum standards of RA 9003, MRFs or partnerships with facilities, access to a sanitary landfill or alternative technology, a SWM board, and instituting policies and programs to promote environmental protection. These laws and local ordinances provide the legal basis, funds, and incentives for LGUs to participate in the project.
- **NSWMC Resolution 9** - Under NSWMC Resolution 9 of 2006, a Technical Working Committee (TWC) was created to work on the phasing out of non-environmentally acceptable (NEA) products and packaging materials. The TWC has established four product categories that are subjected for evaluation, namely: plastics, construction materials, baby products and electronics. Through the Industrial Technology and Development Institute of the Department of Science and Technology (ITDI-DOST), the NSWMC TWC conducted a study to determine the non-environmental acceptability of products or packaging material and life cycle assessment of the products to be listed as non-environmentally acceptable products (NEAP).
- **Plastic Bag Bans** - Since 2018, approximately 316 LGUs have passed ordinances banning or regulating the sale and use of plastic bags and polystyrene foams due to their perceived role in the clogging of waterways, increased flooding, and polluting water. Among these LGUs are the cities of Muntinlupa, Quezon, and Pasig in Metro Manila.<sup>6</sup>

Although the framework provided by these national actions rivals that of some of the more developed countries, the implementation of its requirements has not met expectations. The reasons for this include a lack of enforcement, limited resources and a capacity to develop and implement sound 3R/SWM systems. One example of how much more work needs to be done is how few SWMPs have been approved by the National Solid Waste Management Commission (NSWMC). By now, over 1,500 should be developed and approved. As of 2018, however, only slightly more than 300 SWMPs have been approved by the NSWMC

## 2.2 Solid Waste Management Systems and Capacities in the Philippines

For over two decades, the Republic of the Philippines has recognized the need to improve its 3R/SWM systems with a set of policies that direct LGUs to increase 3R practices, separate at the source, establish sound collection operations and move from randomly dumping waste to more formal and safe disposal systems. This effort was guided by waste characterization analysis data which revealed the types and

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<sup>4</sup> National Solid Waste Management Status Report, 2018.

<sup>5</sup> Ibid.

<sup>6</sup> Ibid.

quantities of waste that needed to be managed. In this section, a description of these findings will be provided as well as an overview of the current 3R/SWM system in the Philippines.

### Solid Waste Generation and Characterization

As presented by the National Solid Waste Management Commission (NSWMC), an estimated 21 million metric tons (23 million tons) of waste will be generated in 2020 in the Philippines.<sup>7</sup> The following projections, prepared by the Environmental Management Bureau (EMB) of the Department of Environment and Natural Resources (DENR), state that between 0.1 – 0.8 kg (0.3 lbs - 1.8 lbs) of waste are generated per person each day, varying upon socio-economic class and degree of urbanization.<sup>8</sup> Generated waste that is burned, managed on site or handled by the informal sector may not be included in these figures. Therefore, CCBO estimates that per capita waste generation could be significantly higher.

Understanding where wastes are being generated can help in the development of a solid waste system. There are several different types of generators of waste. In the Philippines it is estimated that the most waste (57 percent) is residential waste. Figure 2 presents a breakdown of sources of waste. It also shows that a significant quantity of commercial waste is generated at markets, which is mostly food waste.

Nationally, biodegradables are estimated to make up 52 percent of the total composition of municipal solid waste in the Philippines (see Figure 3). 86 percent of biodegradables comes from food scraps.

This waste characterization is very important because it provides insight as to why the Philippine government has required the collection and management of recyclables and biodegradable waste. If these materials could be successfully managed, it suggests that only about 20% would need to be disposed.

### Collection

Discarded products and materials in the Philippines are not always collected. In some cases, materials may be burned, emptied into waterways or left as litter. CCBO believes that these methods are likely to be a major contributor to plastics pollution in the ocean. Studies have yet to be conducted, however, to give an indication of just how much waste is handled in this way. The waste and recyclables that are collected are done through a mixture of both formal and informal systems.

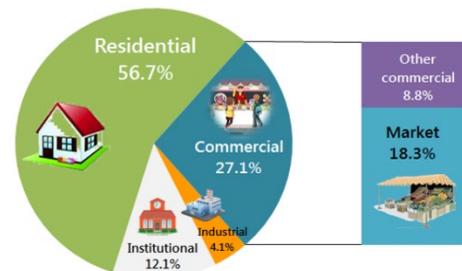


Figure 2. Sources of Municipal Solid Wastes in the Philippines, 2008-2013  
Source: EMB, 2018.

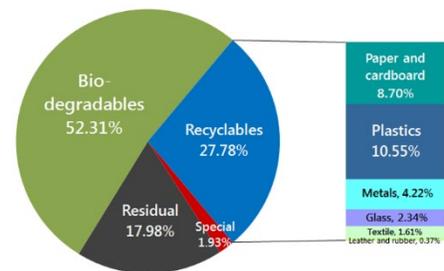


Figure 3. Composition of Municipal Solid Waste in the Philippines, 2008-2013  
Source: EMB, 2018.

<sup>7</sup> The CCBO team would like to have this number confirmed and believes that rather than reflecting the tons generated, it may be likely to be the best estimate that is mainly based on the known quantities of wastes disposed.

<sup>8</sup> According to CCBO's technical expertise and global experience, since the most trackable data on waste and recyclables is that which makes its way into the formal systems, estimations of generated waste quantities reported for the Philippines is likely underestimated.

The formal sector is either conducted by municipal employees or private hauling companies. These services are provided under the authority of the municipality or through private business practices. This form of collection is more likely to be found in urban areas rather than in the rural areas and is done for both residential as well as commercial customers. The formal sector may require separation source of biodegradable organics material and recyclables (as prescribed by law). Wastes may also be collected without separation.

Solid waste management in the Philippines also depends upon the efforts of thousands of informal waste workers. As defined by the NSWMC, the informal waste/recyclables management sector in the Philippines can be characterized as “individuals, families, groups, or small enterprises engaged in the recovery of waste materials with revenue generation as the motivation, either on a full-time or part-time basis. These workers remove valuable materials such as plastic bottles directly from waste (at the landfill, or from waste containers awaiting formal collection) or collect separated materials by going door to door.<sup>9</sup> In 2009, the NSWMC prepared the *National Framework Plan for the Informal Sector in Solid Waste Management*, to encourage local-level plans to include this sector.<sup>10</sup>

### Aggregation and Processing

Once discards are collected, they are either delivered to a disposal site (see the next section) or to an interim site where the material can be aggregated or processed.

While most waste is not separated at the source, a growing number of LGUs are establishing Material Recovery Facilities (MRFs). By law, each barangay is required to have its own MRF that manages recyclable plastics and biodegradables or accepts waste which is sorted or aggregated for efficient transport. According to the Ecological Solid Waste Management Act of 2000, there should be over 42,000 MRFs in the Philippines. As depicted in Figure 4, significant improvements have been made since 2010. Even still, however, only 10,340 MRFs are listed to be servicing 13,612 barangays as of 2018.<sup>11</sup>

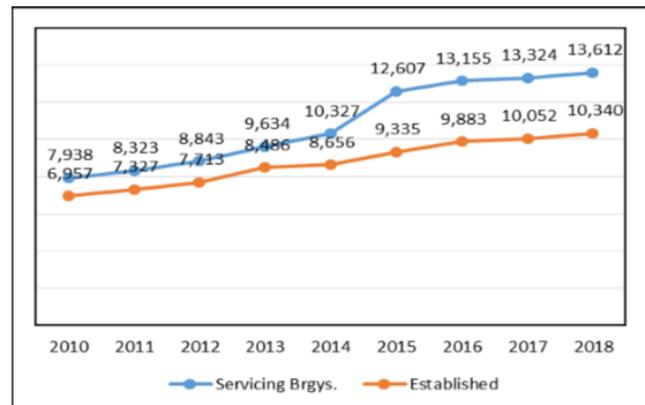


Figure 4. Number of MRFs and Barangays served by MRFs from 2008 to 2018 Source: EMB, 2018

Across the country, the level of sophistication, processing and capacity of MRFs vary greatly.<sup>12</sup> Source separated organics are usually composted at the MRF or at a separate facility. It is unknown, currently, to what extent households are composting their own organics on their properties.

<sup>9</sup> The NSWMC classifies these workers as itinerant waste buyers, jumpers at collection trucks, waste crew, waste reclaimers, and small and illegal junkshops.

<sup>10</sup> National SVM Status Report 2008-2018.

<sup>11</sup> EMB, 2018.

<sup>12</sup> See the definition of MRF in Annex II – Glossary of Terms.

## *Markets/End Uses for Plastics*

Limited markets for the wide variety of plastics in the waste streams of the Philippines has been a factor in thwarting the recovery of these materials. The type of plastics that are most often collected are soda/water bottles made of a resin, Polyethylene Terephthalate (PET). Waste pickers, junk shops, and others are paid for this type of plastic in much of the Philippines (usually in urban centers). It is important to note that a PET bottling manufacturing facility is being built in the Manila Metro area and is expected to be operating by 2021.<sup>13</sup>

The more challenging plastics to find markets for are film plastic such as shopping bags and sachets. Yet, according to a report by the NGO, GAIA, shows that the country uses a "shocking" amount of single-use plastic, including nearly 60 billion sachets and 17 billion shopping bags a year.<sup>14</sup> A very small quantity of these materials have been reintroduced into the marketplace in the form of such things as school furniture, pavers, tiles, eco-bricks, coal substitute for cement kilns and as craft items. But the value is so low that little of this material is being collected.

The value of all these plastics will increase, however, once additional markets are developed for these materials.

## *Disposal*

As late as the 1990's, open dumps were the regular form of disposal in the country. With the passage of the Ecological Solid Waste Management Act of 2000, however, all dump sites (See the definition of MRF in Annex II – Glossary of Terms) in the Philippines would be closed. Unfortunately, dumps still exist today. The number, however, has decreased by more than half from 806 in 2008 to 353 in 2018.<sup>15</sup> Still, according to DENR, about 74% of plastic waste leakage comes from waste that had already been collected.<sup>16</sup>

In addition to having the dumps closed, the national government mandated that other forms of disposal be developed. It requires, at a minimum, that technologically advanced sanitary landfills be developed. As of 2020 there are 186 of these sanitary landfills in place, according to DENR's Assistant Secretary Jesus Enrico Moises Salazar.<sup>17</sup> DENR is exploring other technologies such as anaerobic digestion. With the passage of the Clean Air Act of 1999, however, burning of waste to create energy is a prohibited option.

To illustrate the visible difference between an unstable dump site and a sanitary landfill, pictures of each are presented here. Figures 5 and 6 show the environmental and social impacts of the Smokey Mountain dump (in aerial and street views). It is one of Manila's largest dumpsites and slums, where over 25,000 people were estimated to have picked through the waste to survive. Smokey Mountain has been closed for over two decades, but many of its environmental and social impacts persist.

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<sup>13</sup> Conversation with representatives of the Friends of Hope NGO on 6/23/2020

<sup>14</sup> Plastics exposed: How waste assessments and brand audits are helping Philippine cities fight. GAIA, 2019.

<sup>15</sup> National Solid Waste Management Status Report for 2008-2018

<sup>16</sup> Ibid.

<sup>17</sup> Manila Times



Figure 6. Smokey Mountain Dump - Aerial  
 Source: Google Street View 11-2018



Figure 5. Smokey Mountain Dump - Street View  
 Source: Google Street View 11-2019

Figure 7 shows a preferable landfilling method at the Morong Sanitary Landfill—an example of a recently developed sanitary landfill located in the Province of Rizal, east of Metro Manila.



Figure 7. Morong Engineered Sanitary Landfill  
 Source: Metro Manila, Google Aerial 3-2018

## 3. Current Status of 3R/SWM in CCBO Engagement Sites

### 3.1 ISWMA Summary

Through the ISWMA, CCBO has gathered high-level information on 3R/SW-related governance, generation, recycling, disposal, and supporting education and outreach each of its engagement sites in the Philippines. The ISWMA provides information not only on current capabilities of each of the sites, but also identifies critical gaps that should be filled and presents related recommendations and next steps. The following summary provides a brief overview of the system capacities and gaps found across the engagement sites.

#### Waste Generation and Processing

Across each of the sites, annual waste generation ranges from 94,000 to 145,000 tons, with waste generation increasing in line with population sizes (see Table 1). It should be noted that although multiple data sources were found, there was significant variation in estimates, projections, and calculations making it difficult to establish concrete baseline data.

Table 1. Baseline Waste Generation Estimates Across CCBO Engagement Sites

CCBO Engagement Sites	Barangay (#)	Population (2015) <sup>18</sup>	Per Capita (lbs./day)	Waste Generation (Tons/Year 2020 Projection) <sup>19</sup>	Plastic Waste Generated (Tons) <sup>20</sup>
Batangas City	105	330,000	1.1	94,000	17,900
Iloilo City	180	450,000	1.8	122,000	23,200
Las Piñas City	20	590,000	1.5	132,000	25,000
Pasig City	30	755,000	1.1	<b>145,000</b>	27,600

Across the sites, there also exist varying numbers and capacities of documented operations/facilities that support 3Rs/SWM—particularly data for MRFs. CCBO found that facilities referred to as MRFs ranged from small, roadside stands where containers were labeled by material and residents dropped off their source separated items to large processing facilities that accept unseparated waste for facility sorting, with organics composted. They could also be something in between, like a junkshop. Most MRFs in the engagement sites, however, appeared solely to be aggregation points.<sup>21</sup>

Because CCBO was unable to travel to the sites, many of the operations/facilities listed below were found using Google Earth and Maps (especially for MRFs and junkshops.) This provided visual examples of what MRFs looked like. Registered business records also provided listings of these operations/facilities. Data on

<sup>18</sup> Philippines Statistics Authority, 2015.

<sup>19</sup> Source: Waste Generation Projections Table (2015 – 2020) found in the NSWMC website, 2015.

<sup>20</sup> Assumes that 19% of waste generated is comprised of plastics. See Summary of Results of Disposed Waste Characterization Studies Conducted by Pasig City (2014).

<sup>21</sup> See Annex II. Glossary of Terms for a complete description of MRFs in the Philippines.

the amount of waste received, materials recovered, and residual disposal has not been found.

Table 2. Existing Operations/Facilities at CCBO Engagement Sites

CCBO Engagement Sites	Material Recovery Facility (#)	Organics Processing (#)	Junkshop (#)	Dump (#)	Sanitary Landfill (#)
Batangas City	1 <sup>22</sup>	0	1	0	1
Iloilo City	3 <sup>23</sup>	0	4	0	1
Las Piñas City	3	29	10	1 <sup>24</sup>	0
Pasig City	10	0	3	0	0

### 3.2 Batangas City

Batangas City is in the Calabarzon Region of the Philippines. The city consists of 105 barangays and is home to an estimated population of 330,000.<sup>25</sup> Batangas City lies in the southernmost part of the Province of Batangas and faces Batangas Bay (see Figure 8). Batangas City is classified as a Regional Growth Center because it is rapidly urbanizing. It is home to the Batangas International Port, known as one of the busiest passengers and container terminals in the Philippines. The city also serves as the industrial, educational, and transportation center of the Province and has close to 9,000 business establishments as of 2015.<sup>26</sup> It also hosts one of the largest oil refineries in the Philippines, three natural gas power plants, and several other major industries.

<sup>22</sup> The Batangas website suggests there are many more MRFs in the barangay. This will be verified later.

<sup>23</sup> CCBO believes that there are many more MRFs in Iloilo. This will be verified later.

<sup>24</sup> CCBO believes that the Las Pina's Dump may not active. Google Earth aerials and street view imagery, however, show waste processing activity at and around the dump (May 2019).

<sup>25</sup> Philippine Statistics Authority, 2015.

<sup>26</sup> USAID, 2017. <https://urban-links.org/wp-content/uploads/Assessment-of-the-Business-Enabling-Environment-in-CDI-Cities.pdf>



Figure 8. Map of Batangas City

Although somewhat dated, a 2013 study, *Greening of the Solid Waste Management in Batangas City*, observed several problems encountered by locals in the implementation of 3R/SWM. The study concluded that the increasing population, rapid urbanization, and public indifference; lack of awareness among the people regarding the effects of solid waste management practices to public health and the environment; inadequate government policies and leadership; inefficient waste collection and non-operation of a good disposal facility; SWM waste management practices are major barriers in implementing effective and efficient SWM practices in the city.<sup>27</sup> CCBO has observed that progress has been made since that study was done, but believes that these challenges still apply. More information, however, is required to confirm this.

### 3.2.1 Governance

Ordinance No.16, Series of 2010, also referred to as the Environment Code of Batangas City (E-Code), is a series of regulations that support the city's vision, mission, goals, and objectives in attaining sustainable development. Article XII, titled "Ecological Solid Waste Management" provides the legal framework for the city's systematic SWM. In particular, the ordinance includes:

- **Section 82** - The Batangas City SWMP shall contain strategies that promote waste minimization at source, community-based or cluster-based solid waste segregation, ecologically-sound sanitary

<sup>27</sup> Reyes and Furto, 2013.

temporary storage, safe and secure waste collection methods, efficient and effective transport schemes, market-based disposal fees that would sustain operations of sanitary landfill/s, specific for the following major sources of solid wastes: households, commercial establishments, hospitals, industries located inside the city, and solid and liquid markets.

- **Section 83** - Enforces the segregation of solid wastes, guided by the provisions of Ordinance No. I, Series of 99<sup>28</sup> entitled and the Implementing Rules and Regulations of RA 9003.
- **Section 84** - Regulates the use of plastic and styrofoam packaging in all business transactions within the city. However, no cooperation among residents, barangay officials, business and educational establishment prevails.<sup>29</sup>

Batangas City is one of several LGUs in Batangas Province to have an approved SWMP. CCBO was unable to obtain a copy through any governmental agency website. CCBO will continue to locate the SWMP to evaluate Batangas City's identified SWM approach.

### 3.2.2 Waste Generation

With a population of approximately 330,000, Batangas City generates an estimated 167 metric tons (184 tons) per day, or roughly 0.5 kg (1.1 lbs.) of solid waste per capita.<sup>30</sup> Based on waste generation projections developed by the NSWMC in 2015, an estimated 94,000 tons of waste are projected for Batangas City in 2020.<sup>31</sup>

### 3.2.3 Waste Collection

Batangas City manages a centralized waste collection system subcontracted with the Metrowaste Solid Waste Management Corporation (Metrowaste). The private company operates daily waste collection services for biodegradable, non-biodegradable, and residual wastes.<sup>32</sup> This is done for three routes each day using mini dump trucks and compactors, with an additional night route using dump trucks.<sup>33</sup> As shown in Figure 9, residents are instructed to set out separated materials.

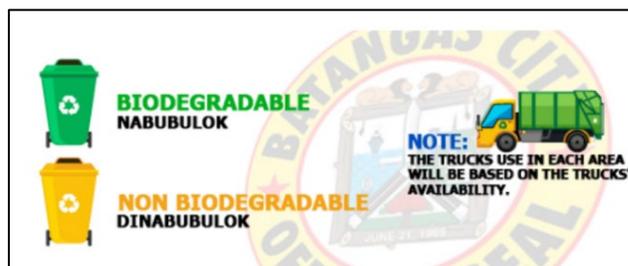


Figure 9. Instructional Information from the Batangas City Website

While Metrowaste covers most parts of the city, many households are situated too far from the truck collection routes. According to a 2005 research report, 34% of the 53,685 households were provided with waste collection services in 2002.<sup>34</sup> Lack of access to SWM services has resulted in illegal dumping and

<sup>28</sup> Note: also entitled "Ordinansang Nag-aatas sa Lahat ng Mamamayan at mga Bahay Kalakalan, na Magtakda ng mga Lalagyang Maghihiwalay sa Nabubulok (biodegradable) at Di Nabubulok (non-biodegradable) na mga Basura na Umaayon sa Layunin at Programang Zero Waste Management ng Lungsod ng Batangas at ang Pagpapapataw ng mga Parusa sa Lalabag Dito"

<sup>29</sup> Bobadilla et al., 2016

<sup>30</sup> USAID's Mother Earth Fact Sheet, USAID, 2019.

<sup>31</sup> NSWMC, 2015.

<sup>32</sup> USAID, 2019.

<sup>33</sup> Batangas City Website

<sup>34</sup> Sumalde, 2005.

trash burning in these areas.<sup>35</sup> It is not known whether services have expanded into these areas since that time.

### 3.2.4 Recycling System

**Material Recovery Facilities** - According to RA 9003, each of the 105 barangays in Batangas City is required to have an MRF to accept both recyclables and biodegradable materials that are separated at the source. CCBO is aware of several small MRFs – some of which are little more than roadside stands. The only information found regarding the existence of a more formal MRF in Batangas City indicate that as of 2017, there was only one registered solid waste processing MRF in Batangas City, located in Barangay San Jose Sico. The exact location of the this MRF was not able to be identified. It is believed to be owned and operated by Wastecon Inc. based on registered business records.<sup>36</sup> An unnamed aggregation location labeled as an MRF on Google Earth was also found in Barangay Tabangao, which borders Manila Bay far from Barangay San Jose Sico (See Figure 10).

Figure 10. MRF Name Unknown Source: Google Street View 3-2018



**Junkshops** - Junkshops play a large role in recycling activities and waste recovery, buying and selling scrap and other items with resale value. According to the 2017 List of Registered Business Establishments for Batangas City, there are 11 registered junkshops including: Donato Junkshop, Johnny Aclan Junkshop, Diosado Junkshop, R.E.S. Junkshop, Barrios Junkshop, Macarig Junkshop, Berberabe Junkshop, Andal

Junkshop, De Torres Junkshop, Felimon D. Magpantay Junkshop, and Rodel A. De Castro Junkshop.<sup>37</sup> Figure 8 shows the location of the majority of the junkshops listed, although some locations were not identified due to lack of information. Two additional unregistered junkshops were found utilizing Google Maps, shown in Figures 11 and 12.

**Recycling Center** - There were no recycling centers identified in Batangas City.

<sup>35</sup> USAID, 2019.

<sup>36</sup> Batangas City Official Website, 2017.

<sup>37</sup> Ibid.



Figure 12. Shirley's Junkshop  
Source: Google Street View 3-2018



Figure 11. Buan Junkshop  
Source: Google Maps 9-2016

### 3.2.5 Waste Disposal

The Province of Batangas has six landfill sites that are in Alitagtag, Bauan, Batangas City, Cuenca, Lemery, and Taysan.<sup>38</sup> Batangas City's sanitary landfill is in Barangay San Jose Sico (see Figure 8 and Figure 13). As described by the Asian Development Bank (ADB), the controlled landfill is owned by the LGU and has a maximum daily capacity of 34 tons.<sup>39</sup> The landfill receives approximately seven tons of waste per day.<sup>40</sup> According to the Philippines Economic Zone Authority, the landfill receives only approximately four percent of the estimated 184 tons of daily waste generation—indicating a lack of accurate, verifiable data on what is happening to the other materials. With no other disposal facilities identified as part of CCBO's online research, there should be a larger percentage being disposed at the landfill daily.



Figure 13. Batangas City Sanitary Landfill Source: Google Aerial 3-2018

<sup>38</sup> Environmental Management Bureau, 2018.

<sup>39</sup> ADB, 2014.

<sup>40</sup> Philippines Economic Zone Authority, 2018.

### 3.2.6 Education and Outreach

No formal education and outreach efforts were found in any governmental agency website through CCBO-conducted online research. Research did highlight one local NGO that has been working for over two decades implementing zero waste programs.

**The Mother Earth Foundation (MEF)** is a Filipino NGO that was founded in 1998 by a group of 15 individuals. Over two decades later, MEF has become a go-to organization for enabling NGOs and local governments in the implementation of zero waste programs in several communities. MEF has a current, \$150,000 project in Batangas City, running from July 1, 2019 - December 31, 2020, to expand its zero-waste SWM approach. The project's three primary objectives are to: (1) expand the city's zero waste community-based model through the decentralization of segregated waste collection, regulation of single-use plastic waste, and recovery of high-value recyclable materials; (2) provide technical assistance to the city's Environment and Natural Resources Office (ENRO) to improve the enforcement of RA 9003, develop SWMPs, and draft local ordinances; and (3) train community organizations and local leaders to monitor SWM activities during the project and after post-implementation. The project aims to recover at least 55% of waste through composting or recycling, with 90% of households practicing waste segregation at the source.<sup>41</sup>

## 3.3 Iloilo City

Iloilo is in the Western Visayas region of the Philippines. Its capital and CCBO engagement site, Iloilo City, is a highly urbanized city that is situated in the southeastern tip of Panay Island and is comprised of 180 barangays (see Figures 1 and 14), with an estimated population of 450,000.<sup>42</sup>

Within the city lies Iloilo River, an estuary that is 15 km (9.3 miles) long and is home to several rare and important marine species. The Iloilo River wharf is a natural harbor that serves as a port for ferries and as a drop-off destination for fishing vessels that bring in seafood to be sold at the local markets. Land use along Iloilo River consists of residential, commercial, institutional, and open space. Port facilities, storage facilities, commercial buildings, and offices, in combination with residential structures, surround the river's Quirino Bridge.

In response to gaps and challenges in the implementation of RA 9003 in the Philippines, the German Federal Ministry for Economic Cooperation and Development appointed the German Technical operation to launch a support project called Solid Waste Management for Local Government Units (SWM4LGUS). The project's objective is to enable LGUs to establish integrated solid waste management systems in an economically and environmentally sustainable manner. According to a 2011 technical report, a large MRF (to accept unsegregated waste) and pilot composting site was established at an open dumpsite in Calahunan in 2004. The MRF consisted of a trommel screen, input conveyor belt, and final conveyor belts for combined mechanized-manual sorting that would process approximately 25 tons of the 170 tons of waste delivered at the Calahunan site daily.<sup>43</sup>

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<sup>41</sup> USAID, 2019.

<sup>42</sup> Philippine Statistic Authority, 2015.

<sup>43</sup> Paul et al., 2011.



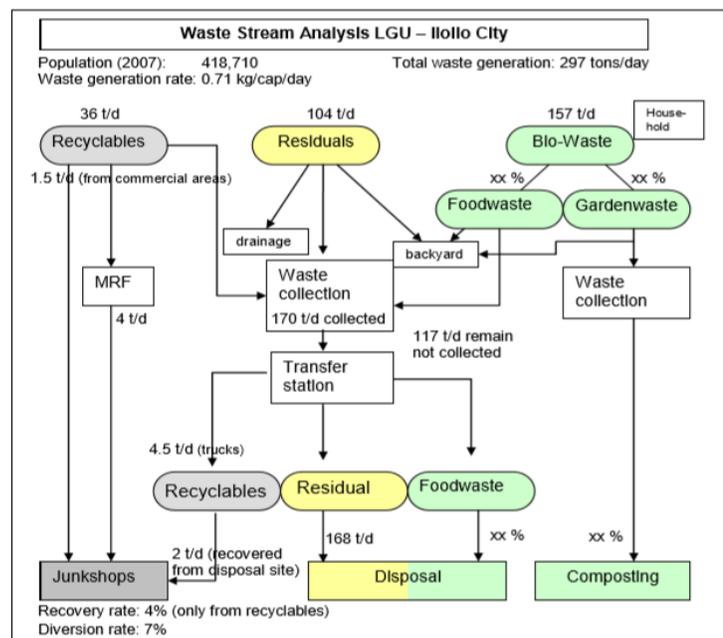
Figure 15. Map of Iloilo City

However, the MRF was not operational at the time of the study. The recovery of marketable materials such as cardboard, metals, and hard plastics is largely influenced by over 300 waste pickers at the local dumpsite. Still, a large portion of valuable materials such as organic and alternative fuels and raw materials (AFR) were disposed as depicted in Figure 15. In 2007, the DENR issued an authority to close the open dumpsite.<sup>44</sup>

### 3.3.1 Governance

In June 2019, the Iloilo City Roadmap “WHEELS,” was launched to by Iloilo Mayor Jerry Treñas, who served as mayor of Iloilo City from 2001-2010 and was reelected in May 2019. “WHEELS” was designed toward inclusive development for all Ilonggos, and to combat the challenges that the capital faces. “WHEELS” stands for Welfare, Health and Sanitation, Education, Environmental Management, Livelihood, and

Figure 14. Status of Solid Waste Generation and Processing in Iloilo City Source: Paul et al. Facts and Figures



<sup>44</sup> Paul et al. 2011.

Sustainability. The program would rationalize the Esplanade operations, improve public plazas, and initiate closer engagements with the DENR, Land Transportation Office (LTO), Department of Health (DOH), the academe, and other stakeholders for the waste management program. Tree planting and coastal clean-up activities would be prioritized by the new administration to mitigate global climate change.

In a recent memorandum order, Treñas stated that they have banned single-use plastics from city hall and public parks in efforts decrease waterway pollution, marine life endangerment, and solid waste. As per the report, the mayor noted the considerable volume of trash is typically collected from Iloilo River Esplanade and public plazas. The recent ban is part of the government’s solid waste avoidance and minimization strategy. This order came after the issuance of the Resolution No. 1363-2020 from the NSWMC, which ordered the DENR to make and enact clear guidelines that would restrict single-use plastics in governmental offices.<sup>45</sup>

Iloilo City is one of several LGUs in the Province to have an approved SWMP but is not publicly available on any governmental agency website. CCBO will continue to locate the SWMP to evaluate the city’s identified SWM approach.

### 3.3.2 Waste Generation and Composition

According to a 2005 report, Iloilo City’s per capita waste generation rate was 0.8 kg (1.8 lbs) per day in 2002.<sup>46</sup> According to the General Services Office, the city generated an estimated 300 metric tons (331 tons) per day,<sup>47</sup> and based on waste generation projections developed by the NSWMC in 2015, an estimated 122,000 tons of waste are projected for Iloilo City in 2020.<sup>48</sup> Figure 16 provides an approximation of the composition of the waste generated in 2003.

As illustrated by a study done in 2011 to look at alternative technologies, Iloilo City’s waste was estimated to be comprised of 60% organic waste, with plastics accounting for an additional 20%. The results demonstrate the significant potential for resource recovery through composting or anaerobic digestion since such a large quantity of the collected waste is classified as organic. Additionally, plastics account for 20% of collected waste, which can be recovered as alternative fuels and raw materials (AFR).<sup>49</sup>

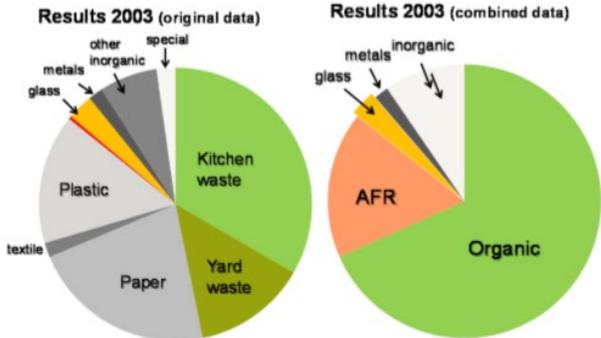


Figure 16. Waste Composition in Iloilo City [2003] Source: Paul et al. Facts and Figures

### 3.3.3 Waste Collection

<sup>45</sup> PhilNews, 2020.  
<sup>46</sup> Sumalde, 2005.  
<sup>47</sup> Social Innovation Challenge, 2019.  
<sup>48</sup> NSWMC, 2015.  
<sup>49</sup> Paul et al., 2011.

A private waste collection company is currently contracted to provide weekly municipal waste collection to households along the main roads of Santo Niño Sur and Barangay Santo Niño Norte.<sup>50</sup> According to a 2019 report, the trucks collect 170 tons of waste each day.<sup>51</sup>

### 3.3.4 Recycling System

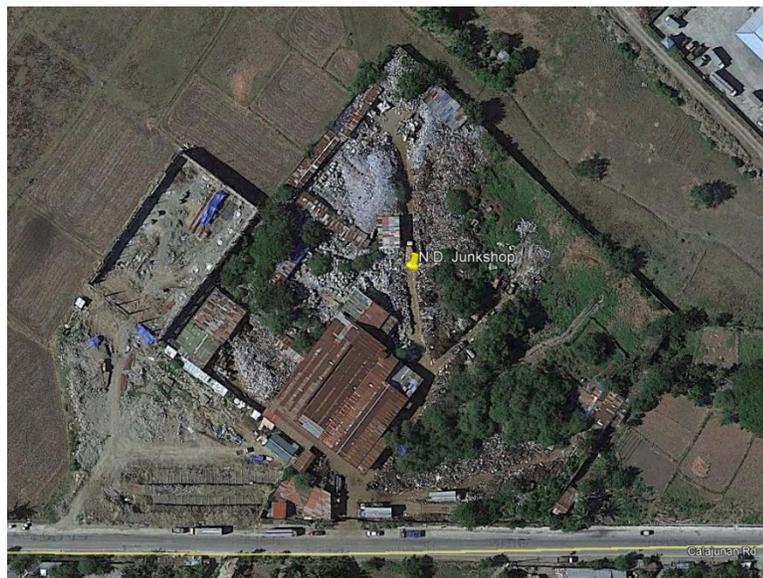
**Material Recovery Facilities** - In Iloilo City, biodegradable waste is segregated and made into compost to use as fertilizer leaving recyclables to go to the closest MRF. A total of three MRFs were identified in Iloilo City: Brgy. Buntala Jaro I.C MRF, Brgy. Buray MRF and Brgy. Baybay Tanza, City Proper MRF using Google Earth (see Figures 17 and 18). The third is identified on the map in Figure 8. These operations seem to be aggregation points only.



Figure 17. Barangay Buray MRF  
Source: Google Street View 3-2018



Figure 18. Baybay Tanza MRF  
Source: Google Street View 3-2018



**Junkshops** - In total, four junkshops in Iloilo City were identified as part of the ISWMA's online review. These include the N.D. Junkshop and Ben Junkshop (see Figure 19 and Figure 20). The map in Figure 14 shows the location of the 3H Junkshop and the NSA Junkshop.

Figure 19. N.D. Junkshop  
Source: Google Aerial 3-2016

<sup>50</sup> Social Innovation Challenge, 2019

<sup>51</sup> Ferronato et al., International Journal of Environmental Research and Public Health, 2019.



Figure 20. Ben Junk Shop Source: Google Street View 3-2018



Figure 21. San Roque Scrap & Surplus Center Source: C&D Reuse

**Recycling Center** - Two recycling centers have been identified in Iloilo City including YLJ Plastics – PET Bottle Scrap Buyer and San Roque Scrap & Surplus Center C&D (see Figure 14 and Figure 21).

### 3.4.5 Processing

In January 2020, the PPP Center approved the Iloilo City Integrated Solid Waste Management Facility Project.<sup>52</sup> The project has recently been approved for Project Development and Monitoring Facility (PDMF) support for project structuring, feasibility studies, preparation of tender documents, management of the bid process, and assistance until financial close. The Iloilo City Government will receive funding with the objective of providing the city with a sustainable SWM solution, including waste treatment and disposal, to meet current and future SWM challenges. The Iloilo Solid Waste Project intends to extend the lifespan of the Calajunan Sanitary Landfill and improve its capacity. The Project will include any or all the components of the SWM value chain, i.e. segregation, recovery, recycling, treatment, and remediation, as well as the possible development of a Waste-to-Energy facility.<sup>53</sup>

<sup>52</sup> Public Private Partnership Official Website.

<sup>53</sup> Republic of the Philippines Public Private Partnership Center, 2020



### 3.3.6 Waste Disposal

Iloilo City has one sanitary landfill that is in Barangay Calajunan, Mandurriao district as shown in the map in Figures 14 and in an aerial view in Figure 22. The Calajunan Sanitary Landfill was constructed with a loan from the Development Bank of the Philippines and was opened and inaugurated by Secretary Gina Lopez of the DENR in August 2016.<sup>54</sup> No waste disposal tonnage reports have been found as part of CCBO's online research.

Figure 22. Calajunan Sanitary Landfill  
Source: Google Aerial 3-2018

### 3.3.7 Education and Outreach

To support the implementation of RA 9003, the majority of elementary and secondary schools in Iloilo City have established waste management systems in order to reduce the amount of solid wastes generated by schools, enforce SWM programs, encourage students and community members to participate, and to teach students the value of recycling waste.<sup>55</sup> For example, with technical assistance from the LGU, the Division of Iloilo City began the implementation of an Eco-Saver's program. Five schools participated June 2009. CCBO was unable to determine if this program is still operating.

Although there have been efforts to promote SWM in Iloilo City schools, there are also several issues that have and continue to hinder environmental education. For example, several schools do not have proper waste bins to segregate waste streams. As a result, students continue to mix biodegradable and non-biodegradable waste, challenging their interest in practicing new waste segregation strategies. A lack of financial funds has also prevented implementation of proposed SWM and recycling projects.

## 3.4 Las Piñas City (Metro Manila)

The City of Las Piñas is situated in Metropolitan Manila—the National Capital Region of the Philippines, as shown in Figure 23. It is also classified as a first class, highly urbanized city in Metro Manila, located approximately 30 kilometers southwest of CCBO engagement site, Pasig City shown on the map in Figure I. About half of the city's area is residential and the remaining half is used for industrial, commercial, and institutional purposes. The city has an estimated population of 590,000, with 20 barangays and 250 private

<sup>54</sup> Manila Standard

<sup>55</sup> Palapas et al., 2010

villages.<sup>56, 57</sup> A rapid increase in population, urbanization, and commercial activity has resulted in an increase of water and air pollution in Las Piñas.



Figure 23. Map of Las Piñas City

Las Piñas City has two major river systems: the Zapote River and Las Piñas River. The Zapote River, also known as the Alabang-Zapote River, runs 18 km between the outskirts of Las Piñas City and Muntinlupa City—flowing into Manila Bay. Las Piñas River spans about 13 km and is linked with the Zapote River by 25 km of tributaries. The rivers have become a dumping site for all types of waste, demonstrating a lack of concern for the environment within the public.

In 2002, Senator Cynthia Villar launched the SAGIP Ilog project to rehabilitate the Las Piñas-Zapote River system. Within the 56-kilometer stretch of the river system, 30 kilometers are now regularly cleaned by river watch volunteers who collect floating garbage and install wire mesh strainers to filter out waste from entering the rivers.<sup>58</sup>

### 3.4.1 Governance

Imelda Aguilar has served as Las Piñas’ mayor since June of 2016, and previously served as mayor from June 2004-June 2007.<sup>59</sup> Aguilar’s sister in law, Cynthia Villar, is currently serving as a Senator of the Philippines and is a strong advocate for environmental protection, leading several coastal clean-up and tree

<sup>56</sup> Philippine Statistic Authority, 2015

<sup>57</sup> Official Website of the City of Las Piñas

<sup>58</sup> United Nations

<sup>59</sup> Manila Times, 2019

planting projects, including the Las Piñas-Zapote Rivers Rehabilitation Project.<sup>60</sup> Given the city's high-profile leadership connections, Las Piñas has often appeared in the spotlight as a Metro Manila city that is advancing SWM and cleaning up its environment.

Backing this progress are a series of Metropolitan Manila Development Authority regulations and ordinances, which include:

- **MMDA Regulation No. 96-009** - Prohibits littering and dumping in open or public places to promote health and sanitation and to prevent and control environmental pollution.
- **MMDA Regulation No. 98-009** - Prohibits littering and dumping of waste in public or open spaces. It also provides penalties for specific illegal acts and vests in the Commission the sole responsibility for the implementation of its provisions in lieu of coordination with other agencies.
- **MMDA Regulation No. 99-004** - Requires establishments and dwellings in Metro Manila to sort their waste at the source using color-coded separate containers. It also promotes recycling and composting as SWM practices.
- **MMDA Resolution No. 02 35** - Urges the LGUs of Metropolitan Manila through the respective city/municipal councils to enact a uniform ordinance adopting guidelines and procedures for a unified approach on solid waste management in their areas of jurisdiction.<sup>61</sup>
- **Ordinance No. 1036-II** - In 2011, the city passed an ordinance banning the use and distribution of thin film, single-use plastic bags as well as polystyrene foam by commercial establishments.<sup>62</sup>

Las Piñas City is one of several LGUs in the Metro Manila to have an approved SWMP but is not publicly available on any governmental agency website. CCBO will continue to locate the SWMP to evaluate the city's identified SWM approach.

### 3.4.2 Waste Generation

According to the Metro Manila Development Authority (MMDA), Las Piñas City's population of 590,000 generates an estimated 360 tons of solid waste on a daily basis.<sup>63</sup> A 2017 report from the United Nations Centre for Regional Development suggests that per capita rates slightly vary between highly urbanized city areas (0.7 kg/day or 1.5 lbs/day) and urban city areas (0.6 kg/day or 1.3 lbs/day).<sup>64</sup> Based on waste generation projections developed by the NSWMC in 2015, an estimated 132,000 tons of waste are projected for Las Piñas in 2020.<sup>65</sup>

### 3.4.3 Waste Collection

In 2003, the ADB estimated that approximately, 200 tons of waste are collected daily.<sup>66</sup>

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<sup>60</sup> Villar SIPAG Official Website

<sup>61</sup> Asian Development Bank

<sup>62</sup> Philippine Information Agency, 2012

<sup>63</sup> Metro Manila Development Authority, 2018

<sup>64</sup> United Nations Centre for Regional Development, 2017.

<sup>65</sup> NSWMC, 2015

<sup>66</sup> ADB, 2003.

The city manages its own collection, and as of 2006, the LGU owned 70 waste trucks. The percentage of households whose waste is collected within the city is unknown. The collection schedule consists of two trips once a week by the waste trucks. Recyclables are placed in separate waste containers and are collected by pushcart boys, barangay multicabs and junkshop collectors.<sup>67</sup> Non-segregated waste is not collected. CCBO was unable to find information about whether all business and residents receive collection.

Las Piñas has the lowest expenses in waste management among the cities in Metro Manila. By managing its own waste, the city government saves more than 100 million pesos annually. Waste management is a well-known best practice in the city. Regular and efficient collection of garbage is done in over 250 private villages and subdivisions as well as the rest of the 20 barangays. The thousand-strong Kaagapay sa Kalinisan and Yellow Boys Volunteers are mobilized to maintain cleanliness on streets and major roads.<sup>68</sup>

### 3.4.4 Recycling System

**Material Recovery Facilities** - A total of three MRFs were identified in Las Piñas: Las Piñas MRF (see Figure 25), MRF Brgy. Pamplona I, and an MRF in Brgy. Talon Uno.

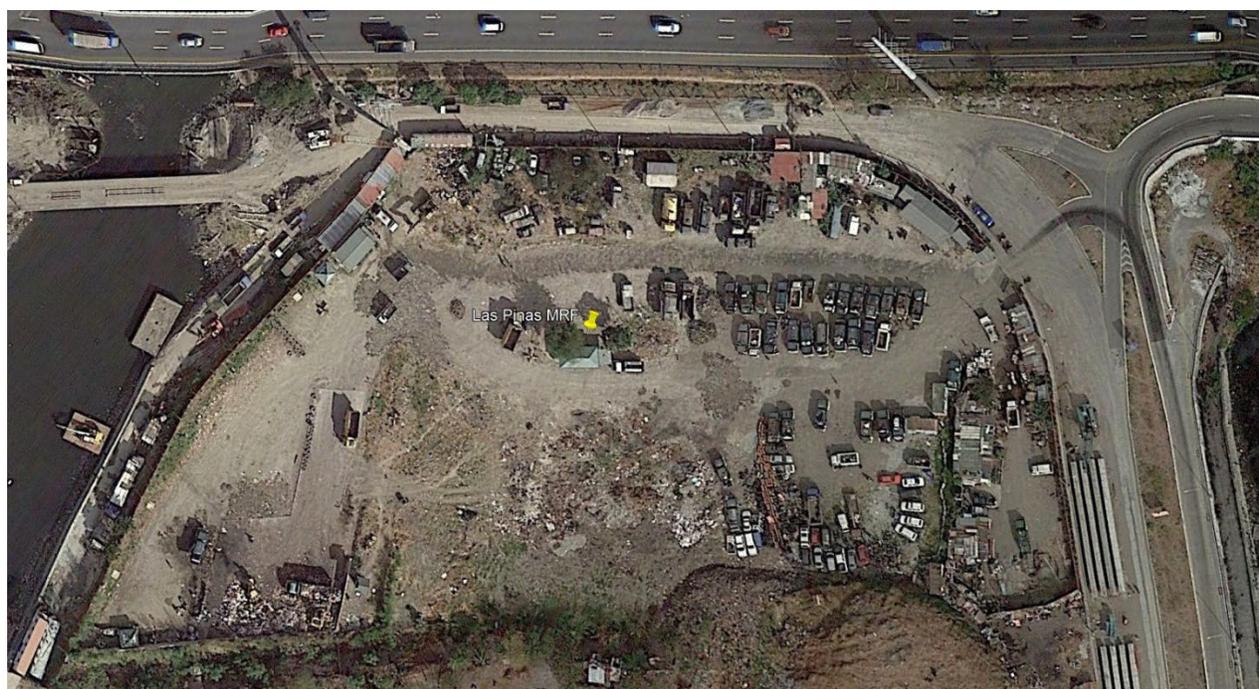


Figure 24. Las Piñas MRF Source: Google Aerial 3-2018

<sup>67</sup> United Nations Development Programme, 2006

<sup>68</sup> <https://laspinascity.gov.ph/tuloy-tuloy-na-serbisyo/10/clean-and-green-environment>

### **Composting Facilities** -

According to the United Nations, as of 2010, Las Piñas City's 20 barangays each had at least one composting facility (see Figure 24). As of 2010, there were 37 rotary composters in the city for 18,500 households. One rotary composter can process the wet waste of approximately 500 households. Each composting machine produced 400 kilograms a week, or a total of 59.2 tons each month across all 37 composters.<sup>69</sup> At one point the city had a goal of developing 100 centers by 2013.



Figure 25. Brgy. Composting Facility  
Source: Google Street View 3-2019

According to Senator Cynthia Villar in 2020, the city currently produces about 70 tons of fertilizer each month, which is provided at no cost to local urban gardeners and vegetable farmers in Metro Manila.<sup>70</sup>

**Junkshops** - Ten junkshops were identified in Las Piñas: LVNMHEZ Junkshop, Ralph Junkshop, Twins Junkshop, G Junkshop, T.S Cruz Junkshop, Patrick's Junkshop (see Figure 26), Roge Ating Junkshop, Nilos Junkshop, Carmelita Junkshop, and RDC Junkshop (See Figure 23).



Figure 25. T.S. Cruz Junkshop Source: Google Street View 3-2018

**Recycling Center** - Filrivli Trading was the only recycling center identified by CCBO in Las Piñas (See Figures 23 and 27).



Figure 26. T.S. Filriyli Trading Recycling Center Source: Google Street View 3-2018

<sup>69</sup> United Nations, 2010

<sup>70</sup> PhilStar, 2020.

### 3.4.5 Waste Disposal

Currently, there are no sanitary landfills in Las Piñas. The city has one dump called Las Piñas Dumpsite, which is adjacent to the Las Piñas MRF (see Figures 23 and 28). The dump was not identified as an active site in any CCBO-reviewed documents or websites, yet Google Earth aerials and street imagery show that it was active at least as of 2018. Most of the waste pickers in Las Piñas reside along the banks of the Zapote and Las Piñas Rivers, which border the dump.



Figure 27. Las Piñas Dump *Source: Google Street View 2-2014*

Waste disposal facilities used by Las Piñas City include Rizal Provincial Sanitary Landfill, Navotas Sanitary Landfill, and the San Mateo Sanitary Landfill. MMDA stated in 2018 that these three active waste disposal facilities used by Metro Manila dispose of about 54 percent of the estimated waste generated.<sup>71</sup> Tonnages disposed by each LGU at each of the three facilities was not found.

A 2018 study from the Solid Waste Management Office (SWMO) of the MMDA demonstrated that the actual volume of waste in Metro Manila that was properly disposed in its dumping area had reached only 30,200 cubic meters per day, out of the estimated 56,100 cubic meters of waste generation. In other words, approximately 46 percent of the estimated generated waste for 2017 was not properly disposed.<sup>72</sup>

### 3.4.6 Education and Outreach

Through the Las Piñas-Zapote River System Rehabilitation Program, thousands of residents from various communities along the river system in Las Piñas City, Paranaque City, and Bacoor have been trained on ecological solid waste and river management. Some of them are designated river watch volunteers. This undertaking has been the commitment of the Couples for Christ-Oikos Ministry volunteers who, since June 2003, have devoted each Saturday conducting values formation and SWM education for the residents.

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<sup>71</sup> MMDA, 2018.

<sup>72</sup> Ibid.

They were trained on ecological SWM as an important component of the program. Some of them have become river watch volunteers.<sup>73</sup>

### 3.5 Pasig City (Metro Manila)

Pasig City is a first class, highly urbanized city in Metro Manila, Philippines that is in the National Capital Region (see Figure 1). It is situated along the eastern border of Metro Manila about 30 km northeast of fellow CCBO engagement site, Las Piñas (see Figure 29). The city is composed of 30 barangays within two districts, with an estimated total population of 755,000. Formerly a rural settlement, Pasig City has developed primarily into residential and industrial use areas. It has become increasingly commercial in recent years, specifically after the construction of the Ortigas Center business district.

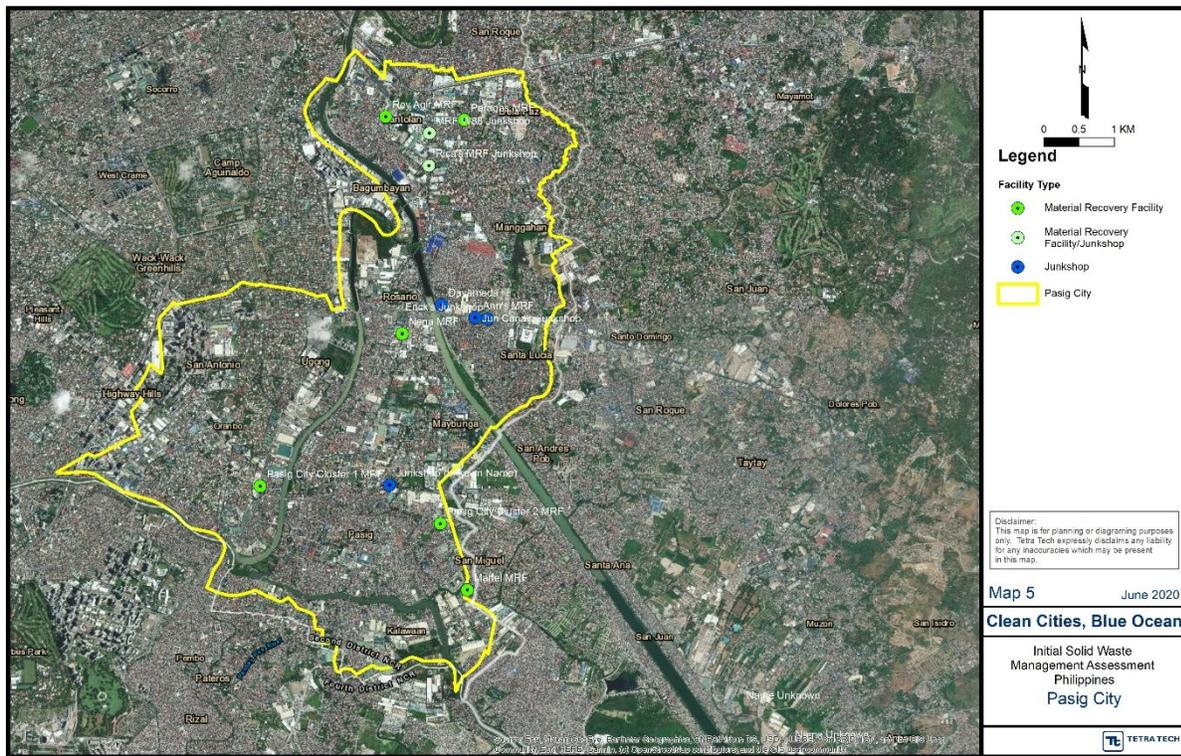


Figure 28. Map of Pasig City

The Pasig River flows from Laguna de Bay to Manila Bay through a length of 26 kilometers (16 miles), with an average width of 50 meters (160 feet). The river runs through some of the most populous areas in the entire country and suffers from a high level of water pollution. Throughout its history, the river was utilized as a major source of transportation, water, and food. The river was such an important part of the country, that many houses were built alongside its shores, including the Malacañan Palace, which is the official residence of the President of the Philippines. After World War II, infrastructure construction, population growth, and the dispersal of economic activities to Manila’s suburbs left the Pasig River neglected. Beginning as early as the 1930’s, increasing levels of pollution led to a drastic decrease in fish

<sup>73</sup> United Nations

migration from Laguna de Bay and by the 1990's, the river was considered biologically dead. In a 2017 study on river plastic emissions into oceans, the Pasig River was ranked as the world's eighth most polluted river.<sup>74</sup>

Efforts to rehabilitate the Pasig River began in 2010 with assistance from the Danish International Development Agency. The ADB also gave the Filipino government a \$200 million loan to implement a 15-year slum upgrade program for Metro Manila, which includes the rehabilitation of the Pasig River, with the primary objective of improving environmental management, specifically with waste-water management and urban renewal.<sup>75</sup>

### 3.5.1 Governance

Pasig City's SWM systems are guided by several Metropolitan Manila Development Authority regulations, which include:

- **MMDA Regulation No. 96-009** - Prohibits littering and dumping in open or public places to promote health and sanitation and to prevent and control environmental pollution.
- **MMDA Regulation No. 98-009** - Prohibits littering and dumping of waste in public or open spaces. It also provides penalties for specific illegal acts and vests in the Commission the sole responsibility for the implementation of its provisions in lieu of coordination with other agencies.
- **MMDA Regulation No. 99-004** requires establishments and dwellings in Metro Manila to sort their waste at the source using color-coded separate containers. It also promotes recycling and composting as SWM practices.
- **MMDA Resolution No. 02 35** urges the LGUs of Metropolitan Manila through the respective city/municipal councils to enact a uniform ordinance adopting guidelines and procedures for a unified approach on solid waste management in their areas of jurisdiction.<sup>76</sup>
- **Other Ordinance/s** - The city has also passed ordinances banning or regulating the sale and use of plastic bags and polystyrene foams.<sup>77</sup>

Pasig City is one of several LGUs in the Metro Manila to have an approved SWMP but is not publicly available on any governmental agency website—although an associated waste characterization study was obtained. CCBO will continue to locate the SWMP to evaluate the city's identified SWM approach.<sup>78</sup>

### 3.4.2 Waste Generation and Composition

Pasig City generates an average of 0.5 kg/day (1.1 lbs./day) per capita, or an estimated 400 tons are generated each day. This is expected to increase to 450 tons in 2020 according to Pasig City's Ten-Year Solid Waste Management Plan for 2015-2024. In 2015, an estimated 145,000 tons of waste were also projected for Pasig City in 2020<sup>79</sup>. In its research, CCBO noted that annual waste generation projections being identified by NSWMC do not add up. With a population of 755,000 and a per capita generation of 1.1 lbs./day, waste generation would likely be twice as much if not more than the 2015 has identified.

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<sup>74</sup> Lebreton et al., 2017.

<sup>75</sup> Asian Development Bank, 2010.

<sup>76</sup> Asian Development Bank

<sup>77</sup> Environmental Management Bureau, 2018

<sup>78</sup> Pasig City WASCs, 2015.

<sup>79</sup> NSWMC, 2015

A 2014 Disposed Waste Composition Study conducted in Pasig City indicated that an estimated 6,700 tons of waste, 1,300 tons of plastic, and 403,000 cubic meters of organic waste were generated in that year.<sup>80</sup>

As demonstrated in Figure 30, study results indicated that food/kitchen waste, plastic, paper, and special waste, were the most disposed categories; food/kitchen waste (37%), plastic (19%), paper (17%), special waste (11%).



Figure 29. Composition of Disposed Waste in Pasig City  
Source: Pasig City SWMP (2015-2024)

### 3.5.3 Waste Collection

The municipality provides collection services for households and businesses across Pasig city. However, some residential areas do not presently have access to collection services. As the city urbanizes, more of the population is getting service by the municipality.

Different types of businesses have varying service charges for their solid waste collection. Table 2 presents the cost for the different types of businesses (in Philippine Pesos).

Table 4. Service Charges for Solid Waste Collection in Pasig City

Type of Business	Cost (in Philippine Pesos)
Manufacturers, millers, assemblers, processors, and similar businesses	5.00 per sq. m, per month
Hotels, apartments, motels, and lodging houses	5.00 per sq. m, per month
Restaurants, day and night clubs, cafes, and eateries	5.00 per sq. m, per month
Condominiums	120.00 per unit, per year
Hospitals, clinics, laboratories, and similar businesses	4.50 per sq. m, per month
Movie houses, amusement, entertainment and recreational places	5.00 per sq. m, per month
Retailers, exporters, wholesalers, and distributors	1.50 per sq. m, per month
Banking and other financial institutions	1.50 per sq. m, per month
Gasoline stations and open pay-parking	5.00 per sq. m, per month
Warehouses	5.00 per sq. m, per month

<sup>80</sup> NSWMC, 2015. Pasig City Ten-Year Solid Waste Management Plan (2015-2024).

All private schools and educational institutions	1.50 per sq. m, per year
Public market stalls:	
Fruits and vegetables	7.00 per sq. m, per month
Dry Goods	3.00 per sq. m, per month
Coconut Vendors	15.00 per sq. m, per month

Source: 2017 Revised Pasig Revenue Code

### 3.5.4 Recycling System

**Material Recovery Facilities** - Ten MRFs were identified in Pasig City: Pasig City Cluster 1 MRF (see Figure 31), Pasig City Cluster 2 MRF and Pasig City Cluster 3 MRF (see Figure 32) For the remaining MRFs: Ann’s MRF, Rica’s MRF, Paragas MRF, Nena MRF, Mariel MRF, Lem-Lem MRF Junkshop, Rey Agir MRF, and MRF W88 Junkshop (see Figure 29).

**Junkshops** - Three junkshops that are also advertised as MRFs were identified in Pasig City: A picture of MRF W88 Junkshop can be seen in Figure 33. For the location of the other two: Rica’s MRF Junkshop and Lem-Lem MRF Junkshop, see Figure 29.



Figure 30. Cluster 1 MRFs  
Source: Google Street View 2-2014



Figure 31. W88 Junkshop  
Source: Google Street View 2-2014

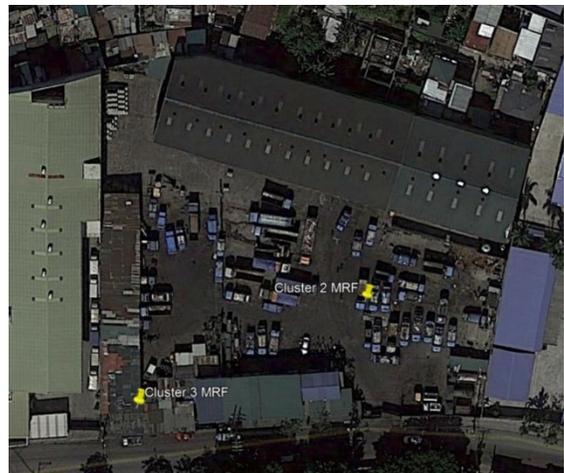


Figure 32. Clusters 2 and 3 MRFs  
Source: Google Aerial 3-2018

### 3.5.5 Waste Disposal

Currently, there are no existing sanitary landfills or dumps that were found in Pasig City.

Waste disposal facilities used by Las Piñas City include Rizal Provincial Sanitary Landfill, Navotas Sanitary Landfill, and the new San Mateo Sanitary Landfill. MMDA stated in 2018 that these three active waste disposal facilities used by Metro Manila dispose of about 54 percent of the estimated waste generated.<sup>81</sup> Tonnages disposed by each LGU at each of the three facilities was not found.

### 3.5.6 Education and Outreach

The city has implemented several reuse and reduction programs over the last few years.

- Green Hearts Saver's Movement Project is a project that aims to collect recyclable waste in exchange for school supplies in various schools. The Creative Recycling Project is a project in which plastics are recycled into hollow blocks and stand-up pouches (day packs) are recycled to make eco-bags. The project has employed approximately 500 eco-bag makers and brings additional income into the barangay.
- The Waste Segregation and Door-to-door Collection Project promotes the establishment of MRFs and provision of segregation bins in all public schools of the city and monitoring of waste segregation in all residential areas. Waste trucks and personnel collect the waste on main thoroughfares and secondary roads, while 46 Ecoboys collect from houses along the inner streets and alleys.
- The 30 Urban Gardens Project is an annual contest on the most outstanding urban garden where participants must use soil conditioners from established composting facilities.
- The Anti-Littering Campaign Project supports the distribution of free waste receptacles made of recycled tin cans to public vehicles.
- The Information Dissemination and Advocacy Campaign Project holds campaigns that promote the proper disposal of waste in schools and all residential areas.<sup>82</sup>

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<sup>81</sup> MMDA, 2018.

<sup>82</sup> Institute for Global Environment Strategies, 2010.

## 4. Additional Information/Data Required

In order to develop a more detailed SWM assessment, additional information and data will be required - as outlined throughout this report. Additional data will enable CCBO to establish high confidence in the critical information being presented such as existing waste generation, collection, recycling, and final disposal data. The following lists some of the information that will be needed depending on the priorities identified by CCBO:

- 10-Year Solid Waste Management Plan – There is a need to obtain a copy of the SWMP for each of the engagement sites. The SWMP will allow for the evaluation of the solid waste management approach being identified by each city. For Pasig City a waste characterization study conducted as part of the SWMP was found, which provided valuable information.
- Solid Waste Generation – Need to identify breakdown of tons of waste generated by each sector including residential, commercial, and industrial.
- Per Capita Generation – Verification of publicized calculations is needed, specifically for Batangas and Pasig Cities, which data did not add up.
- Waste Characterization – If SWMPs don't provide waste characterization data, it is recommended that waste characterization is conducted at the source generation and final disposal.
- Identification of collection methods for all sectors at each engagement site.
- Collection – Identify collection method and associated volumes (recovered materials and residual).
- Existing Processing Infrastructure – Identification/verification of active:
  - Aggregation Points,
  - Material Recovery Facilities (MRF),
  - Junkshops,
  - Construction and Demolition (C&D) Operations, and
  - Organics Processing.
- Permitted/Certified Operations/Facilities – Identify permitting/certification process for the various types of operations/facilities. Available mechanisms to shut down operations/facilities.
- Recovered/Recycled Material Quantities – Tons received, recovered, and residual as applicable. Types of materials recycled. The identification of processors, brokers, or end-users.
- Programs or initiatives involving reuse or reduction of materials.
- Solid Waste Disposal – Total tons disposed on a daily and annual basis and associated tipping fee at dumps, landfills, and sanitary landfills.
- Existing Active and Inactive Open Dumps – Estimated waste in-place calculations to assess proper closure of dump sites.
- Waste Pickers – Need to identify the number of waste pickers associated with junkshops, dumps, and landfills.
- Outreach and Education – Need to identify all existing/current publicly funded education and outreach efforts and NGO's with focus on SWM.
- Regulatory Enforcement and Penalties – Need to identify enforcement actions and penalties if any by any of the engagement sites.
- An understanding of funding and financial systems as well as fee structures and how fees are collected.

- Field Observations – It is obvious that solid waste at CCBO engagement sites is not properly managed, field observations should be focused on set-out, aggregation, collection, and processing (resource recovery).

## 5. Recommendations and Next Steps

The 3R/SWM systems in all four engagement sites are developing. There appears to be both formal and informal forms of collection for both unsorted and source separated waste. The degrees to which there are formal infrastructure for processing and disposal of these materials varies but large MRFs and sanitary landfills are available to manage some materials but more it needed. The CCBO team was able to find some ordinances governing the 3R/SWM systems and suspect that they will find more with time. The good news is that each of the four cities have an approved SWMP, however, the level of implementation and enforcement has yet to be determined. It's important to note that the informal sector plays an important role in collecting, aggregating and processing of plastics and other recyclables that make their way into the formal recycling marketplace, but only for a small number of valuable items. Markets for plastics are needed and establishing a means for managing bio-degradable waste is a must.

CCBO has learned a lot through its online research and will build upon this knowledge as this program progresses. There are, however, some immediate steps that the team believes should be taken and recommends the following be considered in this initial phase of the CCBO program in the Philippines.

Recommendations:

- Continue to research and better understand the existing 3R/SWM systems in the engagement sites, through in-person meetings with local stakeholders.
- Work within the communities to develop a network of government officials, civic society, citizens, workers, NGOs, private sector operators and partners and other entities that have been involved in the current systems and can help improve them.
- Work with these stakeholders to increase their capacity to develop sound 3R/SWM systems.
- Learn more about current funding mechanisms used for the 3R/SWM systems and work with stakeholders to consider additional or alternative revenue generation and financing options to support improvements to these systems.
- Identify sources of plastic leakage into local waterways and assist in the development of mitigation practices to both reduce leakage and pollution.
- Seek ways in which to expand and develop the markets for plastics (those that are currently valuable and those that are not) and bio-degradable materials, including reuse.
- Support communities to develop and improve the services needed to create efficient collection, aggregation and transport of materials as part of a sound 3R/SWM system.
- Support the communities in updating and revising their SWMP to improve their 3R/SWM systems, including providing enabling environments for infrastructure development.
- Engage stakeholders and the private sector to seek mutually beneficial means of building the infrastructure needed in improved 3R/SWM systems (MRFs, Compost Facilities, Anaerobic Digestion, Sanitary Landfills and/or other appropriate technologies.)
- Learn more about existing social behavior in the Philippines within the 3R/SWM systems and seek

appropriate ways to create awareness for increasing material separation at the source.

- Develop a network and understanding of the current circumstances for youth and women in the engagement sites and begin to formulate a path toward improving working conditions as part of the 3R/SWM planning process.
- Review existing laws, policies and regulations pertaining to 3R/SWM systems and support additions or revisions that would support the 3R/SWM planning and implementation process.

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## Annex I. Women’s Economic Empowerment and Current Opportunities

Men, women, and children work as informal waste collectors in the Philippines, including in Iloilo.<sup>83</sup> In 2009, in Quezon City, which borders Pasig City, there were an estimated 2,590 (2,072 males and 518 female) itinerant informal waste collectors, as well as 3,750 (2,045 male and 1,705 female) waste pickers at dumpsites.<sup>84</sup> Information was not readily available on informal waste collectors in Batangas, Las Piñas and Pasig City. However, Las Piñas website states that, “the thousand-strong Kaagapay sa Kalinisan and Yellow Boys Volunteers are mobilized to maintain cleanliness on streets and major roads.” The pictures shown on the website, however, illustrate that most of these “boys” are, in fact, women.

With few exceptions, women are found in the lowest levels of the SWM value chain. Although women work at junk shops, the next highest node on the SWM value chain, relatively few women have owned junk shops, at least in Metro Manila.<sup>85</sup> Furthermore, especially women, but also men, informal waste collectors employed at MRFs may bring their children with them, as they are able to do in their work in the informal sector.<sup>86</sup>

In general, working conditions for those at the lowest levels of the value chain are difficult, especially for women. For example, few MRFs (from internet photographs) appear to have toilets, which are important to women, or for nursing mothers, private space to breastfeed or expel milk.

For those women wishing to advance their positions in the waste value chain, beginning or expanding a business is difficult. Filipina business owners and entrepreneurs working in SWM and recycling sectors have low access to capital; potential funders perceive their businesses as high-risk, low-value investments, despite delivering essential waste and sanitation services that keep urban areas functioning. Women waste pickers and junkshop owners have the lowest social status. They face uncertain daily incomes, with virtually non-existent negotiating power over the resale value of materials they collect or buy.<sup>87</sup> Consequently, women are virtually absent from higher levels of the value chain (i.e., medium and large-sized waste aggregators/collectors, processors, upcyclers, and municipal waste contractors).

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<sup>83</sup> Rodriguez Aug. 26, 2018; Ejares, Paler, and Aguilar 2014; Paul, Jaque, Kintanar, Sipalan, and Gallo 2007.

<sup>84</sup> Chikarmane and Narayan 2009.

<sup>85</sup> Manny Sept. 26, 2010

<sup>86</sup> Paul et al op city

<sup>87</sup> ADB 2013

## Annex II. Glossary of Terms

**Dump or Open Dump** – A facility where waste is disposed by both the public sector and private individuals in an uncontrolled manner. Such sites generally lack even minimal environmental controls and can have a significant negative impact on the local community.

**Junkshop** – Informal solid waste management operations typically operated by individuals out of residences or small street facing lots with canopies.

**Landfill** – A landfill typically means that a site has undergone some type of siting process to ensure that its environmental impacts to the community are minimized. Generally, a disposal site falling into this category involves the excavation of land to create a “cell” and the waste is covered with soil on a regular basis to minimize odors and vectors. However, it may or may not include modern environmental controls such as methane and leachate collection systems, proper drainage for stormwater run-off and other controls. Minimal equipment is on site to compact the waste to preserve the capacity of the site.

**Material Recovery Facility (Philippines)** – For the purposes of this document, a material recovery facility is a facility that receives biodegradable wastes for composting and mixed non-biodegradable wastes for final segregation, re-use and recycling; Provided, that each type of mixed waste is collected from the source and transported in separate containers. MRFs could include a solid waste sorting station, drop-off center, a composting facility, and a recycling facility.

**Sanitary Landfill** – A sanitary landfill is typically an engineered facility built to accommodate known or projected waste streams over a long-term horizon. A site of this variety typically goes through a rigorous siting and environmental impact process, before being designed and constructed by engineering and solid waste professionals. A sanitary landfill has environmental systems in place to control methane and other air emissions, leachate, stormwater run-off and daily cover material and includes monitoring systems to maintain metrics for operating and reporting requirements. Such facilities are operated with modern equipment, including compaction of the waste to optimize the available “airspace” based on a “fill plan” or “fill sequence that places an economic value on the airspace.

**Transfer Station/Material Recovery Facility (U.S.)** – For the purposes of this document a transfer station is a facility where waste is aggregated by both the public sector and private individuals (self-haul) in a controlled manner. Materials separation occurs utilizing manual labor and automated equipment if possible. Recyclables are baled and sent to market. Residual waste is then transferred into larger vehicles and taken to a landfill for final disposal. This may include multiple streams including commercial and residential waste, recyclables, organics, and construction and demolitions debris.