CIRCULARITY ASSESSMENT PROTOCOL

Manila, Philippines

Circularity Informatics Lab – Jambeck Research Group
University of Georgia in Collaboration with Save Our Philippine Seas

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Executive Summary

Developed by the Circularity Informatics Lab at the University of Georgia, the Circularity Assessment Protocol (CAP) is a standardized assessment protocol to inform decision-makers through collecting community-level data on plastic usage and management. Grounded in materials flow and systems thinking concepts, the CAP uses a hub-and-spoke model to holistically characterize how consumer plastics flow into a community, are consumed, and flow out, either through waste management systems or leakage into the environment. The model, shown below, is comprised of seven spokes: input, community, material and product design, use, collection, end of cycle, and leakage. At the center, the system is driven by policy, economics and governance with key influencers including non-governmental organizations, industry and government.

Between January and March 2021, a team from Save Philippine Seas (SPS) in Metro Manila, which served as the local implementing partner (LIP) for this project [the UGA team was unable to travel due to the COVID-19 pandemic] with guidance and support from the Circularity Informatics Lab, conducted fieldwork in three cities within Metro Manila, Philippines. The CAP was conducted with support from the city's local government and local USAID contractor and Municipal Waste Recycling Program implementer, DIG. Field work included product and packaging assessments in stores across the city; key stakeholder interviews with government, industry, and non-profit organizations; material type characterizations for consumer plastic items; cost analysis

of reusable products and alternatives to plastic available in the city; visual audits of recycling contamination; identification of public waste and recycling collection bins; and litter transects in three categories of population. Key findings from each spoke are summarized in the following table.

Key Opportunities

INPUT	There is a mix of local and international sources for plastic manufacturers. All international companies have local distributors, which provides an opportunity to engage the local counterparts for proper collection, alternate delivery systems, and education campaigns.
COMMUNITY	There is a general acknowledgement and recognition of Metro Manila's plastic pollution crisis. Respondents from dining establishments, stores, and local governments have mixed reactions to a proposal for a single-use plastic ban, citing cost implications and lack of alternatives and resources as barriers for implementation.
PRODUCT DESIGN	The majority of the product packaging from dining establishments and stores were designed to be single-use (e.g., to-go cups and utensils, plastic bags, sachets). In recent years, governments, the private sector, and civil society organizations have promoted the switch to paper-based packaging and reusable bags.
USE	The majority of the product packaging from dining establishments and stores came in single-use plastic packaging and in multi-layer film. Volumes of single-use plastic packaging increased due to impacts of COVID-19 (e.g., prohibition of dining in, food delivery services, and concerns for cross-contamination). Plastic bags and glass and plastic containers (PET) are commonly reused, but multilayer film used for household goods are disposed of.
COLLECTION	The waste collection rate in Metro Manila is reportedly at 85%. These services are free for all Metro Manila residential and commercial areas as part of the government mandate. Compliance to the "no segregation, no collection" provision under the national law remains low.

END OF CYCLE	Metro Manila lacks waste management infrastructure, which contributes to the leakage of solid wastes into the environment. Increasing segregation at the source could significantly curb the amount of waste leakage.
LEAKAGE	The majority of litter items collected through the Marine Debris Tracker app were food plastics and tobacco products. These items have low to no value for collection and recycling. This data can inform policy change, specifically Extended Producer Responsibility.

Acknowledgements

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Glossary of Acronyms

CAP	Circularity Assessment Protocol
CE	Circular Economy
CIL	Circularity Informatics Lab
DENR	Department of Environment and Natural Resources
DIG	Development Innovations Group
DOH	Department of Health
EPR	Extended Producer Responsibility
HDPE	High Density Polyethylene
GDP	Gross Domestic Product
IWC	Independent Waste Collector
IEC	Information, Education and Communication
LGU	Local Government Unit
LIP	Local Implementing Partner
MPs	Microplastics
MRF	Materials Recovery System
MRS	Materials Recovery Facility
MSW	Municipal Solid Waste
MSWM	Municipal Solid Waste Management
MWRP	Municipal Waste Recycling Program
NGO	Non-Governmental Organization
NMI	New Materials Institute
NSWMC	National Solid Waste Management Commission
OMSW	Ordinary Municipal Solid Waste
PE	Polyethylene
PET	Polyethylene terephthalate
PMO	Property Management Office
PP	Polypropylene
PPE	Personal Protective Equipment
PS	Polystyrene
RA	Republic Act
SPS	Save Philippine Seas (NGO)
SWM	Solid Waste Management
TCI	The Circulate Initiative
UGA	University of Georgia
USAID	United States Agency for International Development
WWF	World Wide Fund for Nature

US$1 = PhP (Philippine Peso) 47.89 as of 13 May 2021 (source: xe.com)

Introduction

The Circularity Informatics Lab at the University of Georgia has developed a Circularity Assessment Protocol (CAP), which is a standardized assessment protocol used to collect community-level data to inform decision-makers. The CAP characterizes seven community components:

1. Inputs – What products are sold in the community and where do they originate?
2. Community - What conversations are happening and what are the stakeholders' attitudes and perceptions?
3. Product design - What materials, formats, and innovations are found in products, particularly packaging?
4. Use – What are the community trends around use and reuse of product types?
5. Collection – How much and what types of waste are generated? How much is collected and what infrastructure exists?
6. End-of-cycle – How is waste disposed? What is the fate of waste once it is properly discarded? How is it treated?
7. Leakage - What waste ends up in the environment? How and why is it getting there?

Various influencing factors drive this system including governance, economics, policy, and legislation (e.g., bans, taxes). Furthermore, multiple stakeholders exist at every level of the CAP influencing the complex system, and these include the public, government, industry, NGOs, and academia. While the hub and spoke model illustrates the CAP, it is a complex system with components inherently interconnected to each other and to life-cycle impacts beyond each spoke. The CAP is a framework approach to the flow of materials, in this case focusing on plastic and packaging, and the quantity and characterization of leakage from this sector will be characterized during litter assessments that can inform upstream interventions in the rest of the systems model. As of early 2021, CAP has been conducted in 26 cities in ten countries.

This report documents work conducted by the Circularity Informatics Lab at the University of Georgia (UGA) and Save Philippine Seas (SPS) in Metro Manila with support from the USAID Development Innovations Group (DIG) Municipal Waste Recycling Program (MWRP). Background information and a literature review was conducted in January - March 2020. Field work was conducted in January - March 2021 (delayed due to the COVID-19 pandemic). The report is split into the following sections of the CAP, which include results and discussion of each: Input, Community, Product Design, Use, Collection, End of Cycle and Leakage, followed by Opportunities (for change).

In the Philippines, the fundamental legal basis for waste management, prevention, and recycling in the country is the Ecological Solid Waste Management Act of the Philippines (Republic Act (RA) 9003) (Republic of the Philippines, 2001). Under this law, the local government units (LGUs) are mandated to implement and enforce its provisions within their jurisdiction. LGUs also have the responsibility to develop and implement 10-year solid waste management plans and pass their own local laws related to waste management.

Metro Manila is the project site of CAP in the Philippines. It is also known as the National Capital Region, and is considered the seat of the government in the Philippines. Metro Manila is composed of 16 cities, three of which were surveyed as part of CAP.

Input

To get a snapshot of the characterization, scope, and source of common plastic packaged items that are entering Metro Manila, samples of common convenience items were sampled within nine 1km^2 squares in the region - three within each tertile of the population count, which included three within each city area of Quezon City, Manila City, and Mandaluyong City. Small convenience stores that are often attached to houses are called *sari-sari* stores ("variety" in English). The LIP selected three convenience or grocery shops to sample within each 1km^2 transect area where possible (unless there were less than three stores within the area), totaling to a minimum of 27 stores surveyed. For each shop, the LIP collected the most popular brands of candy, snacks, beverages, personal care products, as well as the most popular brands of tobacco products where possible. The "most popular brand" was determined as the most purchased brand based upon shelf space taken up and/or the shopkeeper's input. This yielded 93 product samples total, 24 of which were candy, 27 snacks, 24 beverages, 4 tobacco products, 11 personal care products, and 3 cooking or house supply items. The weight of both the plastic packaging and the product itself were measured for each item using a kitchen scale.

For each of the top products documented, the LIP noted the type of packaging (including polymer, if possible), the brand, and the parent company. From there, the team was able to determine the manufacturing location, which was determined from manufacturing locations listed on product packaging or desktop research, as well as the headquarters location for the parent company of the brand (largely determined by desktop research). Table 1 contains the minimum, maximum and average distance to both the manufacturing facilities and parent companies, vehicle Figures 1-3 show maps of both manufacturer and parent company locations.

Table 1. Distances to Parent Company Headquarters and Manufacturing Facilities for Most Popular Products

	Distance: Store to Parent Company (km)			Distance: Store to Manufacturer (km)		
	Minimum	Maximum	Average	Minimum	Maximum	Average
Candy	7	26,574	4,380	7	15,101	1,423
Snacks	11	119	27	23	119	40
Beverages	7	29,207	16,177	23	5,380	275
Tobacco Products	21	6,042	200	134	6,042	245

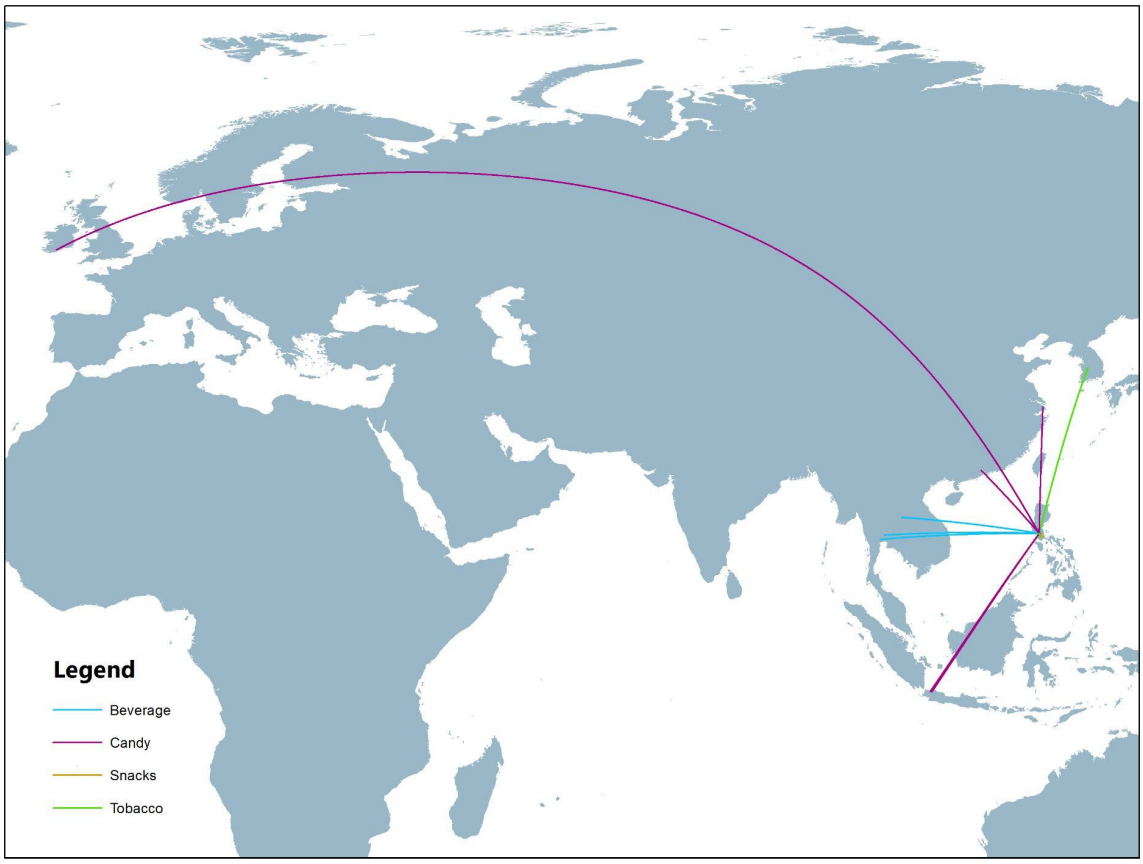


Figure 1: World view of distances between stores and manufacturers

Figure 2: Regional view of distances between stores and manufacturers

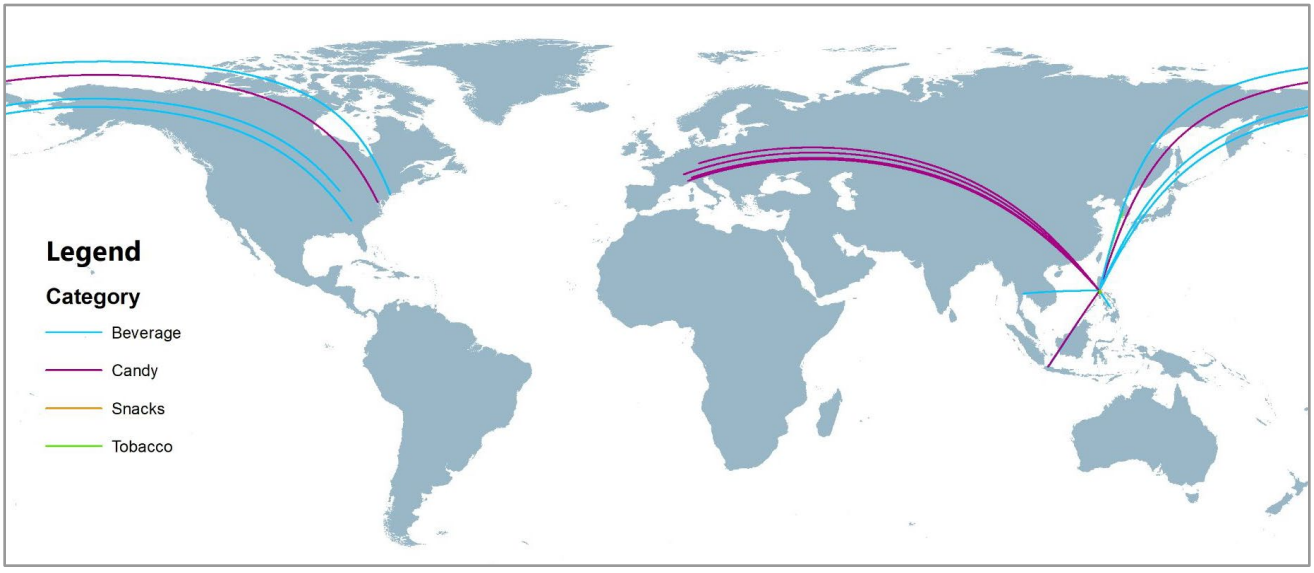


Figure 3: World view of distances between stores and parent companies.

The manufacturers for beverages are the close to the city (275km average), while the average parent company is further away (more than 16,000km average away). Both the parent and manufacturing of the most popular chip brands are less than 100km from the city, providing ample opportunity to discuss packaging design. Tobacco manufacturing and parent companies were also relatively close (less than 300km from the city) and candy was variable with the manufacture occurring an average of just over 100km away, but the parent companies average was over 4,000km away.

Community

To understand current attitudes and perceptions of plastic waste, SPS conducted 71 semi-structured interviews (Table 2). Among those interviewed, 32 were store staff (convenience stores, sari-sari stores, street vendors, and groceries); four were private waste hauling, landfill, or recycling companies; three local junk shops; five were informal recycling aggregators; 12 were food vendors; three were companies using or producing plastic alternatives; three were LGU representatives; three were from local NGOs; three were from academia; and three were from fast-moving consumer good companies that sold majority of their items in plastic packaging.

Table 2. List of Stakeholders Interviewed for CAP

Stakeholder Group	Number of Interviews
Neighborhood Sundry Store Owner/Staff (Sari-sari Store in Filipino)	26
Food vendors	12
Independent Waste Pickers	5
Consumer Product Companies	3
Waste Aggregators	4
Local Government Unit	3
Local NGOs	3
Academia	3
Convenience Store Staff	4
Grocery Staff	1
Street Vendor	1
Local Zero Waste Stores	3
Local Junk Shop Owners	3

Local laws

Each LGU is governed by its own set of SWM laws. In Manila City, there is no local law that regulates or bans plastic. Their 10-year solid waste management plan ended in 2015, and the city LGU is expected to develop the follow-up plan in the next three years with the support of the World Wide Fund for Nature Philippines (WWF Philippines). The directive from the LGU is for barangays (the smallest administrative unit in the Philippines) to establish their own Materials Recovery System (MRS) or Materials Recovery Facility (MRF). The MRS is typically a steel welded wire mesh container that collects PET bottles and other recyclables.

"So according to the national solid waste management commission, there are 489 cities in municipalities that have some kind of plastic regulation...The earliest one was in 2003. There was an increase after Ondoy and Parang, after every big storm there was an increase of plastic bans. So, from there, you can see that we're quite reactive when we think of policies..." (NGO Representative)

Mandaluyong City passed an ordinance banning the use of plastic and polystyrene packaging (often referred to as "styrofoam" or "styropor" in the Philippines) in 2013 (Mandaluyong City Government). The ordinance states that the total ban should have been fully implemented in 2014. Barangay officials are also required to create "recycling cages" within their jurisdiction (similar to Manila City's MRS).

Quezon City first passed an ordinance to reduce single-use plastic bags in 2012. The policy required consumers to pay PhP2.00 ($US0.04) for plastic bags as an "environmental fee" (this fee went to a fund administered by the city, but given to businesses and organizations that wrote proposals for projects that benefit the entire city moving towards sustainability). The ordinance was amended in 2014 to incorporate the city's Environment Code, and amended again in 2019 to impose a total ban on the distribution of plastic bags by all malls, supermarkets, grocery stores, food chains/stalls, restaurants, and pharmacies by January 2020. The total ban did not push through due to the community quarantines brought about by the COVID-19 pandemic in 2020. In

March 2021, the city government announced that the ordinance would again be enacted. The ordinance does not cover bags (i.e., bags with no handles, holes or strings) used for wrapping fresh and cooked food (Quezon City Government, 2021).

Despite the existing local laws in Mandaluyong City and Quezon City, implementation and compliance varies considerably.

"For the retailers' side, they have had to implement the ban as early as January of 2020, I think, they've compiled because they're afraid of being given a ticket or at least be given a cease and desist order by the BPLD once they are caught. They are also very aware that there are environmental enforcers. So, compliance on the side of retailers is I think could be high. Maybe, I believe it's between 90% to 100%." (Local Government)

"Actually, the ones who have more resistance are the consumers, not the retailers because that adds to the cost of the stores that provide small shirt bags. So when he was banned, really the burden was on buying because they didn't bring anything, or they forgot to bring. But, in terms of the retailers, uh, our ordinance is well-accepted. In fact, that's right, because they have reduced the cost of providing a shirt bag, they can outright tell their consumers, "Oh, plastic is forbidden in Quezon City, so no we can provide for you." (Local Government)

"The DENR has to come up with the list of non-environmentally acceptable products. When I was with the National Solid Waste Management Commission, we started doing the life cycle of comparing the plastic, the paper...And now, there are bans on regulation on the use of plastic. But I think it's the behavior of the people. But we cannot legislate the behavior of the people, unless he's an environmentalist. It's really a process to educate the people on the impacts of improper solid waste management." (Waste Aggregator)

At the national level, there is a National Action Plan for Marine Litter being prepared by the Philippines, which is viewed in a positive light by many in the region. The Philippines is also a member country of the Coordinating Body on Seas of East Asia, which has a Regional Action Plan on Marine Litter.

"The National Plan of Action on Marine Litter helped a lot. Why? Because one, their PCAARRD, DOST-PCAARRD who is the agency tasked to develop the technologies to respond to the problem, they're now mandated eh. They're obliged to come up with funds to call for proposals that will answer that problem." (Academic)

Store owner and food vendor owner sentiments

Store owners have varying degrees of understanding on how plastic waste negatively affects the environment. They also had mixed reactions on the possible scenario of a total plastic ban and/or strict implementation of existing ordinances. A few respondents said that a total plastic ban would be acceptable if the LGU provided support for alternatives. One store vendor explained that PS food containers only cost PhP1.00 (US$0.02), and she can cut it in half to maximize its use. The paper-based packaging

option would be PhP5.00 (US$0.10), increasing her operational costs significantly. Several respondents replied that they would not support it because it would negatively impact their income. One store owner in Manila City recounted her experience seeing plastic wastes "returned" to the community when a strong storm hit the country's capital. The relationship between plastic pollution and typhoons is often raised after a big typhoon in the Philippines, as strong winds and storm surges regurgitate all kinds of debris back on land.

"Banning a material without sustainable alternatives can bring a different set of problems and it will also impact the income source of the informal waste sector." (Business Rep)

"I'll be transparent with you, [switching to plastic alternatives] is expensive. And we will really take a hit. You know, on the business side of things if we switch to a more sustainable packaging line up. We're still looking for ways on how to bridge that gap anyway. It's so ironic, you know?...Because we seem to want to be healthy. But we can't do full force because healthy stuff is expensive. And we have the same sentiments as well when it comes to sustainability. There's that hindrance, it's expensive to be sustainable." (Coffee Company Rep)

Ambulant food vendors, streetside dining establishments, and local eateries (*karinderia* in Filipino) are heavily reliant on non-recyclable single-use plastics because of cost and convenience. Plastic use of dining establishments increased during the COVID-19 pandemic. Large chains such as Starbucks and small, local eateries alike reduced and/or eliminated the use of reusables due to the prohibition of indoor dining services and concerns for cross-contamination. The larger establishments have higher capacity and more resources to switch to paper-based packaging, or invest in plastic items that are more dense/sturdier, however smaller businesses struggle with the high costs and lack of incentives to switch to alternatives.

"And then we also have promotion of the use of reusable wares, because on July 1 hotels, restaurants, fast food chains, they can no longer use disposables and single-use plastics for their dine-in customers...So we promote the use of reusable wares even in that take-out. Although, the take-out is not covered by the regulation, we have implemented by-request protocols. So meaning, when you deliver, first ask if you need a plastic spoon and forks so that it doesn't just become waste." (Local Government)

It was also mentioned repeatedly in the interview process that the concept of 'circular economy' is fairly new to the communities and businesses in Manila, in the modern sense of the phrase, even if historic behaviors may have emanated the concept.

"How should we be translating "circular economy" in Filipino or should we not call it circular economy? Because a lot of critics have said that circular economy is just the same thing as [unknown word] economy or sustainable development. We're just rebranding it and we're still messing around by adding this new term." (Business Rep)

We don't use circular economy, especially to consumers because it's not something they would understand. So now we're launching a campaign called Kasambuhay for the Environment. That is to emphasize also the role of consumers in being one with the environment and protecting the environment. But in terms of talking about sustainability, no, I think our emphasis is more on action from consumers versus highlighting the concept of circular economy." (Business Rep)

"So I think because it's a circular economy, for them it's a new concept, so for them they need a new understanding when in fact they seem to separate it too much from what it really is 'yung meron. So that's the usual gap, because it's like when there's a new concept, they immediately think it's a new concept that it needs its framework or they don't immediately think about how it's integrated already in the existing frameworks." (NGO Rep)

LGU perceptions

The LGUs have a multitude of initiatives to address the solid waste problem. Quezon City curbs plastic waste through projects that promote a circular economy such as zero-waste condiment refilling stores and building partnerships with waste aggregators to collect recyclable plastic waste. Manila City exerts efforts on waste diversion programs with the help of NGOs and private companies (Dumlao-Abadilla, 2020).

LGU representatives interviewed for the CAP shared contrasting views on the perceived role of the LGUs in pushing for behavior change to address solid waste issues. A representative claims that promoting behavioral change is beyond their scope, while another representative believes that local policies can help improve solid waste management and drive the necessary behavior to promote a circular economy. Another common response from LGUs is that the existing laws are too aspirational and thus not enforceable.

"I really feel the government plays a big role. I mean we know how influential, how powerful the president is. If he says, 'Today, we close Boracay.' We close Boracay. So I also feel the government plays a big role in saying, "Today, you have to stop throwing [littering], and then you have to start segregating in your own homes." So the messaging is very critical...I have also realized one of the issues in the government is you have the national and then you have the LGU, so even if the national says something but the LGUs don't follow suit, there will be a disconnection So it's very important that both departments are clearly aligned. You have MMDA, you have the LGUs, you have so on and so forth. And then you have the police who will enforce it. So if no one's aligned, it's like the seat belt law or the car seat law, then it becomes really a mess, right?" (Business Rep)

NGO-led initiatives

Pre-pandemic, many NGOs were active in conducting in-person information, education, communication campaigns and capacity-building programs related to SWM. Many NGOs have also used social media to promote their advocacies, creating infographics, toolkits, online petitions, and policy briefs available for free download. The Philippines has been described as the "social media capital of the world," with Filipinos spending the most time online than any other nationality in the world (an average of four hours and 15 minutes a day) (Chua, 2021). During the pandemic, NGOs have adapted their in-person activities to online formats. An analysis of Philippines social media on the topic of plastic pollution was conducted by the SEE Suite in the College of Journalism at UGA (Appendix A).

Another popular initiative that began in the Philippines is the brand audit methodology, first implemented in the Philippines in 2017 by the coalition Break Free From Plastic. In an ordinary coastal cleanup, organizers conduct a waste audit by counting the types of materials collected. The brand audit methodology aims to hold corporations accountable by naming the parent companies of the wastes collected. By 2019, the brand audit method was adopted by 484 cleanups in over 50 countries and six continents.

"So we're working on a bunch of different things, but the main focus is really, waste reduction at source, specifically, on plastic waste, the plastic problem. Because at least here in the Philippines, it's often viewed as a waste management issue or waste in disposal issue. So what we're trying to do is we want to reduce and manage waste by campaigning for bans on single-use plastic including their production." (NGO Rep)

"We think [EPR is] a good idea but we don't actively support it since some EPR approaches, at least in other countries and in other industries, merong concerns. Because, sometimes what happens is it's the industry that self-regulates and then there's really no intervention from the public or from the government and it's hard to make it really an accountable and transparent process." (NGO Rep)

"I think for waste management, there's a lot of really good community based solutions that are coming out and I think it would be good to do IEC campaigns on those community initiatives as well. To make sure that it's doable and also to amplify the ones that we think would work best and then go if it was not aligned with the right principles and the right ideas around circular economy. And also maybe I think continuing that narrative, corporations also have responsibility and there also has to be a responsibility on the government side. Because right now, people's idea of going zero-waste is really more on individuals. It seems that the burden is always on consumers." (NGO Rep)

Community Attitudes and Perceptions

While awareness of the issue of plastic pollution seems high among the city residents, from the interviews it seemed that the awareness level varies depending on the stakeholder group and also that the link between pollution and upstream infrastructure and behavior, such as consumer decisions and waste management, may not be clear.

"Well, in general, in solid waste management, people's awareness is high. Now that we are also doing our plastic waste reduction ordinances, we're implementing that. It actually started in 2012 that if you're from QC and you buy groceries here, you have to pay two pesos when you don't have an eco bag...So, I think in terms of level of awareness, high when it comes to plastic waste management. Except that of course, we still need to strengthen and do it over and over again, to make sure that we can inculcate the lifestyle change we want." (Local Government)

"More people are concerned [with using alternatives due to COVID]. However, we still lack tools. I mean, the tools that we have right now are not as sophisticated. As I mentioned, there aren't any composting facilities yet. So aside from that, education is essential. There's this one client who tried to melt the cling wrap. There are different components -- it's not like that. You have to expose it to certain factors for it to fully biodegrade. So education is really important. The more discerning the people are, the better it would be." (Social Enterprise Rep)

The most common misconception is ...[plastic waste] is a government problem. That is the notion of man. We pay tax. We must be given government service. That's the usual thing they're worried about, that's unbelievable. The misconception. But they don't know that they are part of the solution to this garbage problem." (Waste Aggregator)

"So when it comes to changing behavior, I think it's really multisectoral because you're changing a behavior that's been there for a hundred, hundreds of years, right? Plus the fact that this is the last thing on anyone's mind if you don't have a job and you have nothing to eat." (Business Rep)

It was also mentioned in the interviews that using social media and influencers could prove successful for getting across critical messages for behavior change in the Philippines, and that it hasn't been used to its full potential as of yet.

"And then of course you need influencers, right? You need people that people look up to who are doing it so it becomes a trend. You have to make it trendy...Because especially for the youth, they will follow, right? And we see all these brands also talking about the environment. So I think it's really multifactorial, but you really need to start somewhere. But you have to be convenient, they have to understand, and it has to be enforced" (Business Rep)

"I think our problem in the Philippines is that we don't have any champions or icons. I appreciated this approach when I was in Canada. In Canada, what they did was to

build faces to the problem, to the issue. And you know that, you give a face to the problem. You give a champion to the problem" (Academic)

Product Design

To characterize material types used in common consumer plastics, samples of common convenience and to-go items were obtained as described in the Input section. This included 32 stores and 27 food vendors or restaurants. The average weight of both the packaging and the product itself were collected for all samples (Table 3).

Table 3. Average weight of products and their plastic packaging for common convenience items.

Product Type	Number of Samples	Average Weight of Packaging (g)	Average Quantity of Product (g)
Candy	24	1.2	25.5
Snacks	27	4.9	57.5
Beverage	24	10.5	165
Personal Care Product	11	4.3	42.2
Tobacco Products	4	6.8	14.7

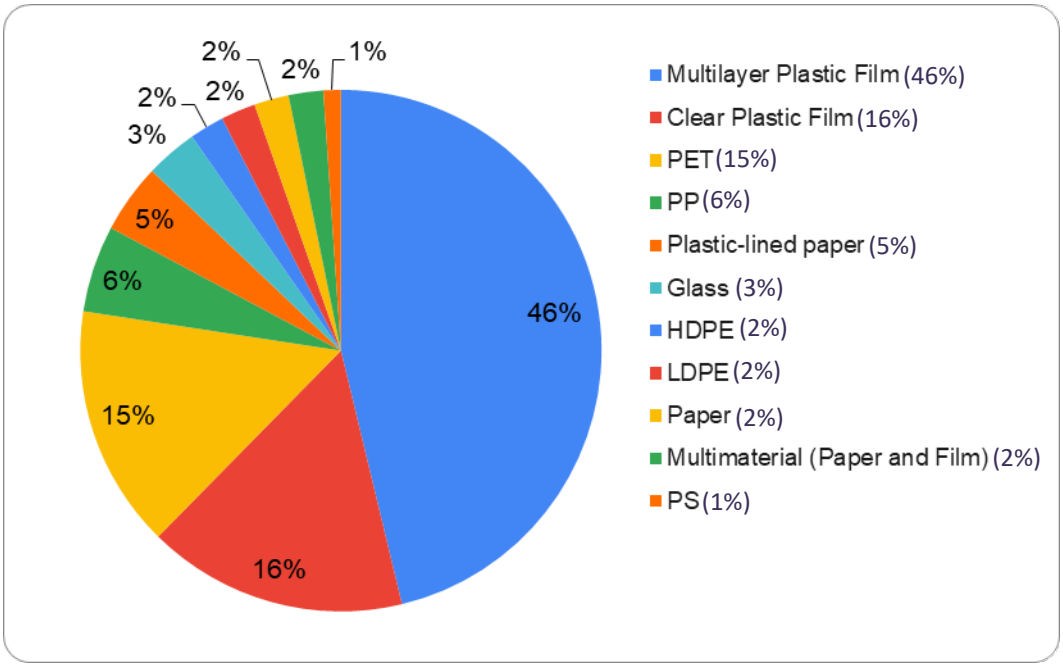


Figure 4: Material Breakdown for Top Convenience Store Items

All but two of the 27 snack products that were sampled from convenience stores were packaged in multilayer plastic film or clear plastic film (Figure 4). Similarly, 75% of candy products and 63% of personal care products were packaged in multilayer plastic film, such as sachets, or clear plastic film. The majority of beverage products (58%) were

packaged in PET, but 20% of beverages were also found packaged in multilayer plastic film.

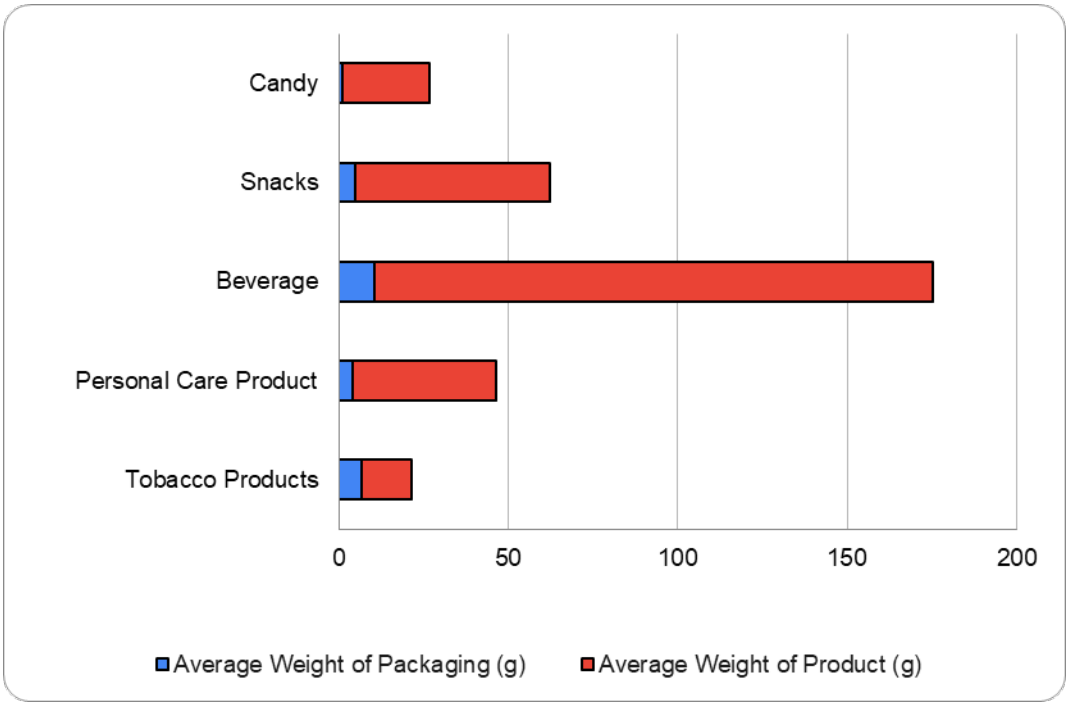


Figure 5: Convenience Store product to plastic ratios, shown in grams

Of the convenience items samples, beverage products on average had the highest packaging and product weight. Tobacco products had the highest ratio of packaging weight to product weight. Candy products had the smallest ratio of packaging weight to product weight. Beverage, and snacks and personal care products had similar ratios of packaging weight to product weight. It is more efficient to deliver as much (higher quantities) of product if it is packaged, and higher value packaging (for recycling) often has more mass, which can seem counter-intuitive, but is also illustrated by the "Leakage" component of the CAP. The lighter, film-based packaging often leaks out of the system.

Table 4. Average weight of common plastic packaging items from food vendors and restaurants.

Product & Material	**Number of Samples**	**Average Weight of Packaging (g)**
Coke Mismo (beverage)	**2**	**18.2**
PET	2	18.2
Condiment bag	**2**	**1.82**
LDPE	2	1.82

Condiment Sachet	**8**	**1.50**
Multilayer plastic	4	1.2
LDPE	1	0.69
PS	1	2.2
Multilayer (carton and polypropylene)	1	4
Multilayer (paper with plastic)	1	0.35
Food wrapper	**7**	**2.93**
Multilayer (paper and plastic)	4	3.33
LDPE	2	1.01
Paper	1	5.2
Lid	**10**	**2.12**
PS	5	2.16
PP	4	2.38
PET	1	0.9
Paper bag	**4**	**17.32**
Paper	4	17.32
Paper sleeve	**1**	**3.6**
Paper	1	3.6
Plastic bag	**14**	**3.65**
LDPE	8	3.08
PE	4	2.75
HDPE	2	7.55
Oxodegradable	1	4.1
Plastic labo	**7**	**0.23**
LDPE	7	0.23

Plate	**1**	**12.6**
Multilayer (paper and plastic)	1	12.6
Skewer	**1**	**0.29**
Wood	1	0.29
Straw	**13**	**0.99**
PP	13	0.99
To-go cup	**23**	**5.98**
PP	11	5.05
Multilayer (paper and plastic)	7	8.7
PS	2	3.9
PE	2	0.8
PET	1	11.7
To-go food container	**16**	**10.25**
PS	7	4.38
Multilayer (paper and plastic)	7	15.49
PP	1	15
PET	1	10
Utensil	**27**	**2.59**
PP	24	2.67
Wood	3	2.03
Utensil packaging	**5**	**1.48**
HDPE	3	1.88
Multilayer (paper and plastic)	1	1.57
Paper	1	0.21

In contrast to the convenience items samples, the majority of the to-go items sampled from restaurants and food vendors in Manila were PP, followed by similar ratios of

products that were multilayer paper and plastic, LDPE, and PS. Nearly 10% of the combined to-go items were composed of organic and biodegradable material, largely in the form of utensils and utensil wrappers. Condiment sachets, to-go cups, plastic bags, and to-go food containers all came in four or more material types across the vendors sampled (Figure 6). Condiment sachets were among the products that were most frequently found as multilayer plastic or multi-material, which can be the most difficult to recycle or develop value for in a waste economy.

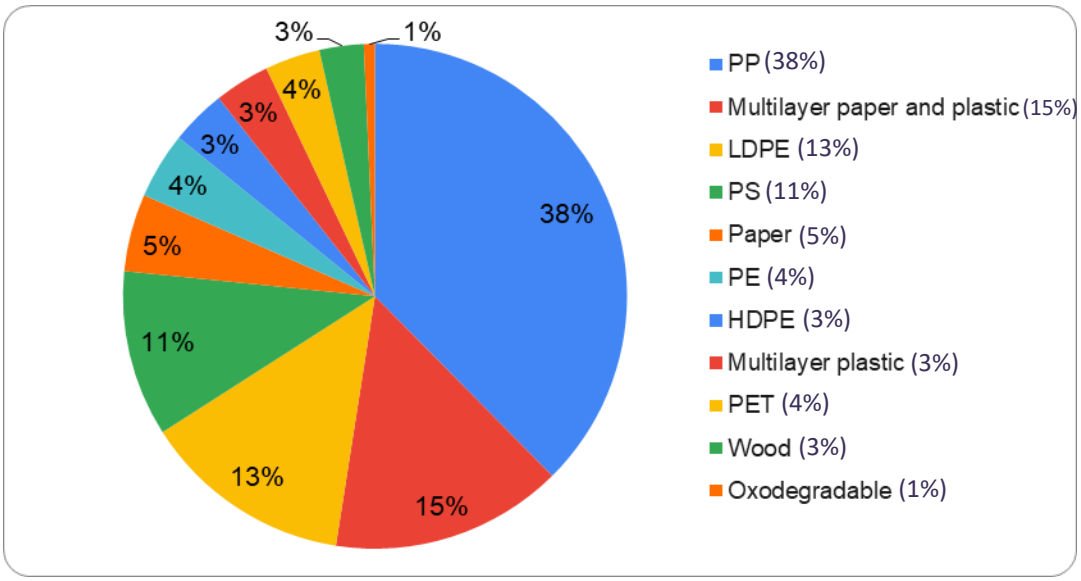


Figure 6: Material Breakdown for To-Go Items

The Philippines has been described as a "sachet economy," and the data above supports this claim. Nearly all household essentials have a variant sold in small quantities (5-15 ml) and in multilayer plastic film because of affordability and convenience. Due to the growing awareness of various stakeholders on the Philippines' plastic pollution problem, many businesses have shifted to paper-based products and the promotion of "eco bags," which are reusable bags made from cloth, polyester, and polypropylene. In the past year, the popularity of cassava-based plastic bags and mailer bags (imported from Indonesia) and honeycomb packaging (imported from China) as a replacement for bubble wrap and plastic mailer bags has increased. This could be attributed to the rise of small, online businesses brought about by COVID-19 and the availability of these materials.

Use

Out of the 27 convenience stores and 27 food vendors or restaurants sampled, five of them offered alternatives to common plastic products. Three of them were reusable or "eco bags" as an alternative to plastic grocery bags, the remaining were paper and reused plastic from shipping of goods. These ranged from PhP6 to PhP25 (US$0.12-0.52)

for the consumer. One store charged an additional PhP2.00 (US$0.04) to use a plastic bag instead of a paper bag.

Table 5. Cost of Available Plastic Alternatives

Store	**Plastic Alternatives**	**Cost of Alternative in PhP**	**Cost of Alternative in US$**
Convenience Store Chain 1	Paper Bags	0	0
	"Eco bag"	PhP 25.00	US$ 0.52
Convenience Store Chain 2	Paper Bags	0	0
Grocery	"Eco bag"	PhP 6.00 - 10.00	US$ 0.12 - 0.20
	Recycled Boxes for bulk/wholesale purchases	0	0
Sari-sari Store 1	"Eco bag"	PhP 15.00	US$ 0.31
Sari-sari Store 2	Reused Paper Bags	0	0

In the Philippines, it is common to reuse plastic bags and other containers (glass or plastic). Households commonly reuse plastic bags as trash bin liners, while some stores reuse collected plastic and paper bags from groceries and even use empty plastic packaging as plastic bags for their customers. Sari-sari stores reuse PET soda bottles as cooking oil container sold in retail or "tingi" (small quantities).

Since March 2019, SPS and other NGOs and social enterprises have been advocating for a policy that allows refilling for personal care and cosmetics. Refilling for home care products is allowed, but very few companies have pursued this so far due to the investment needed for the equipment and the cross-contamination concerns brought about by COVID-19. The refilling of personal care and cosmetics is prohibited due to cross-contamination concerns. In early 2021, the proposed policy was considered feasible by the Philippine Food and Drug Administration, but industry stakeholders have proposed the postponement of its passage, citing COVID-19 as the main reason.

Bulk/zero-waste stores and package-free options

Bulk/zero-waste stores are generally only found in large cities (e.g., Quezon City, Mandaluyong City) and cater to the upper- to upper-middle class market. They are mostly local (i.e., can only be found in one city and do not have other branches). Due to the pandemic, several zero-waste businesses downsized, closed, or adapted to a fully online shop.

In public markets, it is common practice for vendors to place items in a plastic bag or several layers of plastic bags. Food vendors generally allow consumers to bring their own packaging with the exception of pandemic-imposed rules (e.g., Starbucks and Tim Hortons had a global directive to stop promotion of reusables). Online food delivery services such as GrabFood and FoodPanda have options to remove utensils, but this is not always followed by the merchants. In Quezon City, a prohibition on single-use cutleries is imposed on hotels, restaurants, and food chains. However, the policy does not cover to-go food items; instead, establishments are encouraged to implement a "by-request" protocol in issuing plastic utensils and even condiments.

It is observed that micro, small, and medium enterprises have difficulty in transitioning to plastic alternatives due to cost implications. For businesses that promote the use of reusables (e.g., groceries, cafes), there is an observable behavior gap -- despite the growing voice of zero-waste advocates and awareness on waste management issues, the majority of customers continue to choose disposable options. One of the respondents who represented an international chain of coffee shops said that "voices are loud, but few walk the talk."

"In general, in solid waste management, people's awareness is high. We are also doing our plastic waste reduction ordinances, we're implementing that. It actually started in 2012 that if you're from QC and you buy groceries here, you have to pay two pesos when you don't have an eco bag...That started in 2012. But in 2020, there was already a

plastic bag ban. And then eventually, next year even, brown bags will no longer be allowed in groceries and retail stores. So why do we do it phase by phase? Because we understand that the change should have to involve the behavior and lifestyle of the people as well. So with that transition...at first, when you don't bring anything you have a penalty because you have to pay two pesos...Then you get used to it when you carry an eco bag. So 2020, you really don't see plastic bags anymore. The inconvenience of not carrying an eco bag would be a brown bag that is very difficult to carry, especially when you carry a lot. And we're informing the public that by next year, even the brown bags will disappear from retail stores." (Local Government)

Collection

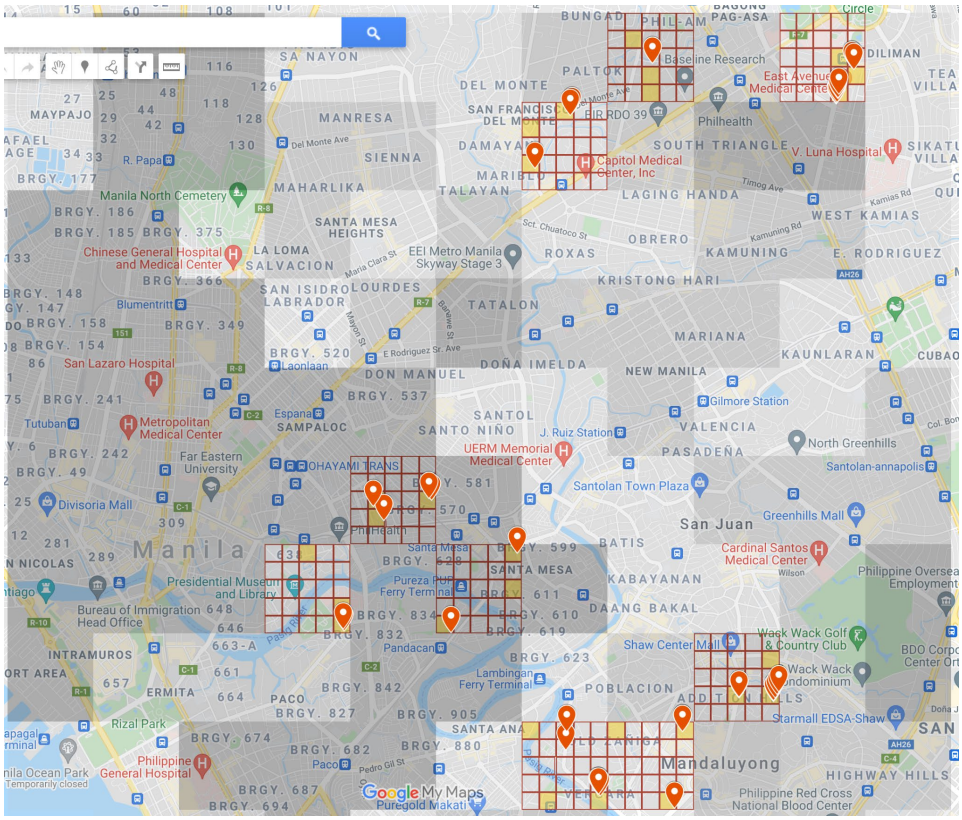


Figure 7. Map of waste and recycling bins in the city (36 bins in total, 2 for recycling)

Public collection bins

Across all three sites, only 36 "public" collection bins were identified (Figure 7note not all bins visible since some are close together on the map). Of these 36 bins, two were designated for recycling. These bins were not necessarily maintained by the government. LIP notes that in Metro Manila, it is rare to see sturdy public trash bins with a clear and systematic segregation system. Based on anecdotal evidence, public trash bins are often stolen, which is why LGUs choose not to provide them in public spaces. Thus, "public bins" in this context come in a range of materials: cardboard boxes, metal crates, plastic bags, used sacks of rice, empty PET bottles, and cracked plastic pails. These bins are often owned by establishments, but are in accessible areas (e.g., inside a store but can be used by customers or bystanders or right outside a store). Since public recycling bins are so rare (just two bins out of 36), all bins contained mixed waste. On waste collection days, it is common to see plastic grocery bags filled with unsegregated trash hooked on gates or piled on the streets of residential areas.

Waste collection services

Waste collection is part of the LGU's mandate. This means that curbside waste collection services, whether residential or commercial, are free. According to a SWM report from the Philippine Senate, the waste collection rate in Metro Manila is 85% (Philippine Senate, 2017). Respondents of the key informant interviews in all three sites shared that there is a daily schedule for waste collection, with biodegradable and non-biodegradable wastes scheduled for pick-up on different days of the week. All respondents said that this is not followed, and that wastes are picked up regardless of its composition. RA 9003 has a "no segregation, no collection" provision, but SPS observed that this is not followed across all sites.

"Actually, we are at the forefront of providing solid waste management services both at the local government unit and the private sector. So we are a member of the IPM Group of Companies. And for the other businesses that IPM has, we do the collection, transport, transfer, and disposal of waste. The IPM group also has a contract with the local government unit for their waste collection and disposal. And so most of what we are doing in BEST is also for government and private companies." (I-11 Waste Aggregator)

"The people [unintelligible 00:15:30] waste disposal. You need to train them. You have to give information. Disseminate information on how they will manage the waste. Without doing that, they will fail...Yeah, there are instructions with regards to the used mask -- There are instructions from the DOH and from the DENR on how to manage those waste. It has to be separated, and put separate. But I don't know if people are doing that...I think it's always a challenge when it comes to implementing these kinds of policies." (I-11 Waste Aggregator)

"Next [in importance] is making it accessible for people. If I don't have segregation, you know, those colored trash bins. It's so difficult for me because my home is so small, where do I put it? So for instance, this aling tindera, we worked with PCX, I think it's very effective. But how do you multiply it to hundreds and thousands and millions of drop-off

points? Because if you make it convenient, then you can at least start to change the behavior, right? But if not, it takes only a person who's super committed to do it. Otherwise, it's quite difficult." (Business Rep)

Informal waste sector

The informal waste sector is a crucial stakeholder in Metro Manila's waste management system. It has been estimated that there are 4,000 informal waste workers in Quezon City alone (Ramos, 2020). The informal waste sector includes itinerant waste buyers, *paleros* (garbage truck crew), "jumpers" (those who jump into collection trucks to recover recyclables), and waste pickers in dumpsites (Global Alliance of Waste Pickers, 2021). The informal waste workers interviewed during the CAP collect waste daily from the streets, households, or commercial establishments. They collect PET bottles (which they call "mineral"), hard plastics (called "sibak"), aluminum cans (called "fanta"), e-wastes, and cardboard boxes. One informal waste worker interviewed explained his unique business model where his family cleans soda PET bottles and sells them to partner retailers in the public market for PhP2.00/each (US$0.04). The income of the respondents range from PhP500/day to PhP500/week (US$10.41).

"Banning a material without sustainable alternatives can bring a different set of problems and it will also impact the income source of the informal waste sector." (I-4 Business Rep)

Junk shops

The rates of junk shops vary considerably. The most profitable wastes are radiators (~PhP70-90/kg or US$1.46-1.87), condensers from air conditioners (~PhP60-80/kg or US$1.25-1.67), glass jalousies (~PhP35-40/kg or US$.0.73-0.83), and aluminum (~PhP35/kg or US$0.73). The commonly collected plastics are hard plastics (~PhP10-12/kg or US$0.20-0.24) and clean PET (~PhP4-12/kg or US$0.08-0.12). All junk shop staff interviewed did not know where the final destination of their wastes would be.

Junk shops or private waste collection facilities are accredited by some LGUs to enable community-based MRS. This accreditation system is intended to integrate the informal waste sector into the formal system and increase waste collection efficiency.

"It's just that we just need to legalize them. So we also had before a junk shop standardization program. Hopefully, that program can also be revived to educate [waste pickers] on their livelihood development, better, money management, their capital. Because we also have a separate office dealing with this sector to better sustain their program. Hopefully, because recycling is really established already...Of course, we will continue to organize them and integrate them. (Local Government)

End of Cycle

According to the World Bank (Hoornweg, D. and P. Bhada-Tata, 2012), solid waste is expected to increase in Philippine cities by 165% to 77,700 tons per day by 2025 and a near doubling of the municipal solid waste generation per capita to 0.9 kilograms per day from the current 0.5 kilograms per capita-day (NSWMC, 2017); Manila is already estimated to have a per capita waste generation rate of 0.7 kilograms per day (Sapuay, 2016). Residential wastes (e.g. kitchen scraps, yard wastes, paper and cardboard, glass bottles, etc.) account for a majority (57%) of the country's total solid wastes (Hoornweg, D. and P. Bhada-Tata, 2012; NSWMC, 2017). Because of this, the country's solid waste is primarily organic, biodegradable materials (52%) (NSWMC, 2017). Commercial and public/private markets account for 27% of the country's total waste (NSWMC, 2017). Approximately 80% of the country's waste stream is either compostable or recyclable (NSWMC, 2017), yet only 28% of that waste is recycled (Kaza et al., 2018). As of 2015, the solid waste diversion rate in Metro Manila is 48%, while outside Metro Manila this rate drops to 46% (NSWMC, 2017).

The National Solid Waste Management Commission was created to oversee the implementation of solid waste management plans and prescribe policies as well as incentives to achieve objectives of the Act (NSWMC, 2017). The Act states that the local government units (i.e. municipalities and barangays) are the primary institutions to implement the Act's guidelines, and to collaborate with the private sectors and other associations that work within the solid waste management sector. The Act encourages the reduction of waste at the source, recovery of materials, recycling, and reuse of wastes with mandatory targets. Local government units that fail to comply are charged criminally or administratively. In 2016, criminal and administrative charges were filed against 50 local government units for violating the provisions of the Act (NSWMC, 2017). Additionally, the Act provides the legal framework for the country's systematic, comprehensive, and ecological solid waste management program to ensure the protection of public health and the environment.

In order to achieve these targets, each barangay must establish a Material Recovery Facility, implement solid waste segregation at the source, including the collection and processing of recyclables and biodegradables (Paul et al., 2012; Sapuay, 2005). As of 2016, there are approximately 9,883 Material Recovery Facilities in operation that serve 13,155 barangays within the entire country, which represents 31.3% of the total 42,000 barangays in the country (NSWMC, 2017). In 2014, approximately 23% of barangays were reported to be served by Material Recovery Facilities (Sapuay, 2016). Presently, most local government units administer their own collection systems or contract out this service to private contractors. In Metro Manila, the common types of collection vehicles are open dump trucks and compactor trucks (NSWMC, 2017). Nationally, 40-85% of the generated solid wastes are collected, while in Metro Manila approximately 85-90% of the waste is collected (NSWMC, 2017). The World Bank reported in 2018 that Quezon City's waste collection rate is 100% (Kaza et al., 2018).

In 2020, the Environment Management Bureau (EMB) of the Department of Environment and Natural Resources (DENR) estimated that the country generated 21,425,676 MT of waste. This is more than a 50% increase (59%) over the 2010 figure (13,481,326 MT). According to EMB's 2008-2013 SWM progress report, the MSW composition by weight was 2% special wastes,[1] 52% biodegradable, 18% residuals, and 28% recyclables. A parallel MWRP project conducted by EcoWaste provides greater detail on the waste management systems in Metro Manila.

In general, the Philippines still has progress to be made towards developing their solid waste management infrastructure. As of mid-2020, only 34% of LGUs are serviced by MRFs, and only 24% of LGUs are serviced by sanitary landfills (DENR, 2020). Quotes from interviewees working within the waste management system providing their input are below.

"In 2013, the residential sector still is the biggest source of our waste, comprising of 60.85% of our total waste generation...this includes all biodegradables, non-biodegradables, and recyclables." (Local Government)

"Largest sources of waste come from the households." (Waste Aggregator)

"We had a survey, a preliminary survey in Manila Bay. Most of the plastics that we saw are really, um, plastic cups, bottle caps, PT, uh, plastic bottles, and then the plastic bags. That's just the initial survey so we give the data to EMB to MPOA Committee. So that becomes a sort of support to say if there is a plastic that we need to ban, these are the types of plastics that we should focus on, right? Because these are actual data, these are the actual plastics floating out there. So it's not just saying because it's the most abundant, you know, but it's really also the most mismanaged type of plastic. So the argument becomes stronger." (Academic)

"In terms of recycling, we would like to find the solution where our products can be recycled back into its original form, so back into a polymer so that it's back to oil and it becomes plastic again. Although, especially with the sachet format, it's difficult at this point to do that. The next best thing would be upcycling, so turning it into products, 'cause the challenge you face is that if we if we look at naman, if you try to convert it to compostable -- I mean, we'd rather it become more high-value products then go back into the soil. So if we can find the solution, toward recyclability then that's a better option to take, but if, let's say, push comes to shove and the problem gets worse, and no recycling facility can be put up in the next few years, or no recovery facility, then it makes sense that compostable or biodegradable has to be the route, just to ensure that it doesn't end up in the environment. But I think the first priority is to make sure that we can try to find solutions to recycling as best we can whether that be mechanical or chemical." (I-5 Business Rep)

[1] "Special waste" under Republic Act 9003 refers to hazardous wastes from residential and commercial sources, e.g., consumer electronics, white goods, yard wastes, batteries, oil, and tires.

There are two large-scale recycling facilities being constructed. Coca-Cola Beverages Philippines, Inc., the bottling arm of Coca-Cola in the Philippines, is investing PhP1 billion to construct the largest state-of-the-art, bottle-to-bottle recycling facility in the Philippines in partnership with Indorama Ventures, a Thailand-based company. The facility will be built in General Trias, Cavite (the province next to Metro Manila) and is expected to be completed by 2022. PETValue will recycle up to 30,000MT of PET plastic bottles per year (2 billion plastic bottles), with an output of 16,000 MT/year of recycled PET (RPET). The facility will not only collect Coca-Cola bottles but also PET bottles from other companies (Inquirer BrandRoom, 2020). The Philippine Alliance for Recycling and Materials Sustainability is also constructing a PhP25 million facility in Parañaque City, Metro Manila that aims to turn sachets into plastic blocks and eco-bricks. These private sector investments focus solely on end-of-life waste recycling, but not collection.

Leakage

In total, 2,093 litter items were recorded across 27 100m^2 transects in nine different square kilometer areas sampled between January and March 2021. Litter transect locations were selected using a stratified random sampling method, in which transects were randomly selected in nine square kilometers which were distributed across three groups of population count (upper, middle, lower) based on LandScan ambient population data. Litter items were recorded using the open source Marine Debris Tracker app.

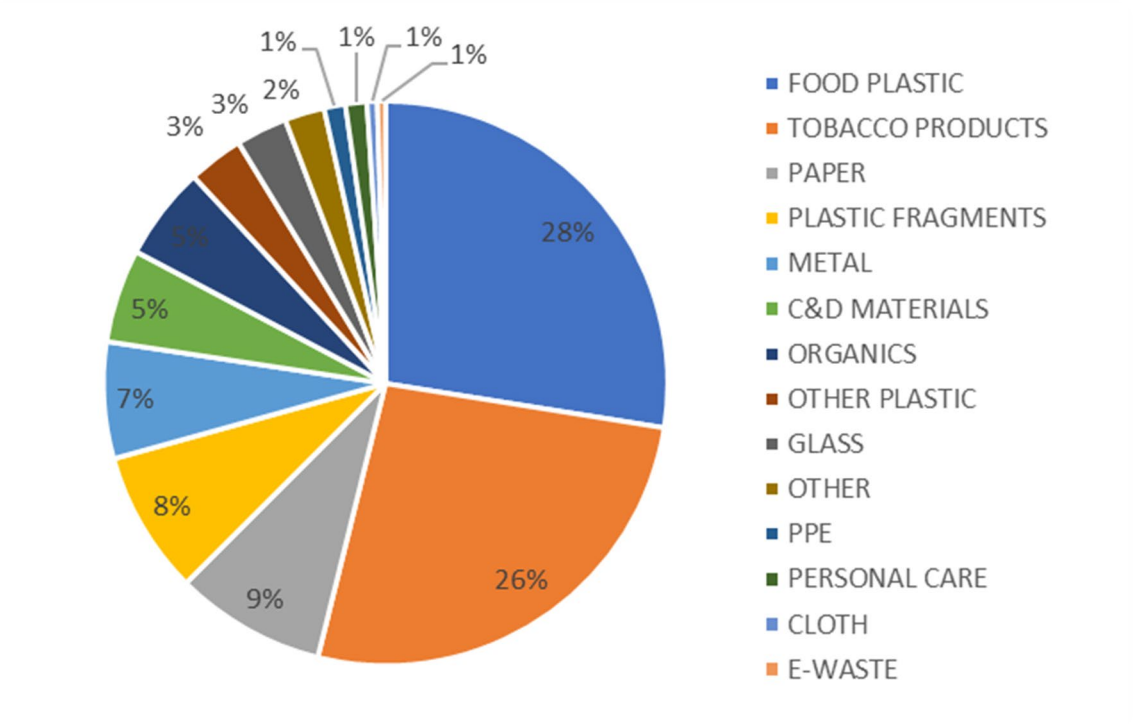


Figure 8. Litter Material Breakdown for All Transects

Across all 27 transects, the two most common categories of litter items were tobacco products and food plastic (Figure 8). This is also reflected when we compare the litter material types between the three areas of Quezon, Manila, and Mandaluyong.

When we compare the observed litter between the three city areas (Figure 9), we see that more litter items (1,189) were found in Quezon, followed closely by Manila (1,109), and Mandaluyong had the lowest number of litter items (726). Distinctions are also seen between the material breakdown of litter in those three areas. All three areas have tobacco products and food plastic as the most common material types, however there was a higher proportion of metal, paper, and C&D materials in Quezon when compared to Manila and Mandaluyong. Manila and Mandaluyong also had a higher proportion of plastic fragments than observed in Quezon. Similar proportions of organics (4-7%) were found in litter between all three areas.

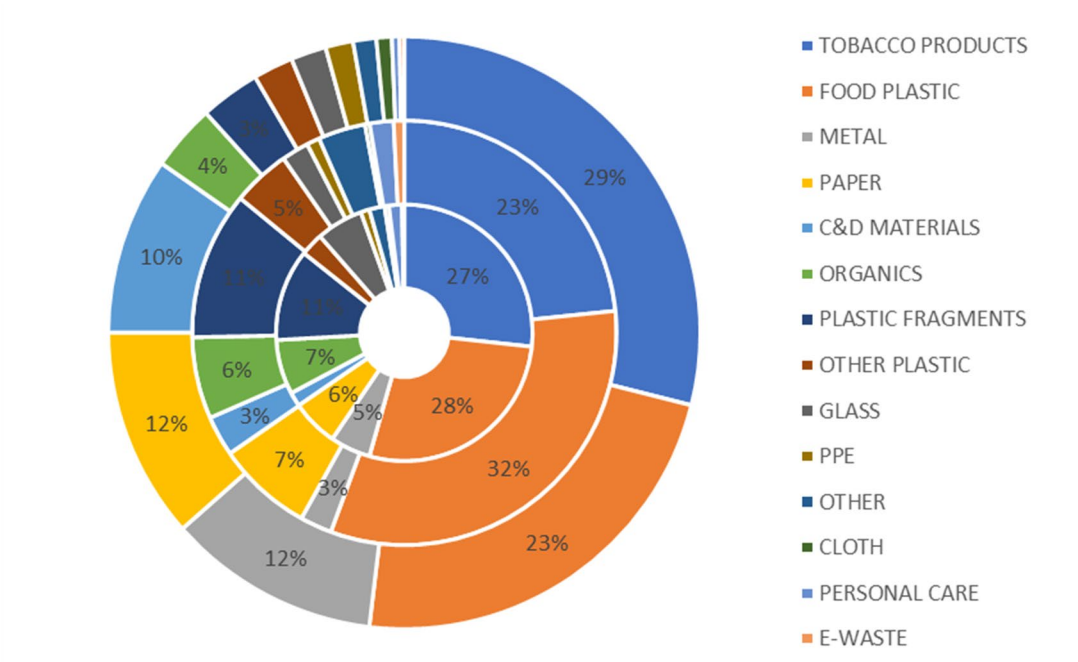


Figure 9. Comparison of Material Composition of Litter in Quezon (outer), Manila (middle), and Mandaluyong (inner)

The litter density was calculated for each of the three population count tertiles (Table 6). The density of litter per square meter was highest in the high population count areas and lowest in the low count areas. Litter densities across other countries in South Asia (e.g., India and Bangladesh) range from 0.5 items/m^2 to 15 items/m^2, with an average between 4-5 items/m^2 (n transects = 40) (Youngblood et al., Submitted). Litter densities

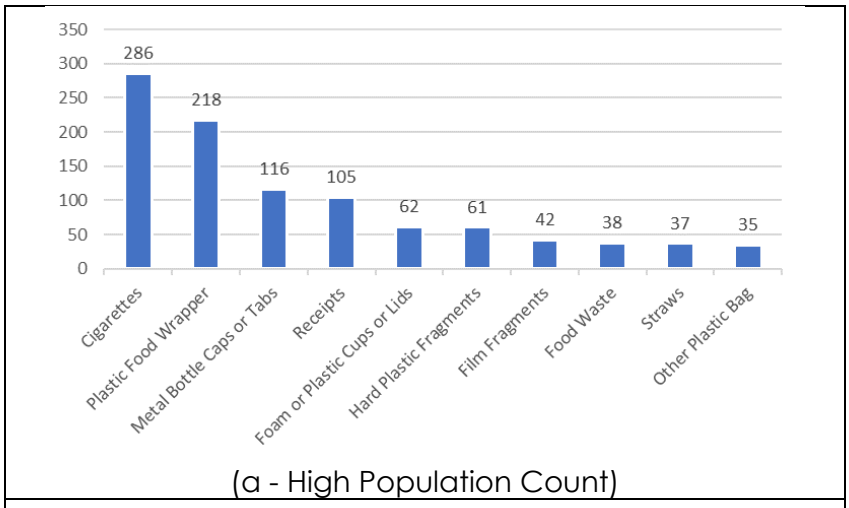
across Southeast Asia (Indonesia, Malaysia, and Vietnam) range from 0.75 to 3.39 items/m^2 with an average of 1.83 items/m^2 (n = 27) (Urban Ocean). The litter densities in the locations sampled for this project are below the SE Asia average observed to date, but within the range observed across all cities sampled in South and Southeast Asia.

Table 6. Litter density and top litter items from all transects in Manila

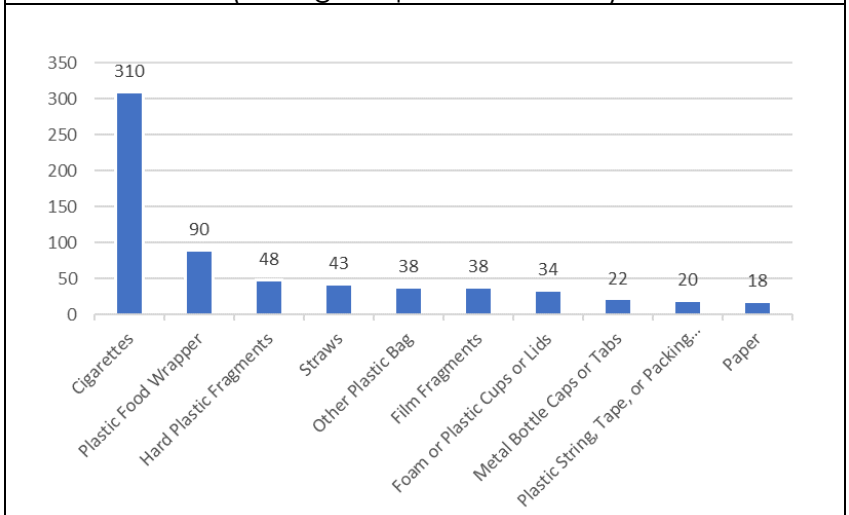
Population Count Tertile	**Top 5 Litter Items**	**Litter Density (count/m^2)**
Upper (19-21,955 pp/ km^2)	1) Cigarettes, 2) Plastic Food Wrapper, 3) Metal Bottle Caps or Tabs, 4) Receipts, 5) Foam or Plastic Cups or Lids	1.55
Middle (21,956-35,631 pp/ km^2)	1) Cigarettes, 2) Plastic Food Wrapper, 3) Hard Plastic Fragments, 4) Straws, 5) Other Plastic Bag	0.95
Lower (35,632-65,941 pp/ km^2)	1) Cigarettes, 2) Lumber, 3) Plastic Food Wrapper, 4) Glass or Ceramic Fragments, 5) Other Organic Waste	0.85

Cigarettes were the most abundant litter item identified in all three population account areas (Figure 10a-c). Plastic food wrappers were among the top 5 most abundant litter items in all population count areas as well. Lumber, glass or ceramic fragments, and other organic waste were uniquely in the top 5 items in the lower population count areas, whereas the other top items in the middle and high population count areas were more plastic convenience items such as straws, plastic bags, cups and lids.

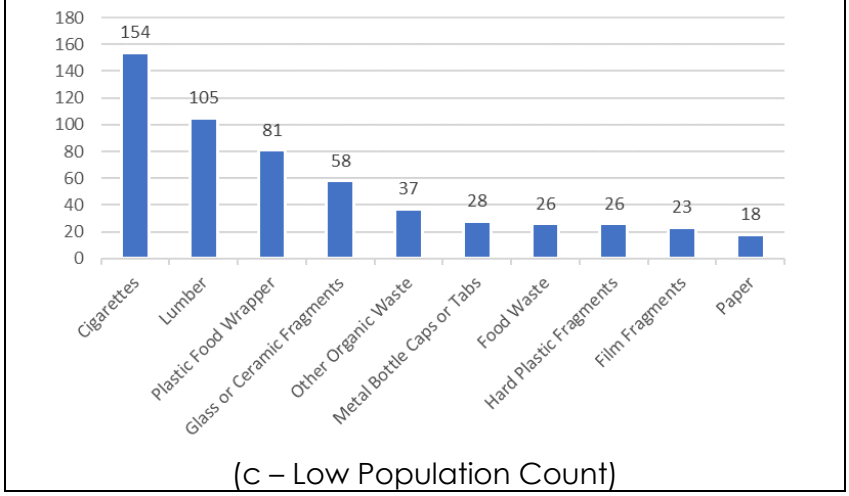
The material breakdown of the litter between the three population count areas also yielded distinct patterns (Figure 10). Similar to what was observed in the overall litter material breakdown, the top items were in the food plastic and tobacco products categories. In the high population count areas, there was a higher percentage of paper litter and metal litter than in the medium and lower population count areas. The lower population count area was unique from the other two areas in its high proportion of C&D materials as well as glass.



(a - High Population Count)



(b – Mid Population Count)



(c – Low Population Count)

Figure 10. Top 10 Items in Each Population Count Across Metro Manila

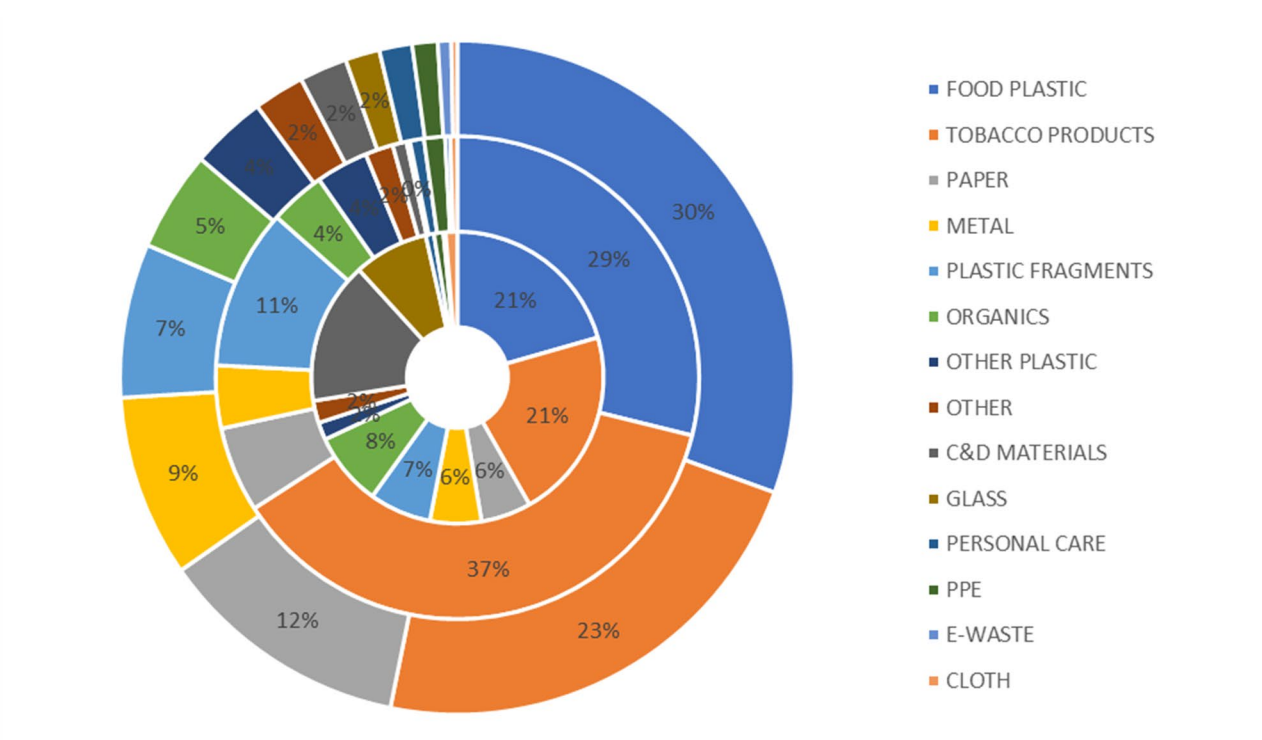


Figure 11. Comparison of Material Composition of Litter in areas of high population count (outer), medium population count (middle), and lower population count (inner)

Opportunities

In a workshop held July 15, 2021 (see Appendix B for details and vision boards) with 30 attendees across sectors of government (primarily Quezon City), private sector NGOs and waste management, four overlying barriers to progressing on opportunities to reduce plastic pollution were identified collectively:

1. human behavior change,
2. societal norms within plastic/waste management,
3. economic tensions,
4. and infrastructure limitations.

Workshop participants also envisioned a future free of these barriers and the values they held with how to reach these visions. These values are: **accessibility, accountability, inclusivity, and the development of intuitive participatory logistics over time.** The opportunities outlined below are described with these barriers, values, and input of workshop participants in mind (the terms are in bold italics when used). The opportunities below are outlined under the seven spokes of the CAP.

Input (and Leakage)

- **Change the default *behavior* and *societal norms* of commercial establishments** (e.g., cafés, schools, restaurants, supermarkets). This means not automatically offering single-use plastics, providing an opt-out option or offering "naked" products (i.e., products without packaging). A case study conducted along Katipunan Avenue, Quezon City showed that serving straws upon request instead of serving them by default reduced usage by 70% (Espina, 2020).

- **Extended Producer Responsibility (EPR).** Corporations should be ***accountable*** for their packaging. There and examples of both legislative and voluntary models of EPR around the world. Cites and communities should not hold 100% of the burden of waste management – it can be a shared responsibility between companies, government, and community-members.

Community

- **Develop audience-segmented, gender-based programs and *behavior change* campaigns.** Implementing organizations must consider how programs and proposed actions and behavior changes affect different target groups, as these have different impacts on women, children, and disadvantaged groups (e.g., persons with disabilities; informal waste pickers; coastal communities). Applying a gender and human rights lens that is ***inclusive*** to programs and policies is necessary to mitigate negative outcomes.

- **Develop campaigns and programs on other topics in SWM besides single-use plastics and use other communication channels besides social media.** Many programs, campaigns, and projects focus on single-use plastics. Many topics remain relatively unexplored. Examples that could be pursued: modeling sustainable behavior, such as using reusables, on popular media (*teleseryes,* movies, vlogs); how to segregate at source; and how to compost at home.

- **Engage other civil society organizations such as religious groups and academic institutions.** Religious groups and academic institutions are influential in shaping behaviors, attitudes, perceptions, and cultures. Environmental conservation organizations can work with them and build their capacity to promote science-based and research-based SWM programs.

- **Digital Campaigns.** With COVID-19 affecting social interactions, mass gatherings, and physical touchpoints, there will be a higher demand and greater opportunity for digital campaigns, learning/teaching opportunities, and online platforms. From 2019-2021, there has been a rise in mobile apps that facilitate waste collection. For many of these platforms, collection is limited to Metro Manila. Interviews also revealed that there may be opportunities to bring on influencers, develop local champions and figureheads, and establish icons for waste reduction messaging in Manila. See Appendix A for the social media analysis conducted for this project. While over 74% of the Filipino population has access to smartphones, this still limits the use of this opportunity to being 100%

accessible and inclusive, so it should be used hand-in-hand with other outreach, like in-person campaigns where needed. In combination, these could still make progress on the barriers identified at the workshop of human behavior change, societal norms within plastic/waste management, and potentially with mobile app waste collection, infrastructure limitations.

- **Pursue new and increasing funding opportunities.** In recent years, alliances, multilateral development banks, corporations, foundations, and aid agencies have allocated significant funding for waste management and circular economy initiatives. In the Philippines, there is significant interest in funding initiatives in Metro Manila, in line with the national government's priority to rehabilitate Manila Bay. Examples of organizations and/or programs are Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH Rethinking Plastics and USAID's MWRP and Clean Cities, Blue Ocean programs. NGOs such as WorldVision Philippines, WWF Philippines, and International Container Terminal Services, Inc. (ICTSI) Foundation have community-based SWM projects in Metro Manila. Development projects should be accessible, inclusive (open to everyone in the community), and help to develop the intuitive participatory logistics that the city/community desires.

Material and Product Design

- **Invest in packaging redesign.** Brand owners and manufacturers can redesign packaging to ensure that it is recyclable or reusable. Similar to other places globally, limited options exist for recycling multi-layer packaging, a common material used in packaging in Metro Manila.

Use

- **Invest in alternative delivery systems.** Refilling models offer a promising and sustainable solution. If the Philippines runs on a sachet economy, the principle of selling and purchasing goods in small quantities can be applied in refilling systems, where the consumers will buy only what they need and what they can afford. There are 800,000 to 1 million sari-sari stores in the Philippines, and the wide adoption of a micro-refilling system for household essentials could be ***accessible and inclusive*** while reducing the burden of plastic and packaging waste management. Although sanitation issues have been raised by some, these challenges have been overcome in other similar locations.

Collection

- **Segregation-at-source initiatives**. As one example, urban high-rise communities rely heavily on property management offices (PMOs) in dealing with household waste. The PMOs then coordinate with the LGU or a private contractor on disposing of the collected household waste -- the majority of which goes to landfills. There is an opportunity for PMOs to develop segregation-at-source habits and support nearby waste aggregators that buy recyclable waste products (e.g., metal, paper, plastic) in exchange for redeemable points or

monetary rewards. Some of these waste aggregators are accessible to the high-rise communities, which opens an opportunity to divert recyclable waste from the landfill to a nearer circular economy entry point.

- **Enforce the "no segregation, no collection" provision at the barangay level.** The barangay is the smallest administrative unit in the Philippines. By decentralizing waste collection to the barangay level, waste workers are able to build closer and more personal relationships with residents at the household level, encouraging higher compliance.

Waste Management / Infrastructure

- **Develop *infrastructure* that includes *intuitive participatory logistics*.** Research from the DENR shows that compliance to the waste management infrastructure required by RA 9003 is still below 40%. Having more sanitary landfills, MRFs, recycling facilities, composting facilities, and infrastructure for reverse logistics would encourage higher compliance to existing laws and prevent leakage of wastes into the environment. The two large-scale recycling facilities being constructed could help to expand and encourage source separation and recycling of materials. Recycling markets inherently give value to materials and help keep them out of the environment.

Accessibility, accountability, inclusivity, and intuitive participatory logistics

It would be beneficial for all sectors to build and nurture multi-sector, interdisciplinary partnerships. In Metro Manila, environmental conservation organizations and advocates are the most active actors in the waste management and circular economy spaces. While they have had considerable gains and successes, other organizations and types of expertise must be integrated for a diverse, systemic, and sustainable approach. Examples of potential organizations that could collaborate with environmental conservation organizations are mainstreaming gender, and labor; academic institutions; and economists. LGUs and corporations could work with industrial designers, materials engineers, supermarket chains, and sari-sari store owners to ensure that alternatives are affordable, durable, and intuitive. Policy changes must also incorporate support for a just and socially equitable transition. Open dialogue and collaborations can help mitigate concerns on trade-offs and risks and promote industrial symbiosis where waste from one industry can be raw material for another.

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Appendix A

Appendix B

Creating Music for Transformative Change: Circularity Assessment Protocol Workshop Summary

Metro Manila Philippines (Zoom); July 15 2021

Group Topic: CAP Research Findings and Opportunities

Participants: See attached list

The SONGS (Sharing Our Narrative Grows Strength) model was introduced and used to facilitate creative explorative conversations utilizing the CAP data report. This summary outlines the process used to discuss opportunities in the CAP as well as a review of some of the transformative conversations, themes and actions resulting from participation in the workshop on this topic.

Dominant Narratives Identified: Four specific problem narrative storylines addressing barriers to opportunities were identified collectively by the workshop participants and placed into questions that explored the group member's relationships to the problem stories. The top four barriers, or problem stories, identified by the workshop group included:

1. ***human behavior change,***
2. ***societal norms within plastic/waste management,***
3. ***economic tensions,***

4. ***and infrastructure limitations.***

Problem Externalized: Workshop participants divided into four focus groups to address the four specific problem/dominant narratives identified as a result of the CAP data summary. Each group mapped out identified problem stories on vision boards. These problem stories were drawn out in words, images, and symbols so all participants could ask questions, share responses, notice themes, and curiously investigate beliefs, ideas, values and hopes layered in the identified dominant narratives.

Alternative Narratives Discovered/Explored: As participants in this workshop questioned and visualized relationships to the problem stories shifting into preferred narratives; collaborative value-based themes emerged. These themes resulted from dialogue that allowed for acceptance of similarities, differences, role identities and solution opportunities. The following collaborative thematic values were identified across all 4 problem (dominant) stories explored in this workshop:

Accessibility, accountability, inclusivity, and the development of intuitive participatory logistics over time. These identified values are significant as they may be utilized by this community/group to formulate new questions, develop action steps, and measure committed actions toward change (as significant or not) within each dominant problem story.

For example, questions rooted in these collaborative values may include (yet are not limited to) options such as (from the dominant narrative vision board on infrastructure, when talking about managing organics in an integrated solid waste management system):

- Could landfill gas to energy/anaerobic digestion initiatives include all or any of the above named values?
- What actions within infrastructure solutions/options create movement toward the above noted collaborative values?
- Who would help make actions toward these values possible?
- What amount of time would be needed to move in the direction toward any of the above values for landfill gas to energy/anaerobic digestion solutions?
- What other voices/stakeholders would be willing to help contribute to actions or any incremental movements toward any of the above values as it pertains to solution initiatives?

Similarly thematic values based dialogue and questioning may also be applied and repeated in each dominant story domain including current or future proposed solutions/ideas. A second example demonstrating the application of developing questions for another problem story domain is as follows: *"How could/would trash to cash back programs move towards the values of accessibility, accountability, inclusivity and intuitive participation?"* This question example again utilizes the group's identified

collective thematic values to explore the alternative narratives around changing human behavior as it relates to waste management within the category of use and reuse.

The opportunities outlined in the final report to USAID have been edited with these narrative themes in mind.

Preferred Narrative Actions/Commitments:

The preferred narratives will continue developing beyond participation in this workshop if ongoing transformative questioning and listening opportunities are made possible within diverse perspectives. At the close of this workshop, the participants were proposed with the following questions of commitment in fostering participation towards transformative change together.

- ★ Do you want to work with one another going forward?
- ★ What, when, where and how would you be willing to commit to working together?
- ★ What role identities or restrictions may limit you from transformative questioning and listening to one another?
- ★ With whom would you be willing to share your preferred visions, stories, hopes, ideas and actions?

Every participant in this workshop replied "yes" to creating change and named the importance of the CAP data as a platform for creating ***meaningful human partnerships that foster acceptance, awareness and transformative opportunities for change.***

As a final summary of this workshop experience, I would circle back to the song that identifies your personal waste management journey. As you listen to this tune, consider reflecting on the values of accessibility, accountability, inclusivity, and intuitive participation in your own stories. This is where new transformative songs of change begin; within each of us!

**Addendum: sharing the small group vision (jam) boards with workshop participants as an attachment to this document will be beneficial for ongoing group work opportunities.

One suggestion in expanding future group work opportunities for this project would be to intentionally invite/include wide generational participants in solution centered work together. Intergenerational work on this issue has been shown to have co-benefits towards reaching solutions (Hartley et al., 2021).

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