

Trends in Addressing Plastic Pollution in the Philippines

Emerging
Trends *in*

APO Members

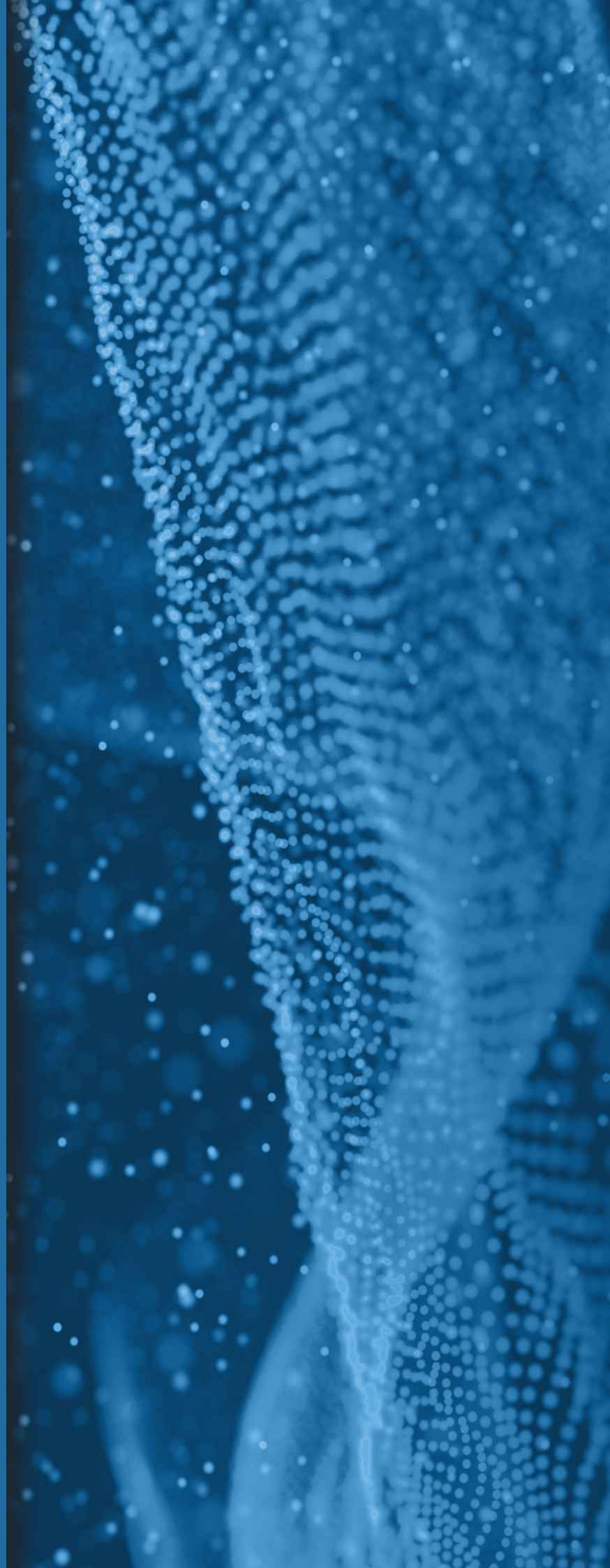
Asian Productivity Organization



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EMERGING TRENDS IN APO MEMBERS:

**TRENDS IN
ADDRESSING PLASTIC
POLLUTION IN
THE PHILIPPINES**

EMERGING TRENDS IN APO MEMBERS:
TRENDS IN ADDRESSING PLASTIC POLLUTION IN THE PHILIPPINES

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First edition published in Japan
by the Asian Productivity Organization
1-24-1 Hongo, Bunkyo-ku
Tokyo 113-0033, Japan
www.apo-tokyo.org

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PREFACE

This publication on *Emerging Trends in APO Members* is aimed at enabling better navigation of the volatility, uncertainty, complexity, and ambiguity (VUCA) landscape. In today's turbulent, unpredictable world, the APO adopts a country-specific approach to understand and analyze emerging trends and driving forces that will have significant effects on member economies in terms of productivity and competitiveness. This series of reports introduces several emerging trends with the potential to disrupt and transform markets, governments, and society now and in the near future. It is hoped that through these publications analyzing those impactful trends, governments, policymakers, and ordinary citizens from all walks of life will be able to harness those driving forces while coping with critical uncertainties.

Recommended approaches and methods to address the challenges ahead include political, economic, social, technological, legal, and environmental perspectives. Being future-ready requires such a comprehensive approach to informed decision-making by governments, enterprises, and individuals in the fast-changing environment in the Asia-Pacific region. For the APO, it is all about early identification of issues and prospects, which requires strengthening its role as a think tank and regional adviser on productivity in the region.

The APO thanks all contributors to the report. We hope that it will benefit those seeking to improve productivity and quality of life brought about by emerging trends in a rapidly changing world.

ACKNOWLEDGMENTS

The author would like to thank the following organizations and individuals who assisted in this research:

- The Asian Productivity Organization (APO) for providing the opportunity to conduct the research and offering necessary guidance on report publication
- The Development Academy of the Philippines (DAP), acting as the National Productivity Organization (NPO), for informing the author about this project and receiving the submitted proposal
- Business for Sustainable Development for allowing the time off to focus on this report and providing access to their library for research
- Raoul Perez for generously sharing his knowledge of waste-to-energy technologies and trends in the use of renewable energy in the Philippines

TRENDS IN ADDRESSING PLASTIC POLLUTION IN THE PHILIPPINES

Executive Summary

Plastic pollution is a global concern, particularly in the Philippines, and, by extension, in the Asian Productivity Organization (APO) member economies. Plastic leakage that ends up in our oceans adversely affects marine life and makes the perennial flooding worse by clogging drainage systems.

Data from the World Population Review shows that 80% of plastic waste originates from six Asian countries, with the Philippines ranking first and accounting for more than 36% of plastic pollution.

Several laws have been enacted to address the growing solid waste management problem in the Philippines from the 1990s to 2000s. These include Republic Act (RA) 9003 and the most recent RA 11898. The Department of Environment and Natural Resources (DENR) also released a Department Administrative Order (DAO) addressing the provision of the Clean Air Act regarding the incineration ban and providing guidelines for the use of alternative fuels and refuse-derived fuels. While there are currently no national laws banning single use plastics (SUPs), several local government units (LGUs) have taken the initiative to regulate and outright ban them.

In the Philippines, the responsibility for solid wastes management falls under the LGUs. Waste is typically collected either house-to-house or communally, where a materials recovery facility exists. Biodegradable waste is intended to be used for composting while recyclables are sold to junk shops. Residual waste is sent to disposal sites.

There are several issues and emerging trends in plastic pollution management that are now being practiced in the Philippines. These include illegal importation of plastic wastes, increased stakeholder partnerships, the impact of microplastics, the adoption of waste-to-energy (WTE) technology, proposed national legislation to ban SUPs, and cash-for-trash programs.

Introduction

Plastics most commonly end up in our oceans, harming marine life. Coastal and marine litter not only affects aesthetics, which impacts tourism, but also causes pollution and damage to marine ecosystem. Flooding is a persistent issue in the Philippines, particularly in Metro Manila, and plastic pollution exacerbates the situation by clogging drainage systems. This blockage prevents rainwater from flowing freely, leading to increased water levels that result in overflow and flooding.

A 2017 study revealed that 80% of plastic waste in the ocean came from five Asian countries: PR China, Thailand, Vietnam, Indonesia, and the Philippines. This study was updated in 2021 and showed similar results [1]. Of the 10 highest polluting countries in 2019, six were in Southeast Asia with the Philippines ranking first, contributing 356,371 MT of plastics to the ocean annually. The other countries include Malaysia, Indonesia, Myanmar, Vietnam, and Thailand [2]. Due to the coastal nature of these countries, plastic waste generally end up in what is termed as the Great Pacific Garbage Patch, with plastic waste ending up on beaches, in mangroves, and seagrass beds, damaging marine ecosystems. Figure 1 compares the top 10 plastic waste emitters to the ocean, including their GDP growth rate and actual GDP for 2019, alongside the amount of plastic wastes produced.

FIGURE 1

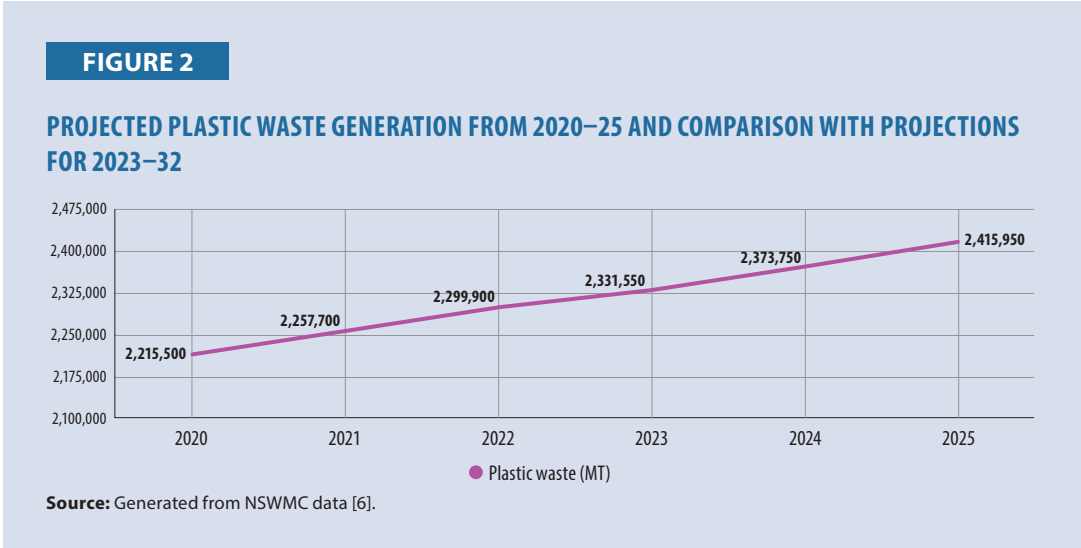
COMPARISON OF TOP 10 PLASTIC WASTE EMITTERS TO THE OCEAN, THEIR 2019 GDP GROWTH RATE, AND PLASTIC WASTE PRODUCTION



The Philippines had an economic growth rate of 5.6% in 2019. Although this is below the government’s target of 6%–7%, it still marks the fastest growing economy in Southeast Asia with growth projected to continue in 2024. Inflation is expected to hover between 3.2% and 3.6% in 2024, after it was recorded at 6% in 2023. However, the trade deficit stands at USD52 billion due to slow global demand and geopolitical uncertainties [3]. Despite challenges like the COVID-19 pandemic, high global commodity prices, and tight global financial conditions, the poverty rate declined from 23.3% in 2015 to 18.1% in 2021 [4].

The Philippines faces various environmental challenges. These include deforestation, natural disasters exacerbated by climate change (e.g., flooding, soil erosion leading to landslides), biodiversity loss, and plastic pollution [5]. While there are environmental regulations in place, their effectiveness varies. Although this paper focuses on plastic pollution, it is also important to recognize these environmental issues as well.

While the Philippines has no recent data on plastic waste generation, the National Solid Waste Management Commission (NSWMC) has data on projected solid waste generation from 2020 to 2025, as shown in Figure 2. The percentage of plastics waste in municipal solid waste is estimated at 10.55%. Based on these projections, the country generated 2,215,500 MT of plastic wastes in 2020, which is expected to increase to 2,415,950 MT by 2025.



In the late 1990s, one of the Philippines’ major concerns was the insufficient number of sanitary landfills for municipal waste disposal [7]. This issue has been carried over into the present, as the current lack of disposal facilities has contributed to rising plastic pollution. At that time, it was estimated that Metro Manila was generating 4,000 tons of solid wastes daily, with about 3,400 tons collected and transported to dump sites [8].

Methodology

This section outlines the principles in conducting secondary data research to identify trends in addressing plastic pollution in the Philippines. Plastic pollution was identified as the focus due to numerous articles highlighting the Philippines as one of the largest contributors to plastic pollution in the world. A policy brief from Duke Nicholas Institute for Environmental Policy Solutions, published in February 2022, ranks the Philippines as the third-largest contributor to plastic pollution. As mentioned in the Introduction, the Philippines consistently ranks in the top 10 in terms of plastic wastes entering the ocean. The World Economic Forum, along with several articles, cites a study by Lourens J.J. Meijer that was published in the American Association for the Advancement of Science on 30 April 2021. The study shows that six of the top 10 plastic-polluting countries are in Southeast Asia, with the Philippines in the number one spot.

This study focuses primarily on the Philippines and aims to identify the trends and tools being used to address the problem of plastic pollution. This report draws knowledge from the author’s previous studies on the collection, handling, and management of plastic wastes as well as secondary online sources.

The majority of secondary data sources were accessed online, with some hard copy reports also consulted, especially those predating the widespread availability of online resources. Online sources included several websites of national government agencies (NGAs), including the Department of Environment and Natural Resources (DENR), National Solid Waste Management Commission (NSWMC), Environmental Management Bureau (EMB), and the lower and upper houses of the Philippine Congress. Additionally, websites of environmental NGOs including the World Wide Fund for Nature (WWF) and the Philippine Alliance for Recycling and Materials Sustainability (PARMS) were also reviewed. Websites of several LGUs were also consulted, in particular those with environmental ordinances related to addressing the plastics pollution, along with websites of corporations that use plastics packaging to understand how they are addressing the issue.

From these websites, the past and current practices in handling plastic pollution were identified, which is part of the municipal solid wastes, to determine areas for improvement in plastic pollution

management. National laws, policies, and LGU ordinances related to plastic pollution were also determined to assess how the problem is being addressed.

By reviewing existing practices and laws, this study seeks to determine the government's efforts and direction in tackling plastic pollution. Additionally, by exploring trends in sustainable development, the green economy, and the circular economy; the direction and strategies the Philippines is adopting were identified to address plastic pollution with recently implemented policies, including circular economy models, and environmental management options. It also includes identifying recent arising issues and how they are being addressed in the country.

Based on these, this study considers whether the identified trends, issues, and strategies are applicable to neighboring Southeast Asian countries.

Government Policies, Laws, and Regulations

This section discusses relevant policies, laws, and regulations that impact the management of plastic waste.

Republic Act (RA) No. 9003 (Ecological and Solid Waste Management Act of 2000) [9]

In January 2001, RA 9003 was promulgated into law. The announcement came in the aftermath of the Payatas dumpsite landslide, where a wall of municipal solid waste collapsed and went up in flames, engulfing 300 shanties and resulting in 218 deaths.

RA 9003 declared a state policy to adopt a systematic, comprehensive, and ecological solid waste management program that will ensure the protection of public health and the environment. This includes the adoption of best environmental practices with the exclusion of incineration, the improvement of solid waste management techniques, and the promotion of public environmental awareness and cooperation. It follows a waste management hierarchy that emphasizes avoidance and minimization, reuse, recycling, composting, and resource recovery before treatment and disposal.

Although this law is hailed as a major breakthrough in reforming municipal solid waste management, its implementation at the LGU level is still very limited [8]. LGUs are also required to formulate a 10-year solid waste management plan addressing waste segregation at source, collection, and disposal.

The Act created the National Solid Waste Management Commission (NSWMC), which includes representatives from various government agencies, NGOs, the private sector, and the recycling industry. This commission was tasked to formulate policies on solid waste management, supervise the implementation of LGUs solid waste management plans, and monitor and review the implementation of the law.

RA 9003 also mandates a prohibition on non-environmentally acceptable products (NEAP) and packaging, which is to be enforced through a gradual phase-out program.

The law provides fiscal and non-fiscal incentives, which includes tax exemptions and a simplified customs process for imported equipment related to recycling operations. The Solid Waste Management Fund was also established to support the law's implementation.

Key provisions of the Act include prohibitions on littering, open burning, and the operation of open dumps.

Additionally, the law also calls for solid waste management to be integrated into the educational system as part of the curriculum and in public awareness campaigns to promote responsible waste management practices. It also encourages research and development (R&D) in waste management technologies.

While RA 9003 is viewed as a significant step forward in environmental legislation and is often praised for its comprehensive approach to waste management, its effectiveness largely depends on its implementation and enforcement, where admittedly is lacking, particularly in waste segregation and infrastructure development.

RA 11898 (Extended Producer Responsibility (EPR) Act of 2022) [10]

RA 11898 amends RA 9003 to include provisions that hold companies with assets of PHP100 million (approximately USD1.7 million) or more accountable for managing the waste generated by their products throughout their life cycle, with a primary focus on addressing plastic wastes. This law provides incentives in developing sustainable practices through collaboration with the government, industries, and communities. It officially became law on 23 July 2022.

Producers, including brand owners, manufacturers, and importers, of products using plastic packaging are required to develop and implement an EPR program. The program covers postconsumer plastic packaging waste, including sachets, labels, containers, and SUPs.

The law has set incremental plastic recovery targets which producers must meet. Table 1 presents the percentage target for plastic recovery from 2024 to 2028, with the 2028 target serving as a baseline for future years thereafter. The law also mandates periodic reviews of the EPR program and the targets, indicated in Table 1, to assess progress and make the necessary adjustments based on technological advancements, environmental considerations, and industry feedback. According to a commissioner of the NSWMC, initial data from obligated enterprises (OE) suggests that the 2023 target of 20% has been surpassed, with approximately 30% recovery and about 130 million kg of plastic waste diverted.

TABLE 1

REQUIRED ANNUAL TARGET PERCENTAGE FOR PLASTIC RECOVERY BY PRODUCERS FROM 2023 TO 2028 AND BEYOND

| Year of Implementation | Percentage of Plastic Recovery |
|------------------------|--------------------------------|
| 2023 | 20% |
| 2024 | 40% |
| 2025 | 50% |
| 2026 | 70% |
| 2027 | 80% |
| 2028 onwards | 90% |

Source: Information Reformatted from RA 11898 [10].

The law encourages producers to redesign products and packaging to minimize waste, enhance recyclability, and incorporate recycled materials. It also promotes the consideration of environmental impact at every stage of a product’s life cycle, from design and production to disposal.

The law also offers incentives to producers who meet or exceed recovery targets in the form of tax breaks, grants, or access to green financing. Additionally, public recognition is provided to companies who comply with the law, giving them enhanced reputation and trust among consumers.

On the enforcement side, producers who fail to meet EPR requirements face fines, penalties, and other sanctions. Continued noncompliance and more severe violations will lead to stricter fines and penalties, including the revocation of business permits and/or operator licenses. The DENR is responsible for monitoring compliance, evaluating the effectiveness of producers’ EPR programs, and enforcing the law. This includes reviewing annual reports to ensure the producers meet their annual recovery targets.

LGUs play a key role in implementing the law within their respective jurisdiction. They are tasked in facilitating partnerships involving producers, waste management entities, and local communities. One way of doing this is through public awareness campaigns that raise awareness and educate the local community on waste reduction, recycling, and producer responsibility.

RA 11898 is a relatively new law with the implementing rules and regulations approved only in 2023. Although it is still too early to fully assess the effectiveness of its implementation, DENR has launched

a public awareness campaign to inform businesses and the public about the law. Of note, the 2023 recovery target of 20% has been met and exceeded.

RA 8749 (Clean Air Act of 1999)

RA 8749 is relevant to plastic pollution since Section 20 of this law prohibits incineration, one of the treatment options for solid wastes, particularly plastic residuals. It specifically bans the incineration of municipal, biomedical, and hazardous wastes that result in the emission of toxic and poisonous fumes. However, the law allows the use of certain thermal treatment technologies, such as gasification, plasma arc, and pyrolysis, provided that these do not emit toxic pollutants and comply with the air quality standards set by the DENR.

DENR Administrative Order No. 2010-06 (Guidelines on the Use of Alternative Fuels and Raw Materials in Cement Kilns) [11] and DAO No. 2021-14 (Amendment on Some Provisions of DAO No. 2010-06) [12]

DAO No. 2010-06 aims to ensure that waste-to-energy (WTE) projects in the Philippines are conducted in an environmentally responsible manner, aligning with national waste management and energy policies. It seeks to minimize the negative impacts of WTE technologies while promoting sustainable waste management and energy generation practices. The DAO specifically addresses the exempted technologies under Section 20 of RA 8749, or the ban on incineration technologies [11]. DAO 2021-14 further clarifies Section 5 of DAO 2010-06, specifying certain wastes that are not acceptable for co-processing.

There are several environmentalists who question the legal basis of this DAO, arguing that co-processing is a form of incineration and that companies engaging in this practice risk violating the law [13].

RA 8749, along with DAO 2010-06 and DAO 2021-14, provides clearer guidelines on the use of cement kilns in managing solid wastes. These regulations have allowed cement plants to receive plastic residuals as fuel. While not all cement plants accept plastic residuals, the DENR expects that a majority of the 29 cement plants in the Philippines will eventually use plastic residuals as fuel for their operations. Further outcomes in these regulations are discussed in the section on WTE Technologies and Co-processing.

Ordinances Regulating/Banning SUPs

While there is no national law that bans SUPs, there are about 500 LGUs that have passed ordinances that regulate or ban SUPs within their jurisdictions [14]. These ordinances often include prohibitions on the use of plastic bags, straws, stirrers, and plastic utensils.

As an example, Quezon City, the most populous city in the Philippines, has implemented Ordinance No. 2868-2019, known as the Single-Use Plastics/Disposable Materials Ban, and Ordinance No. SP. 2876-2019, the Plastic Bag Ban [12].

The first ordinance prohibits the use of SUPs and disposable plastics, including plastic straws, stirrers, utensils, cups and plates, and takeout containers coming from hotels, restaurants, fast food chains, and similar establishments. Exemptions are made for prepackaged food and instances when health and safety concerns mandate the use of SUPs. This ordinance was temporarily lifted in 2020 due to the COVID-19 pandemic but has since been reinstated [11].

The second ordinance, on the other hand, bans the use of SUP bags for dry and wet goods in all commercial establishments and encourages consumers to carry reusable bags as an alternative. If an establishment offers a plastic bag for wet goods, a “Plastic Recovery System Fee” of PHP2.00 (approximately USD0.03) per plastic bag is charged to the consumer. Exemptions apply to the primary packaging of fresh fish, meat, and poultry, where suitable alternative materials may not be available.

Current Practices

Table 2 shows the typical composition of municipal solid waste in the Philippines. While most municipal solid waste is biodegradable, the focus of this report will be on the 10.55% plastic recyclables and residual plastic waste. Based on a 2010 waste generation rate of 0.4%, the country's waste production is expected to increase from 13,481,326 MT in 2010 to 16,628,026 MT in 2020. In 2020, recyclable plastics accounted for 1,754,256.743 MT, with residuals accounting for 2,989,719.0748 MT.

TABLE 2

TYPICAL COMPOSITION OF MUNICIPAL SOLID WASTE IN THE PHILIPPINES

| Type of Municipal Solid Waste | Percentage by Weight |
|--|----------------------|
| Biodegradables (kitchen/food wastes, yard/garden wastes) | 52.31% |
| Recyclables | 27.78% |
| Paper and cardboard | 8.70% |
| Plastics | 10.55% |
| Metal | 4.22% |
| Glass | 2.34% |
| Textile | 1.61% |
| Leather and rubber | 0.37% |
| Special (household healthcare wastes, waste from electrical and electronic equipment (WEEE), bulky wastes) | 1.93% |
| Residual | 17.98% |

Source: Tabulated from data from EMB and NSWMC [15].

Municipal solid waste is supposed to be segregated at the source, but most households do not practice this, and waste is usually collected as mixed garbage by haulers. Some LGUs provide separate bins for biodegradables, nonbiodegradables, and recyclables for easy identification, making segregation easier [15].

Segregation for biodegradable and recyclable wastes is ideally carried out at the *barangay* (the smallest unit of government in the Philippines) level while cities handle the residual and special wastes. However, since most municipal solid waste is not segregated, collection often occurs at the city or municipal level. In the Philippines, municipal solid waste is either collected house-to-house or communal, where households drop off their municipal solid waste in a materials recovery facility (MRF). In most areas, MRFs are managed by the *barangay* or the homeowners association (HOA). Uncollected municipal solid waste are often linked to the performance of LGUs and often have political implications. There are many instances in which LGUs outsource their waste collection to private contractors. It is estimated that waste collection efficiency in LGUs vary from 30% to 99%, with urban areas generally having higher coverage than rural areas [15].

Plastics are usually sold to junk dealers, consolidators, and recyclers. Some households collect plastics, and even street sweepers gather and sell them to junk shops. In the event that plastics are mixed in other waste, collectors may segregate them in the trucks during travel or during mandated stops. Informal waste collectors also retrieve plastics from disposal sites and sell them to junk shops. According to the NSWMC Report, disposal site scavengers recover more recyclable plastics compared to street collectors and collection workers [15].

Recovered plastics from the junk shops pass through a chain of middlemen and wholesalers, and are usually exported outside the country for recycling. However, in 2021, the first bottle-to-bottle, food grade recycling facility was established in the Philippines. The PHP1 billion (approximately USD17 million) facility has a capacity of 30,000 MT/year, or almost 2 billion polyethylene terephthalate (PET)

bottles annually and resulting in about 16,000 MT/year of recycled PET resin [16]. In May 2024, it reached a landmark of recycling its 1 billionth PET bottle [17].

Before RA 9003, nearly all municipal solid waste was disposed of in dumpsites. However, RA 9003 mandated the closure of open dumpsites and replaced with sanitary landfills (SLFs). There are still several open and controlled dumpsites in operation, however, these numbers have been steadily decreasing from 806 in 2008 to 350 in 2015 [15]. These are in line with the DENR program of closing all dumpsites in the Philippines. In 2021, DENR closed 335 dumpsites, making alternative disposal options of solid waste critical to address waste management challenges [18].

With the closing of open dumpsites, new SLFs are being constructed. In 2008, there were only 21 SLFs operational in the Philippines. By 2015, the number increased to 101, with 17 more under construction. The number of LGUs serviced by SLFs also increased from 63 (3.9% of total LGUs) to 228 (14%) in 2015 [15].

On the onset, it is evident that the Philippines is facing several challenges in addressing solid waste management, particularly plastic pollution. These include: (i) inadequate enforcement of laws, with some LGUs lacking resources or political will; (ii) lack of infrastructure, as evidenced by the reliance of some LGUs on dumpsites (though DENR is making headway in closing several open dumpsites); (iii) low public awareness and participation, especially in the segregation of solid wastes; (iv) lack of financial resources for investment in infrastructure; (v) increasing urbanization and population growth, leading to more generation of solid wastes; (vi) gaps in communication and coordination among government agencies, private sector, and civil society, which has affected effective solid waste management; and (vii) cultural shifts, such as dependence on “sachet culture” [19–20].

Future Directions and Lessons Learned

This section describes trends in the management of plastic waste, including legislation, policies, issues, and solutions. These trends offer possible lessons that can be replicated in APO member economies given that they are in the same geographical location and affecting common bodies of water.

Addressing the solid waste management challenges mentioned in the previous section will require a multidimensional approach. This includes stronger enforcement, political will, increased information and education campaigns, improving the solid waste management infrastructure, and continuous efforts and collaboration between government agencies, the private sector, and civil society.

Illegal Importation of Plastic Wastes

In July 2018, a shipment from Republic of Korea (ROK) labeled as “plastic synthetic flakes” arrived in the Philippines. Months later, it was discovered that the shipment contained plastic waste and other trash materials. By 2019, 1,400 MT were returned to ROK, with an additional 5,177 MT scheduled for return. Concerns were raised that the Philippines might become part of the global waste trade and a dumping ground for more developed countries [21].

In response, Senate Bill 1329 was filed to ban the importation of solid wastes, though it is still pending at the committee level. This bill aims to address the issue of the Philippines potentially becoming the most recent destination of solid wastes from developed countries. Previously, PR China was the world’s largest importer of waste until it banned the importation of 24 types of solid wastes, including plastics in 2018 through their National Sword policy [22].

Public-private Partnerships (PPP)

One key lesson that can be learned is the importance of integrating knowledge and forming partnerships with all relevant stakeholders. The solid waste problem, specifically, plastic pollution, entails a whole-of-society approach, involving government, civil society, and industry in its resolution.

Collaboration is essential to ensure that technological innovations are adapted and aligned with sustainability tenets. The DENR continues to seek strategic engagements with stakeholders in the private sector and NGOs that will yield multiple benefits for communities, the environment, and the economy [23]. For instance, EMB Director Gilbert Gonzales has called for innovation, collaboration, and a reevaluation of habits and ecosystems to achieve Zero Waste to Philippine Waters by 2040 from all stakeholders [24].

Many companies are already partnering with LGUs in collecting plastics, as highlighted in the section on “Exchanging Plastic Residuals for Cash or other Incentives”.

Microplastics

Microplastics are a growing global environmental issue that affects marine life, ecosystems, and human health. These tiny pieces of plastic particles measure 5 mm or less in size [25].

As an emerging issue, there is still much to learn about the impacts of microplastics. They come from a variety of sources, including the breakdown of larger plastic debris that degrade into smaller pieces. Microbeads are also considered as microplastics. They are very tiny pieces of polyethylene plastic that are added as exfoliants to health and beauty products, such as cleansers and toothpaste. These tiny particles easily pass through filtration systems and end up in the ocean, posing a threat to aquatic life.

As the Philippines is one of the top contributors to plastic waste, it goes to follow that microplastics will be a major concern more likely sooner than later. While the impacts are still being studied, potential environmental and health risks include ingestion by marine organisms, animals, and humans. This could result in stress, internal injuries, and ability to feed. Moreover, since microplastics can absorb harmful chemicals, they may potentially affect the health of living organisms.

The University of the Philippines Marine Science Institute (UP MSI) has been studying microplastics. Their Microplastics Quantification, Identification, and Biodegradation Facility (MicroQuib) is dedicated to plastic research. It can do microplastics counting coupled with deep learning for easier and faster quantification [26]. UP MSI has also partnered with the Circular Explorer, a floating scientific laboratory and research center that collects data on pollutants, including microplastics, in Manila Bay for analysis by UP MSI scientists.

WTE Technologies and Co-processing

WTE is a term used to describe various technologies that convert nonrecyclable, energy-rich materials into usable forms of energy. The DENR is pushing for WTE technologies, which are already established in other countries, as a solution to the solid waste management problem and as a better alternative to SLFs. The utilization of WTE facilities in the Philippines has been championed by several legislators. One of the bills currently being debated in the Philippines Senate is Senate Bill No. 1789, or the proposed “Waste-to-Energy Act”, which aims to address the increasing waste generation by providing additional treatment and disposal options while also generating energy [27].

Although WTE is not a new technology, it has not been widely implemented in the Philippines due to the incineration ban under RA 8749, enacted in 1999. It was only in 2010 that DAO 2010-06 addressed WTE and introduced the concept of Co-processing. Co-processing refers to the recovery of thermal and mineral properties from waste materials, such as residual plastic or rice husks as alternative fuel. This process is unique to cement plants due to the high temperatures used in cement manufacturing that allow for complete fuel consumption.

Cement companies are offering co-processing as a solution for other businesses to meet their plastic neutrality goals. Previously, cement companies relied on imported refuse-derived fuel (RDF), but DENR has encouraged them in 2020 to buy RDF domestically [13].

According to the EMB director, three cement plants can process 33,123 MT/year of plastic residuals. If all cement plants were engaged in co-processing, they would be able to process 300,000 MT/year.

Currently, three cement companies are involved in co-processing: Republic Cement, CEMEX Philippines, and Holcim Philippines [13].

Local company Prime Infra plans to establish a biorefinery plant in Luzon, targeting operations by 2025. This facility will convert municipal waste into green fuels, such as aviation fuels. Through its subsidiary, Prime Integrated Waste Solutions Inc. (PWS), the company is already active in Cebu, supplying low-carbon RDF produced from processed municipal solid waste after sorting and segregation. Prime Infra has also set up automated materials recovery facilities (MRFs) in Cebu and Porac, Pampanga [28].

On the other side of the coin, environmentalists have raised concerns regarding the burning of plastic wastes as fuel. They have called for a temporary suspension of co-processing stating that they have negative impacts on public health and the environment. They are calling for further studies and analysis, and redrafting regulations for emission standards for cement kilns [13].

Some organizations consider co-processing as a temporary solution until better circular recycling technologies become available [13].

Use of Plastics in Roads

In a recent development, the Department of Public Works and Highways (DPWH) has approved the use of shredded plastic in road construction projects to help mitigate plastic pollution, which is one of the major causes of flooding in Metro Manila [29].

Department Order No. 139, series of 2024, outlines the standard specification for using low-density polyethylene (LDPE) plastic bag waste in item 310 (15) - bituminous concrete surface courses or asphalt. This initiative aims to promote the recycling of LDPE by shredding and incorporating shredded plastic as an additive to reduce the susceptibility of deformation in asphalt concrete [29–30].

Comprehensive National Law Banning SUPs and Other Legislative Action

As mentioned in the section on Ordinances Regulating/Banning SUPs, there is currently no comprehensive national law that bans SUPs. However, several proposed legislation in Congress aim to address this issue.

TABLE 3

LIST OF PLASTIC PRODUCTS TO BE PHASED OUT AND PHASE-OUT PERIOD

| Tier | Plastic Products to be Phased Out | Phase-out Period |
|--------|---|--|
| Tier 1 | Drinking straws, stirrers, sticks for candy, buntings, confetti, packaging, or bags of less than 10 microns in thickness | One year from effectivity of the enacted law |
| Tier 2 | Plates and saucers, cups, bowls and lids, cutlery, food and beverage containers made of expanded polystyrene, oxo-degradable plastics, film wrap, packaging, or bags of less than 10 microns in thickness; sachets and pouches that are multilayered with other materials | Four years from effectivity of the enacted law |
| Tier 3 | Multilayered products or packaging, such as tetra packs, streamers, and other noncompostable SUPs not covered in Tiers 1 and 2 (to be determined by DENR in coordination with the Department of Trade and Industry (DTI), Department of Science and Technology (DOST), and the NSWMC, based on high replaceability, low recyclability, and low retrievability | Within two years after identification by DENR; plastic products for phase-out to be determined within two years of the law’s passage |

Source: Information taken from the Climate Change Commission (CCC) website [31].

House Bill No. 9147, or the Single Use Plastic Products Regulation Act, seeks to regulate the production, importation, sale, distribution, provision, and use of SUPs. It proposes a gradual phase-out of these plastics, divided into three tiers. Table 3 outlines the breakdown of the plastic products to be phased out by tier. The phase-out plan includes EPR programs in which producers and importers of SUPs need to undertake: (i) recovery schemes through redemption, buy-back, offsetting, etc., (ii) proper

transportation of recovered SUPs for composting, recycling, diversion, and disposal; and (iii) clean-up efforts for plastic wastes that have leaked into coastal areas, roads, and other sites [31]. The bill also has a provision on the development of a Philippine National Standard (PNS) for compostable plastic products within six months.

This bill passed its third reading at the House of Representatives in July 2021 and is now awaiting action in the Senate. The Senate also has counterpart bills that address SUPs and plastic bags, which are either pending or may have been consolidated or substituted.

Exchanging Plastic Residuals for Cash or Other Incentives

As part of the implementation of RA 11898 and the development of PPPs, many cash-for-trash programs are being implemented by the LGUs in collaboration with fast-moving consumer goods (FMCGs) companies, NGOs, obligated enterprises (OEs), and producer responsibility organizations (PROs). Similar to the process where recyclable plastics are purchased by junk shops, some FMCGs, PROs, and NGOs are assisting LGUs in the segregation and collection of plastic residuals by providing incentives, such as cash and products from FMCGs in exchange for plastic residuals.

These community-driven efforts aim to accelerate and increase the collection of plastics. For example, Coca-Cola Bottlers Philippines, Inc. (CCBPI), has its program, “*Tapon to Ipon: Basta Klaro, Panalo*” (Discard to Earn: If it’s clear, it’s a win!). This involves partnering with micro, small, and medium enterprises (MSME), such as *sari-sari* stores (small neighborhood shops selling a variety of goods), to maximize their role as neighborhood centers and collection hubs where consumers can return their used plastic bottles in exchange for Coca-Cola products. The end goal is to ensure that the used PET bottles are sent to PETValue for recycling [17].

CCBPI has also partnered with the Metro Manila Development Authority (MMDA), where MMDA’s mobile MRF will serve as a collection point for used clear PET bottles, Coca-Cola glass bottles, and crates. A contest sponsored by CCBPI will reward *barangays* for collecting the highest number of clear PET bottles, glass bottles, and crates [17].

Conclusion

Plastic pollution, and by extension solid waste management, is a major problem in the Philippines that grows bigger every year. With limited land available in the country, waste disposal options are limited. The government must look for innovative approaches to tackle this problem while also identifying new challenges that arise as a result of plastic pollution.

Issues, such as the importation of solid wastes, microplastics, and SUPs, are being addressed - or soon will be addressed - through additional research and new legislation. To illustrate the point, after PR China banned the importation of some types of solid wastes, other countries in Asia, such as Indonesia, India, Thailand, Vietnam, and Republic of China (ROC) began accepting and recycling these wastes. However, these countries have also established regulatory measures to limit or prohibit the importation of waste [22], which aligns with the Philippines' current effort. Some of these countries also import solid wastes marked as “recycling”, a practice deemed legal in these countries, and has been identified as a loophole that allow the entry of illegal waste [22].

Since this is a global issue, the importance of collective involvement from all countries cannot be overstated. Additional research on developing evidence-based policy and prevention programs is still needed, particularly in studies demonstrating the toxicity of microplastics to human cells and systems.

On an individual level, opting for alternatives to plastics can be a practice that people can adopt as well as by being mindful of one’s own consumption habits and fashion choices.

With regards to SUPs, as mentioned previously, a comprehensive national law banning them is currently under consideration in the Philippine Congress. Other Asian countries, such as PR China, India, Thailand, and to some extent Indonesia, have already banned SUPs or nonbiodegradable plastic

bags. Along with the Philippines, Japan, Vietnam, Singapore, and Malaysia are introducing or planning measures to reduce SUPs, including the introduction of fees or additional taxes [32–37].

Several other technological approaches are already being implemented or explored by the government. While some of these technologies are new, others have been around for some time but have not been fully implemented or enforced due to concerns about potential negative impacts. These technologies include WTE initiatives, and the incorporation of low-density polyethylene (LDPE) in concrete roads.

In addition to these technological innovations, the government has also looked into positive behavioral shift among the population. The implementation of RA 9003 has recognized this by promoting environmental awareness and public cooperation involving NGAs, NGOs, the private sector, and the recycling industry.

It is hoped that as the nation continues to support behavioral shifts in the population, segregation of municipal solid waste will become a reality. It has been acknowledged that achieving this is difficult, particularly when municipal solid waste collection is linked to political will.

The Philippine government should also look at global trends, particularly in the Asian region, where the countries share a common geography. At the same time, the Philippines' approach to managing plastic pollution can also provide valuable lessons to its Asian neighbors in handling their own plastic waste.

Moving in this direction, the Philippines joined the Global Plastic Action Partnership (GPAP) in late 2023. GPAP is a multistakeholder platform dedicated to turning commitments to reduce plastic pollution and waste into concrete action. It will assist the Philippines in its development of a National Plastic Action Partnership (NPAP), which is expected to bring together stakeholders, drive the transition to a circular economy, and develop an evidence-based national plastic action roadmap [38]. Other Asian countries that are members of GPAP include Indonesia, Vietnam, Pakistan, Cambodia, and Lao PDR.

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ABBREVIATIONS AND ACRONYMS

| | |
|--------|--|
| APO | Asian Productivity Organization |
| CCBPI | Coca-Cola Bottlers Philippines, Inc. |
| DAP | Development Academy of the Philippines |
| DAO | Department Administrative Order |
| DENR | Department of Environment and Natural Resources |
| EMB | Environmental Management Bureau |
| EPR | Extended Producer Responsibility |
| FMCGs | Fast-moving consumer goods |
| GPAP | Global Plastic Action Partnership |
| LDPE | Low-density polyethylene |
| LGUs | Local government units |
| MMDA | Metro Manila Development Authority |
| MRF | Materials recovery facility |
| MSME | Micro, small, and medium enterprises |
| MT | Metric ton |
| NGAs | National government agencies |
| NGOs | Nongovernmental organizations |
| NSWMC | National Solid Waste Management Commission |
| OEs | Obligated enterprises |
| PET | Polyethylene terephthalate |
| PPPs | Public-private partnerships |
| PROs | Producer responsibility organizations |
| RA | Republic Act |
| RDF | Refuse-derived fuel |
| ROK | Republic of Korea |
| SLFs | Sanitary landfills |
| SUPs | Single use plastics |
| UP MSI | University of the Philippines Marine Science Institute |
| WTE | Waste-to-energy |

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