



Clean Ports, Clean Oceans: Improving Port Waste Management in the Philippines

Solid Waste Management Baseline Study
Philippine Ports





Acknowledgement

This report was produced by AMH-Philippines and published by WWF-Philippines.

This study has been enriched by the great contribution of key stakeholders in the conducted stakeholder interviews and consultations. Their inputs have been taken into account by the authors BUT do not necessarily represent their opinions and positions. We are grateful for their contributions.

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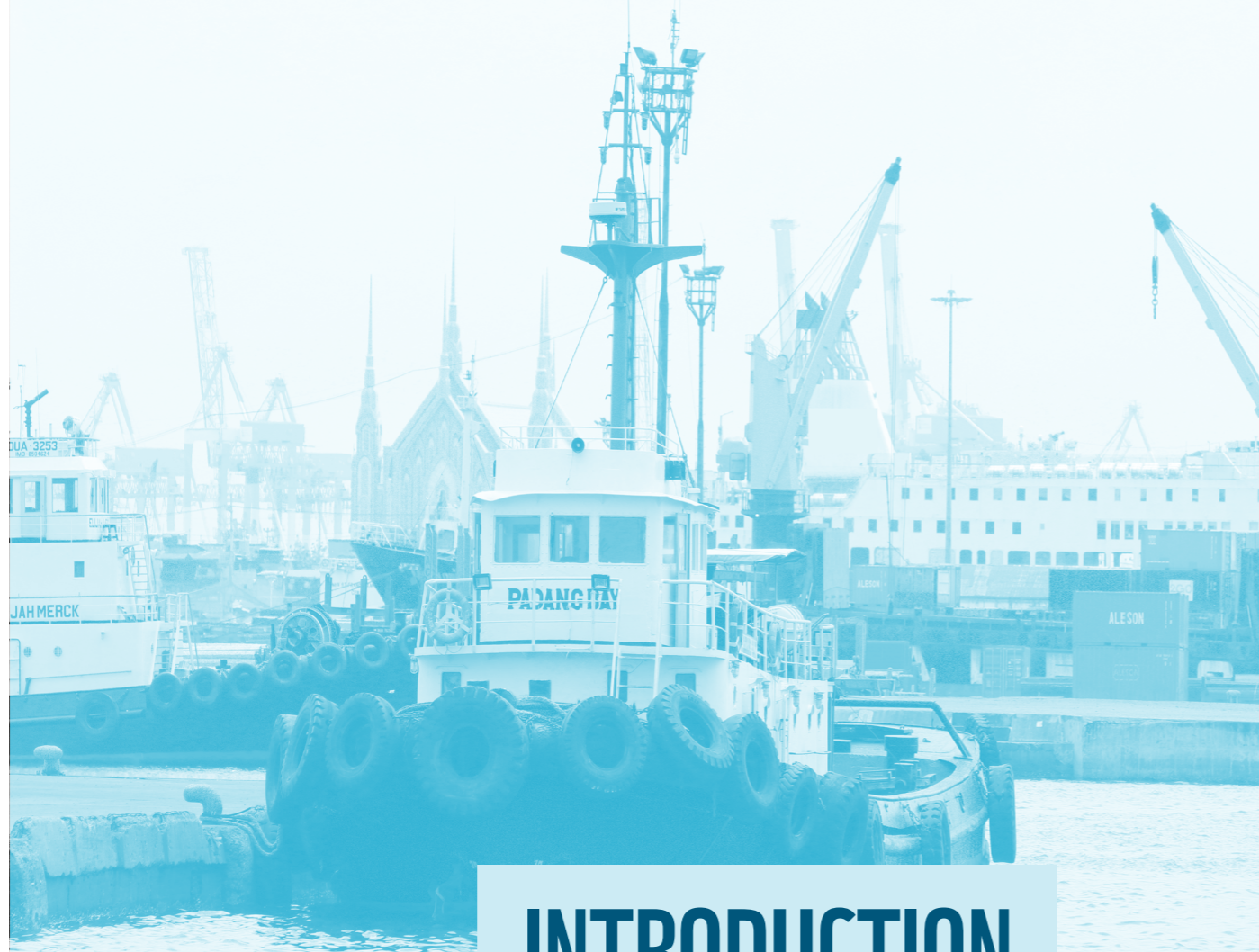
Acronyms

AGS	PPA PMO Agusan	ICM	Integrated Coastal Management
AMH	AMH Philippines, Inc.	IGPPC	International Garbage Pollution Prevention Certificate
AO	Administrative Order	IMO	International Maritime Organization
ATI	Asian Terminals, Inc.	IMS	Integrated Management System
BCL	PPA PMO Bicol	IPB	Isla Puting Bato
BFAR	Bureau of Fisheries and Aquatic Resources	ISO	International Organization for Standardization
BGS	PPA PMO Batangas	ITDI	Industrial Technology Development Institute
BHL	PPA PMO Bohol	km	Kilometer
BNA	PPA PMO Bataan/Aurora	km²	Square Kilometer
BOC	Bureau of Customs	KPI	Key Performance Indicator
CDF	Countryside Development Fund	LDPE	Low Density Polyethylene
CE	Circular Economy	LGU	Local Government Unit
COBSEA	Coordinating Body on the Seas of East Asia	LNI	PPA PMO Lanao del Norte/Iligan
DENR	Department of Environment and Natural Resources	m	Meter
DOF	Department of Finance	m²	Square Meter
DOST	Department of Science and Technology	m³	Cubic Meter
DOTC	Department of Transportation and Communication	MARINA	Maritime Industry Authority
DOTr	Department of Transportation	MARPOL	International Convention for the Prevention of Pollution from Ships
DPS	Department of Public Services	MC	Memorandum Circular
DVO	PPA PMO Davao	MDO	PPA PMO Mindoro
DWT	Dead Weight Tonnage	MEPC	Marine Environment Protection Committee
ELS	PPA PMO Eastern Leyte/Samar	MICT	Manila International Container Terminal
EMB	Environmental Management Bureau	MNHPI	Manila North Harbour Port Incorporated
EMS	Environmental Management System	MO	Memorandum Order
EO	Executive Order	MOC	PPA PMO Misamis Oriental/Cagayan de Oro
EPR	Extended Producers Responsibility	MOZ	PPA PMO Misamis Occidental/Ozamis
FGD	Focused Group Discussion	MRF	Materials Recovery Facility
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit	MRQ	PPA PMO Marinduque/Quezon
GRaSPS	Green, Resilient and Smart Port Strategy	MSB	PPA PMO Masbate
Grieg	Grieg Star Group AS	MSW	Municipal Solid Waste
GT	Gross Tonnage	NBB	PPA PMO Negros Occidental/Bacolod/Banago/Bredco
ha	Hectares		
HDPE	High Density Polyethylene		
HME	Harmful to Marine Environment		

NCN	PPA PMO NCR North	PT	Passenger Terminal
NCS	PPA PMO NCR South	PTC	Passenger Terminal Complex
NCWC	National Coast Watch Council	PVC	Polyvinyl Chloride
NGAs	Non-Government Agencies	QMS	Quality Management System
NIMBY	Not-In -My Backyard Attitude	RA	Republic Act
NIPAS	National Integrated Protected Areas System	RAP MALI	Regional Action Plan on Marine Litter
NLZ	PPA PMO Northern Luzon	RoRo	Roll-on/Roll-off
NOS	PPA PMO Negros Oriental/Siquijor	SCP	Sustainable Consumption and Production
NPCC	National Pollution Control Commission	SDG	Sustainable Development Goals
NPOA-ML	National Plan of Action on Marine Litter	SLF	Sanitary Landfill
NSWMC	National Solid Waste Management Commission	SOCKSARGEN	South Cotabato, Cotabato, Sultan Kudarat, Sarangani and General Santos
NSWMF	National Solid Waste Management Fund	SRF	Shore Reception Facilities
OC1	Operations Center 1	SSG	PPA PMO SOCKSARGEN
OC2	Operations Center 2	SUG	PPA PMO Surigao
OGP	Other Government Port	SUP	Single-Use Plastics
PA	Protected Areas	SWM	Solid Waste Management
PAP4SCP	Philippine Action Plan for Sustainable Consumption and Production	SWMP	Solid Waste Management Plans
PCG	Philippine Coast Guard	TEU	Twenty-footer Equivalent Units
PD	Presidential Decree	The Plaf	The Plastic Flamingo
PEP	Port Environmental Policy	TMO	Terminal Management Office
PET	Polyethylene Terephthalate	UN	United Nations
PLW	PPA PMO Palawan	UNDP	UN Development Programme
PMO	Port Management Office	UNEP	UN Environment Programme
PNG	PPA PMO Panay-Guimaras	VMLS	Vitas Marine Loading Station
PNP-MG	Philippine National Police Maritime Group	WACS	Waste Analysis and Characterization Study
PP	Polypropylene	WaCT	Waste Wise Cities Tool
PPA	Philippine Ports Authority	WLB	PPA PMO Western Leyte/Biliran
PS	Polystyrene	WOBVIF	Waste On-Board Vessel Information Form
PSA	Philippines Statistics Authority	WWF	World Wide Fund for Nature
		ZBA	PPA PMO Zamboanga
		ZDN	PPA PMO Zamboanga del Norte



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INTRODUCTION

This report presents the results of the conducted national baseline study for the Philippine Ports Authority (PPA)-listed ports (Figure 1) based on the results of the conducted select ports baseline study and on the solid waste management status reports forwarded by the PPA to WWF Philippines covering the period for the first semester of 2018 to the second semester of 2020.

The results of the conducted select ports study for the Port of Batangas, Port of Cagayan de Oro, and Manila North Harbor may be accessed through their respective reports.

In October 2020, the World Wide Fund for Nature Philippines (WWF-Philippines) and the World Wide Fund for Nature Norway (WWF-Norway) started the project “Clean Ports, Clean Oceans: Improving Port Waste Management in the Philippines”, funded by the Grieg Foundation to help address the issue of plastic pollution in Philippine ports. The project is being implemented in partnership with a private sector entity, Grieg Star Group AS (Grieg). WWF-Philippines then contracted AMH Philippines, Inc. (AMH) to conduct baseline studies at select Philippine ports – Manila North Port, Port of Batangas, and Cagayan de Oro Port. AMH is also currently tasked to conduct a national baseline study.

Rationale of the Study

The Sustainable Development Goals (SDGs) is a campaign of the United Nations (UN) to address the challenges the humanity is currently facing on a global scale. Many SDGs directly relate to waste management and sustainable development such as SDGs 11, 12, 14 and 17.

SDG 11 – Sustainable Cities and Communities seeks to make cities inclusive, safe, resilient, and sustainable. One of its global targets is that the adverse per capita environmental impact of cities in terms of air and municipal and other wastes has reduced by 2030.

SDG 12 – Responsible Consumption and Production has a goal to ensure sustainable consumption and production patterns. This also aims that by 2030, waste generation are substantially reduced through prevention, reduction, recycling, and reuse.

SDG 14 – Life Below Water aims to conserve and sustainably use the world’s ocean, seas, and marine resources. One of its targets is to prevent and significantly reduce marine



pollution of all kinds, particularly from land-based activities, including marine debris and nutrient pollution. An estimate of 5 to 12 million metric tons of plastic enters the ocean every year, which costs roughly US\$ 13 billion per year for clean-up costs and financial losses in fisheries and other industries. About 89% of plastic litter found on the ocean floor are single-use items like plastic bags.

SDG 17 – Partnership for the Goals strives to strengthen the means of implementation and revitalize the global partnership for sustainable development. One of its specific targets is to promote the development, transfer, dissemination, and diffusion of environmentally sound technologies to developing countries on favorable terms, including technologies with regards to waste management.

Plastic pollution is the most widespread problem affecting the marine environment. It threatens ocean health, food safety, human

health, and tourism.

The geographical distribution of marine plastic debris is strongly influenced by the entry points and the different transport pathways, which are in turn determined by the density of plastic debris coupled with prevailing currents, wind, and waves (Rech, et al., 2014). Wastes coming from ports, vessels and the communities near the coast are potential sources of marine litter.

Despite the provisions of the MARPOL and the Republic Act (RA) 9003: The Ecological Solid Waste Management Act of 2000, there are still large amounts of solid wastes present within the Philippine marine water bodies. Around 2.7 million tons of plastic waste are generated in the country each year with about 20 percent of it ending up in the ocean (McKinsey & Company, 2015) making the Philippines the third largest contributor of plastic wastes into oceans (Jambeck, et al., 2015).

Objectives of the Study

The project aims to improve the port waste management in the Philippines to reduce the flow of plastic waste entering nature and the ocean. Its goals are to reduce plastic waste leakage by 50% in at least three ports within the country, to provide input to the national action plan on port waste management – highlighting the importance of the port industry in addressing plastic pollution, and to enable scaling up in other Philippine and global ports by project documentation (WWF Philippines,

Inc.). This national baseline study, specifically, is to provide inputs to the National Plan of Action for the Prevention, Reduction, and Management of Marine Litter (NPOA-ML) which aims to provide a blueprint to enhance the current efforts of the Philippines in resource and waste management, to bring a closer look to marine litter issues and the control of additional leakage of waste into bodies of water (Department of Environment and Natural Resources, 2021).

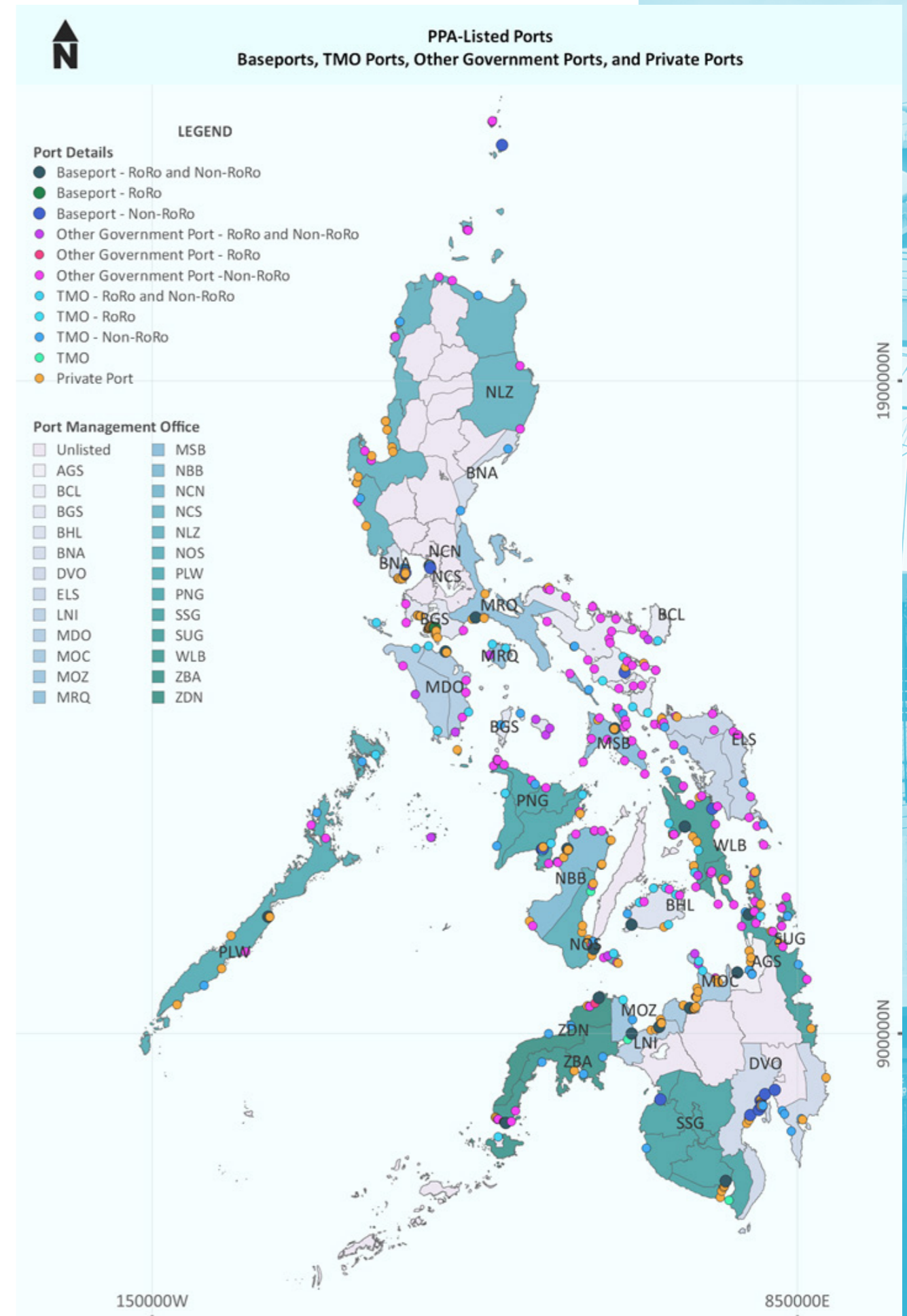


Figure 1. PPA-Listed Ports: Baseports, TMO Ports, Other Government Ports, and Private Ports (Philippine Ports Authority; NAMRIA, 2020)



PORTS IN THE PHILIPPINES

The Philippines has a total of 552 ports that are being managed by 25 port management offices (PMOs). Of this number, 36 are classified as baseports¹, 93 are terminal ports² under terminal management offices³ (TMOs), 152 are other government ports⁴ (OGP), and 271 are private ports⁵ (Figure 1). These ports may either be serving RoRo vessels or not (Table 1).

The PMO of Cotabato (CBO) was downgraded to a TMO in 2018 through PPA Memorandum Order (MO) No. 08-2018 and was placed under the jurisdiction of PMO SOCSARGEN (SSG).

¹ A baseport serves as a center or a hub of operations and is almost always the busiest terminal in each port management office (Philippine Ports Authority).
² A terminal port consists of a port facility or several port facilities – government or private – that may be engaged in multi-purpose operations as opposed to specialized or may be specialized/dedicated to a single type of operation (Philippine Ports Authority).
³ A terminal management office is an administrative unit that oversees the operation of a terminal in delivering frontline services (Philippine Ports Authority).
⁴ Other government ports are public ports owned and maintained by other government entities such as local government units (Philippine Ports Authority).
⁵ Private ports are either commercial or non-commercial ports, as allowed by PPA, owned and maintained by a private entity (Philippine Ports Authority).

Figure 1. PPA-Listed Ports: Baseports, TMO Ports, Other Government Ports, and Private Ports (Philippine Ports Authority; NAMRIA, 2020)

Port Type		Number of Ports	Percentage Contribution (%)
Baseport	RoRo & Non-RoRo	17	3.1
	RoRo	2	0.4
	Non-RoRo	16	2.9
	No Data	1	0.2
TMO	RoRo & Non-RoRo	34	6.2
	RoRo	4	0.7
	Non-RoRo	50	9.1
	No Data	5	0.9
Other	RoRo & Non-RoRo	13	2.4
	Government Port	1	0.2
	Non-RoRo	138	25.0
	No Data	0	0.0
Private Port	No Data	271	49.1
Total		552	100.0

Table 2. PPA Port Management Offices

PMO Abbreviation	PMO Name	PMO Abbreviation	PMO Name
AGS	Agusan	NBB	Negros Occidental/Bacolod/Banago/Bredco
BCL	Bicol	NCN	NCR North
BGS	Batangas	NCS	NCR South
BHL	Bohol	NLZ	Northern Luzon
BNA	Bataan/Aurora	NOS	Negros Oriental/Siquijor
DVO	Davao	PLW	Palawan
ELS	Eastern Leyte/Samar	PNG	Panay-Guimaras
LNI	Lanao del Norte/Iligan	SSG	SOCSARGEN
MDO	Mindoro	SUG	Surigao
MOC	Misamis Oriental/Cagayan de Oro	WLB	Western Leyte/Biliran
MOZ	Misamis Occidental/Ozamis	ZBA	Zamboanga
MRQ	Marinduque/Quezon	ZDN	Zamboanga del Norte
MSB	Masbate		

Shipcalls – along with the gross tonnage recorded, container traffic, passenger traffic, and RoRo traffic at the Philippine ports were all affected by the stricter travel restrictions imposed across the country brought about by the COVID-19 pandemic.

Shipcalls

A total of **321,934 vessels** called⁶ at the PPA-listed ports in 2020, which is far less than the total of **503,098 in 2019** (Philippine Statistics Authority, 2020; Philippine Statistics Authority, 2021). Most of the calls, whether in 2019 or 2020, are domestic vessels – at 97.8% contribution in 2019 and at 96.4% in 2020 (Figure 2).

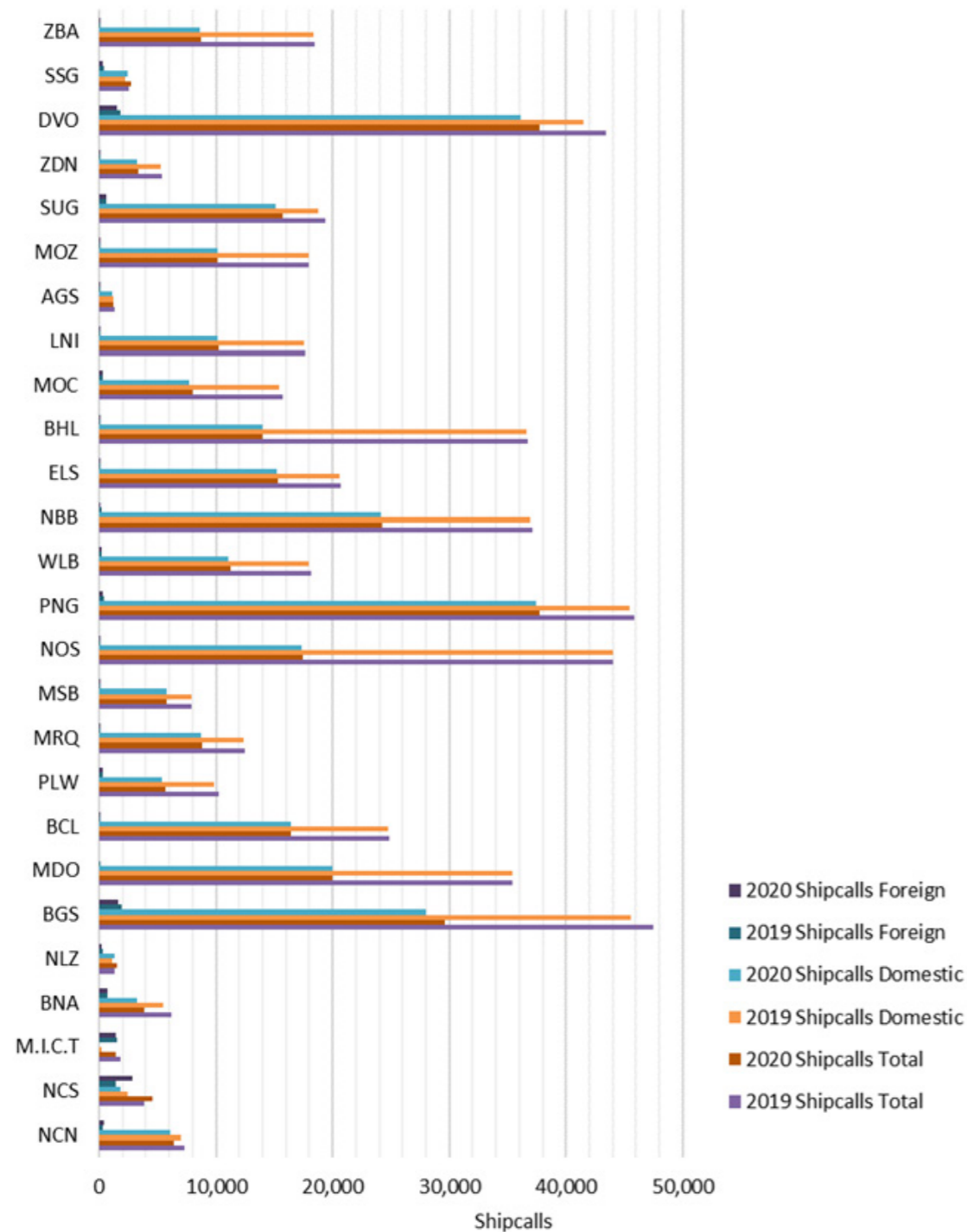


Figure 2. Domestic, Foreign, and Total Shipcalls at PPA Port Maintenance Offices and at MICT in 2019 and 2020 (Philippine Statistics Authority, 2020; Philippine Statistics Authority, 2021)

⁶ Shipcalls is the number of vessels which call/arrive at a given port at a given time (Philippine Ports Authority).

Gross Tonnage

A total of 541,716,268 tons – gross – called at PPA-listed ports in 2020, which is 1.23% lower than the total of 548,446,120 in 2019 (Philippine Statistics Authority, 2020; Philippine Statistics Authority, 2021). Most of the gross tonnage in 2020 are from foreign vessels – at 57.9% contribution – while, most are from domestic vessels in 2019 at 57.0%. NCR South PMO received most of the tonnage in 2020; while, Batangas PMO received most the tonnage in 2019 (Figure 3).

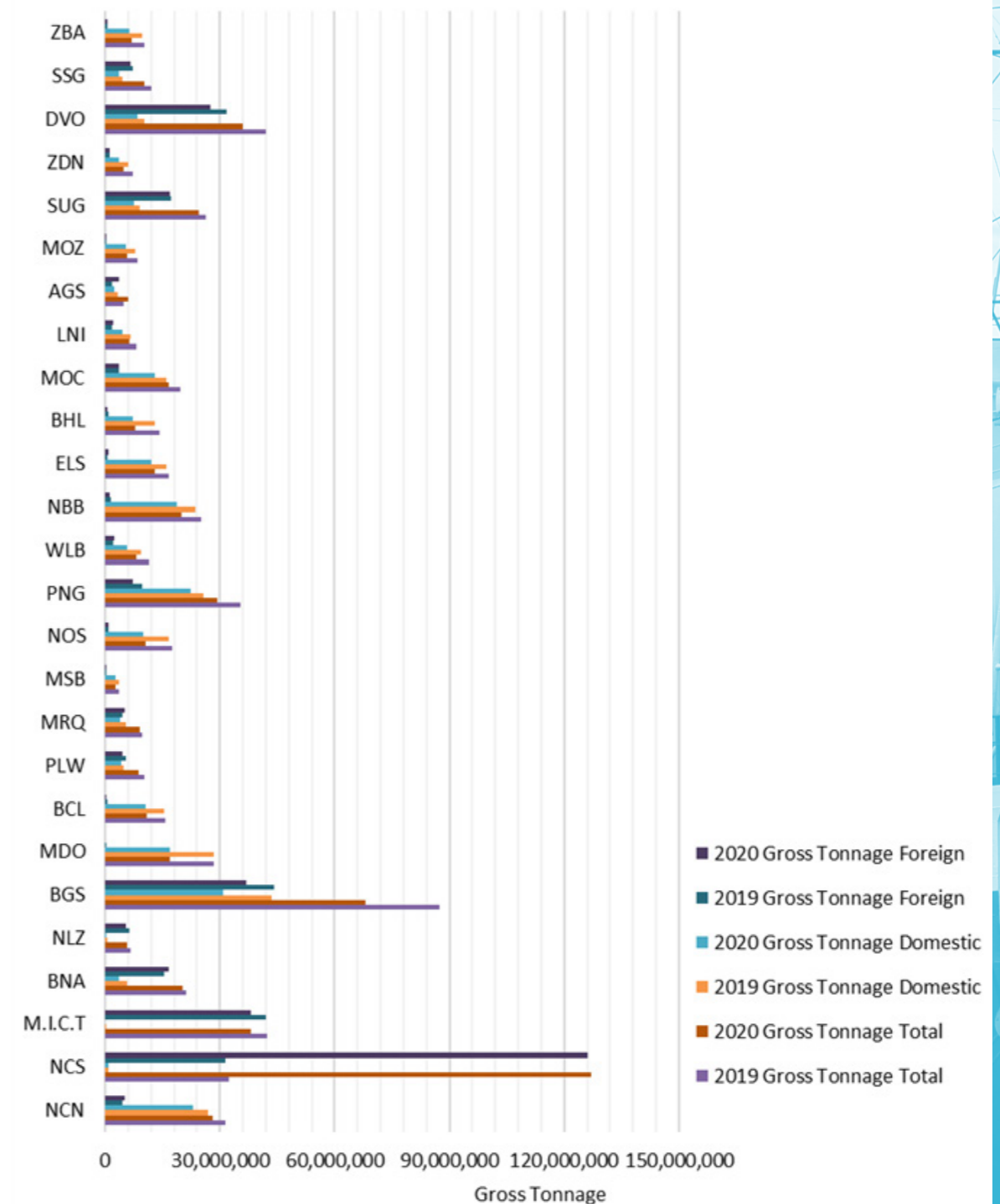


Figure 3. Domestic, Foreign, and Total Gross Tonnage at PPA Port Maintenance Offices and at MICT in 2019 and 2020 (Philippine Statistics Authority, 2020; Philippine Statistics Authority, 2021)



Container Traffic

The container traffic in the PPA-listed ports was at a total of 7,865,905.75 in 2019 and decreased by 14.09% in 2020 to 6,757,741.00 2019 (Philippine Statistics Authority, 2020; Philippine Statistics Authority, 2021). Most of the container traffic in both years are foreign at 59.8% in 2019 and 59.4% in 2020 and are at the Port of Manila – South Harbor and Manila International Container Terminal (MICT, Figure 4).

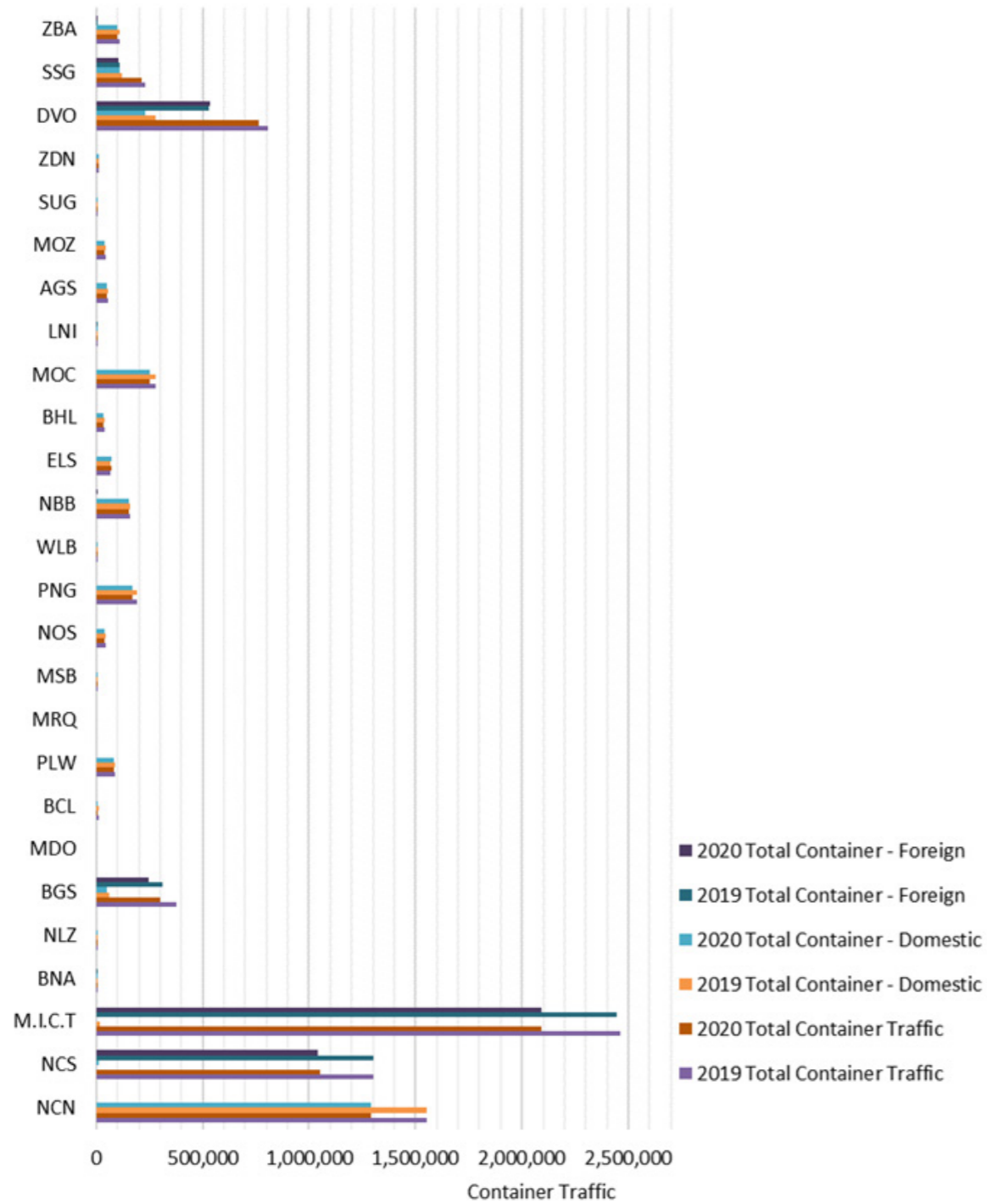


Figure 4. Domestic, Foreign, and Total Container Traffic at PPA Port Maintenance Offices and at MICT in 2019 and 2020 (Philippine Statistics Authority, 2020; Philippine Statistics Authority, 2021)



Passenger Traffic

Most of the passenger traffic are domestic embarking⁷ and disembarking⁸ passengers. Cruise ship passengers are at a minimum (Philippine Statistics Authority, 2020; Philippine Statistics Authority, 2021). There is also minimal passenger traffic in the PMOs of Northern Luzon (NLZ), Bataan/Aurora (BNA), Agusan (AGS), SOCSARGEN (SSG), NCR North (NCN), and NCR South (NCS, Figure 5 to Figure 8).

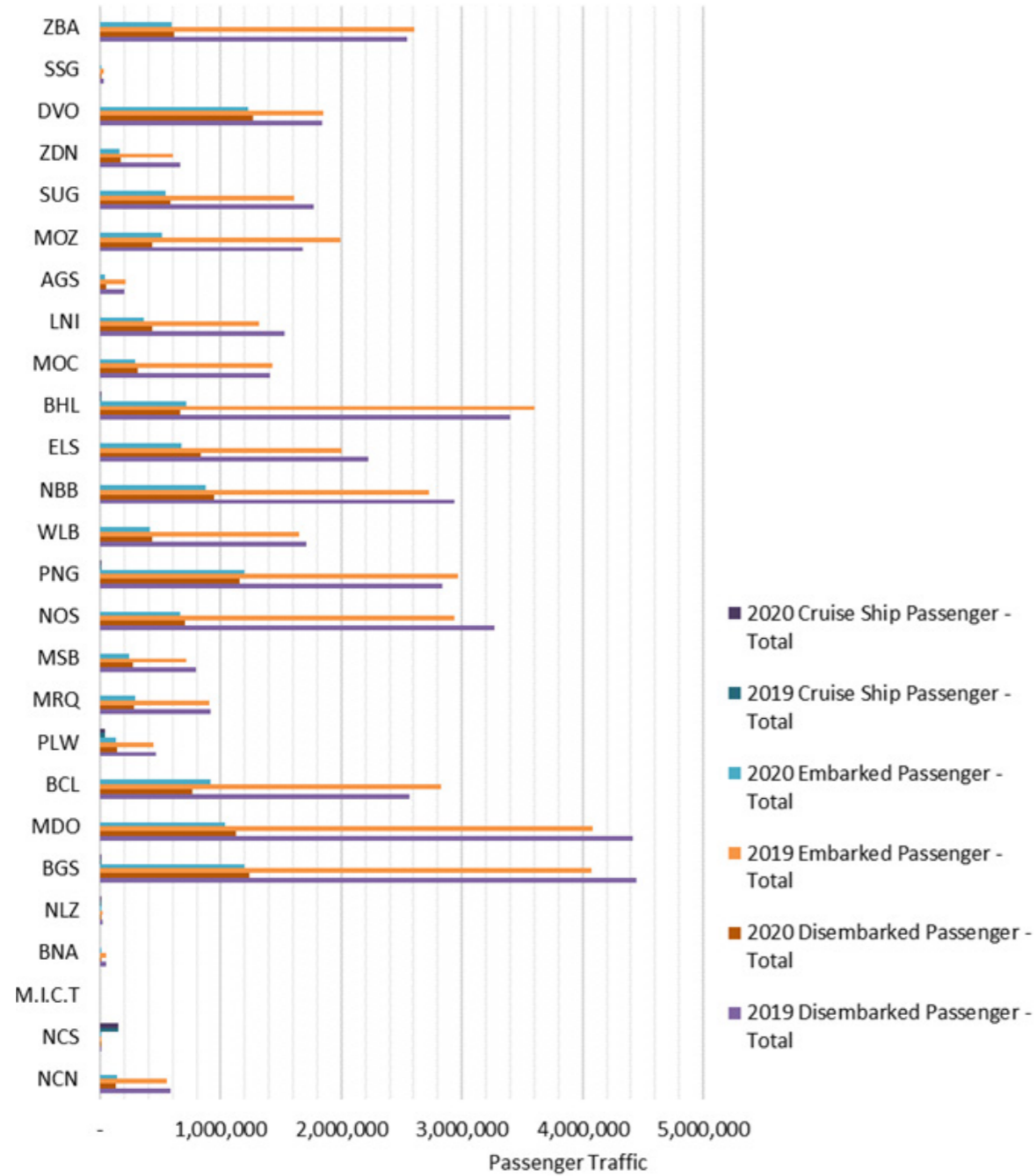


Figure 5. Embarking, Disembarking, and Cruise Ship Passenger Traffic at PPA Port Maintenance Offices and at MICT in 2019 and 2020 (Philippine Statistics Authority, 2020; Philippine Statistics Authority, 2021)

⁷ Embarkation is the act of boarding a vessel or ship (Philippine Ports Authority).
⁸ Disembarkation is the act of landing or going ashore from a vessel or ship (Philippine Ports Authority).

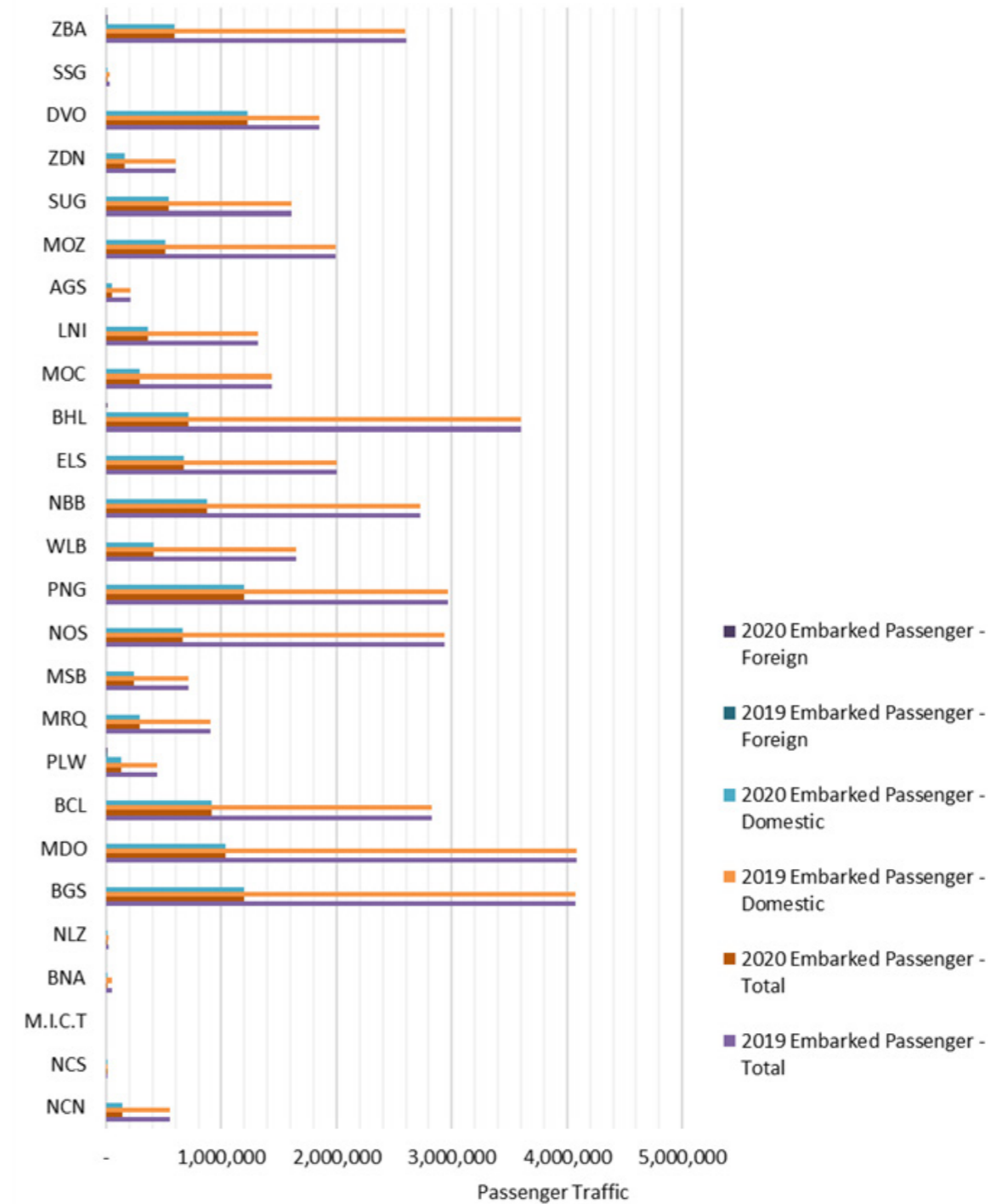


Figure 6. Embarking Passenger Traffic at PPA Port Maintenance Offices and at MICT in 2019 and 2020 (Philippine Statistics Authority, 2020; Philippine Statistics Authority, 2021)

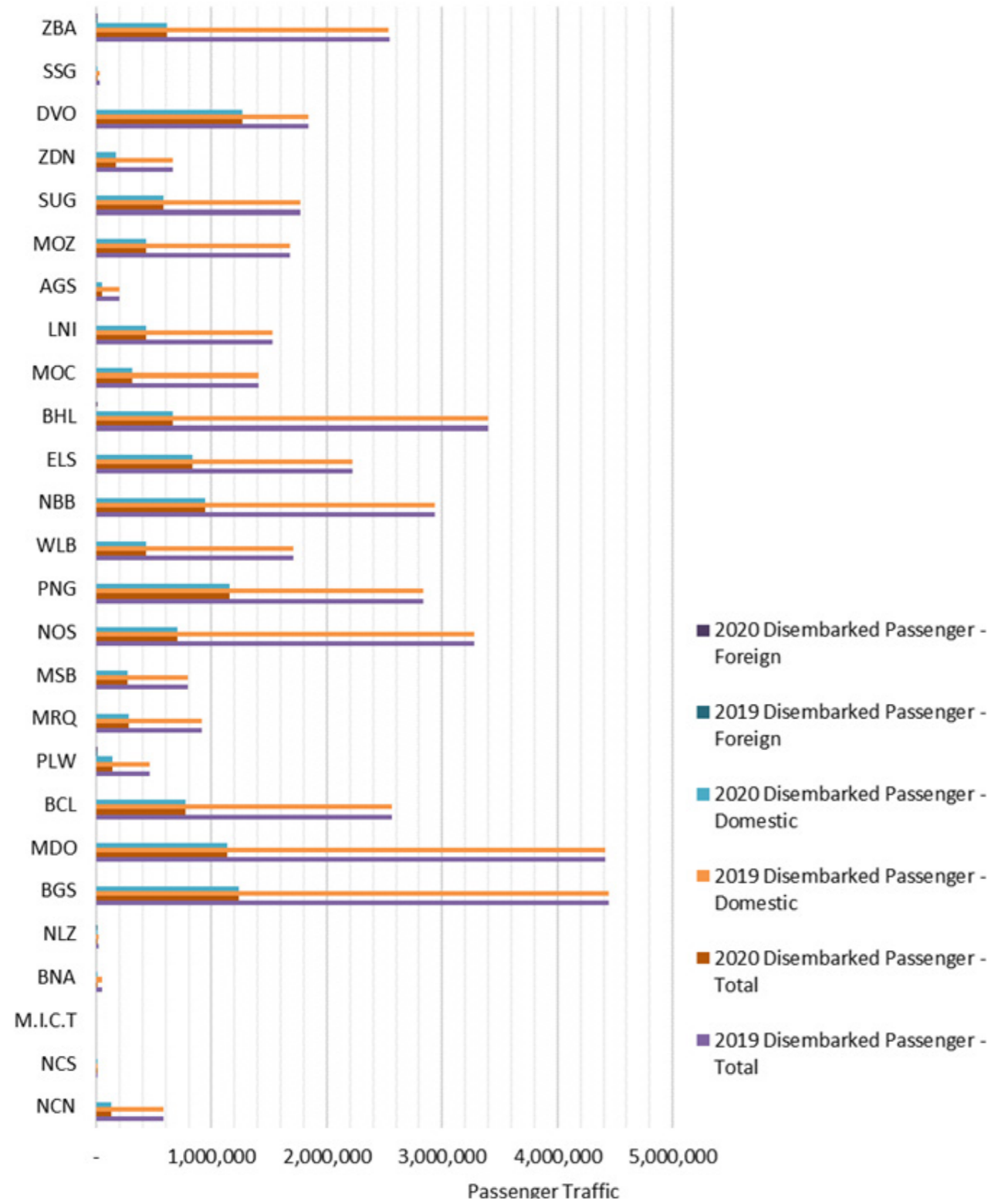


Figure 7. Disembarking Passenger Traffic at PPA Port Maintenance Offices and at MICT in 2019 and 2020 (Philippine Statistics Authority, 2020; Philippine Statistics Authority, 2021)

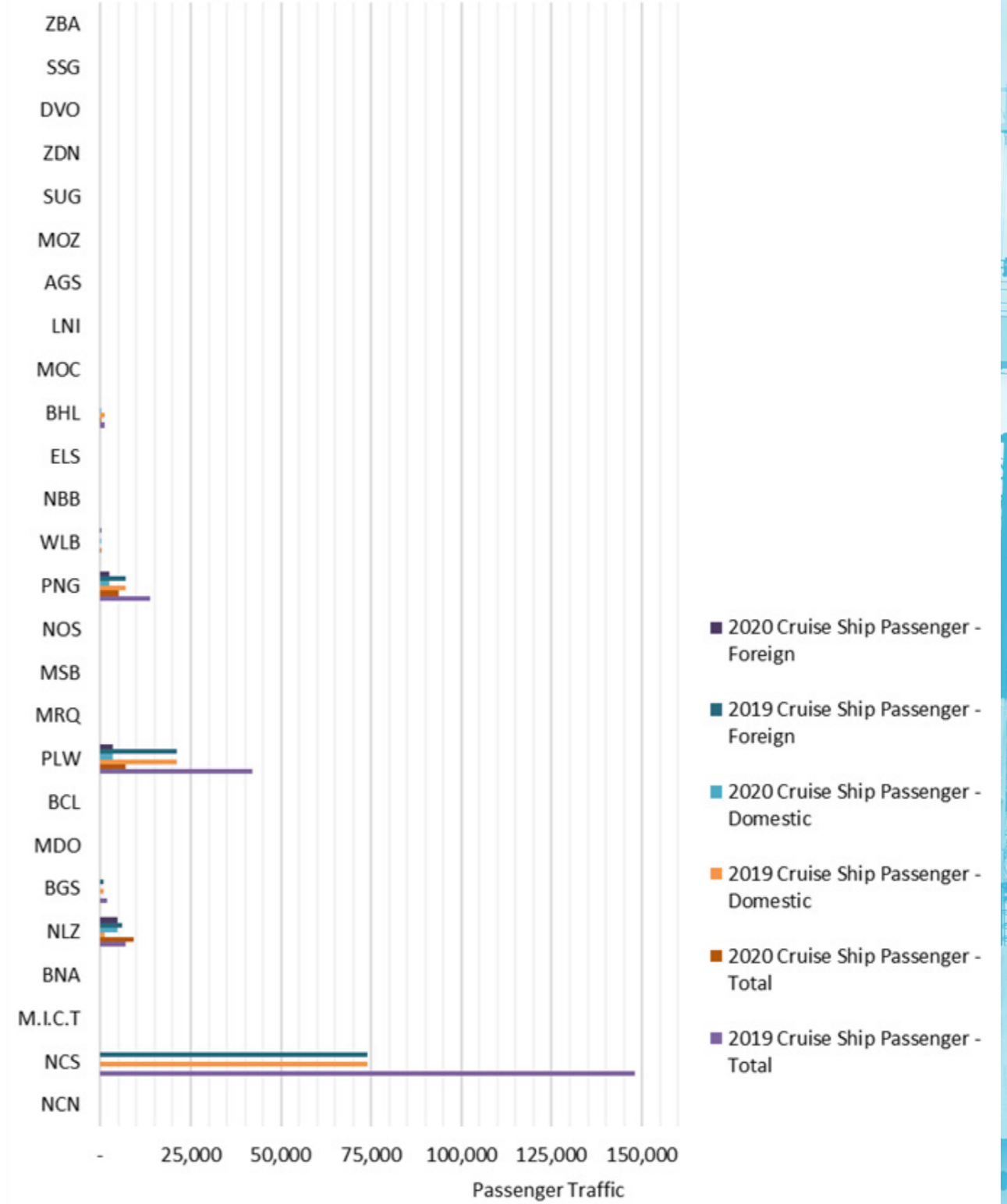


Figure 8. Cruise Ship Passenger Traffic at PPA Port Maintenance Offices and at MICT in 2019 and 2020 (Philippine Statistics Authority, 2020; Philippine Statistics Authority, 2021)

The total embarked passenger traffic decreased by 70.20% between 2019 and 2020 from a total of 41,198,946 to 12,276,337; while the total disembarked traffic decreased by 70.25% from a total of 42,308,684 to 12,588,486. Cruise ship passengers also decreased at 89.89% from 213,765 to 21,614 (Philippine Statistics Authority, 2020; Philippine Statistics Authority, 2021).



RoRo Traffic

RoRo traffic within PPA-listed ports decreased by 35.06% between 2019 and 2020 from a total of 7,818,963 to 5,077,610. RoRo traffic is minimal at PMO NCN; while, nil at PMO NCS, BNA, and Davao (DVO, Figure 9).

In both cases, RoRo traffic is almost equally divided between outbound and inbound RoRo considering RoRo moves only within the islands of the country (Philippine Statistics Authority, 2020; Philippine Statistics Authority, 2021).

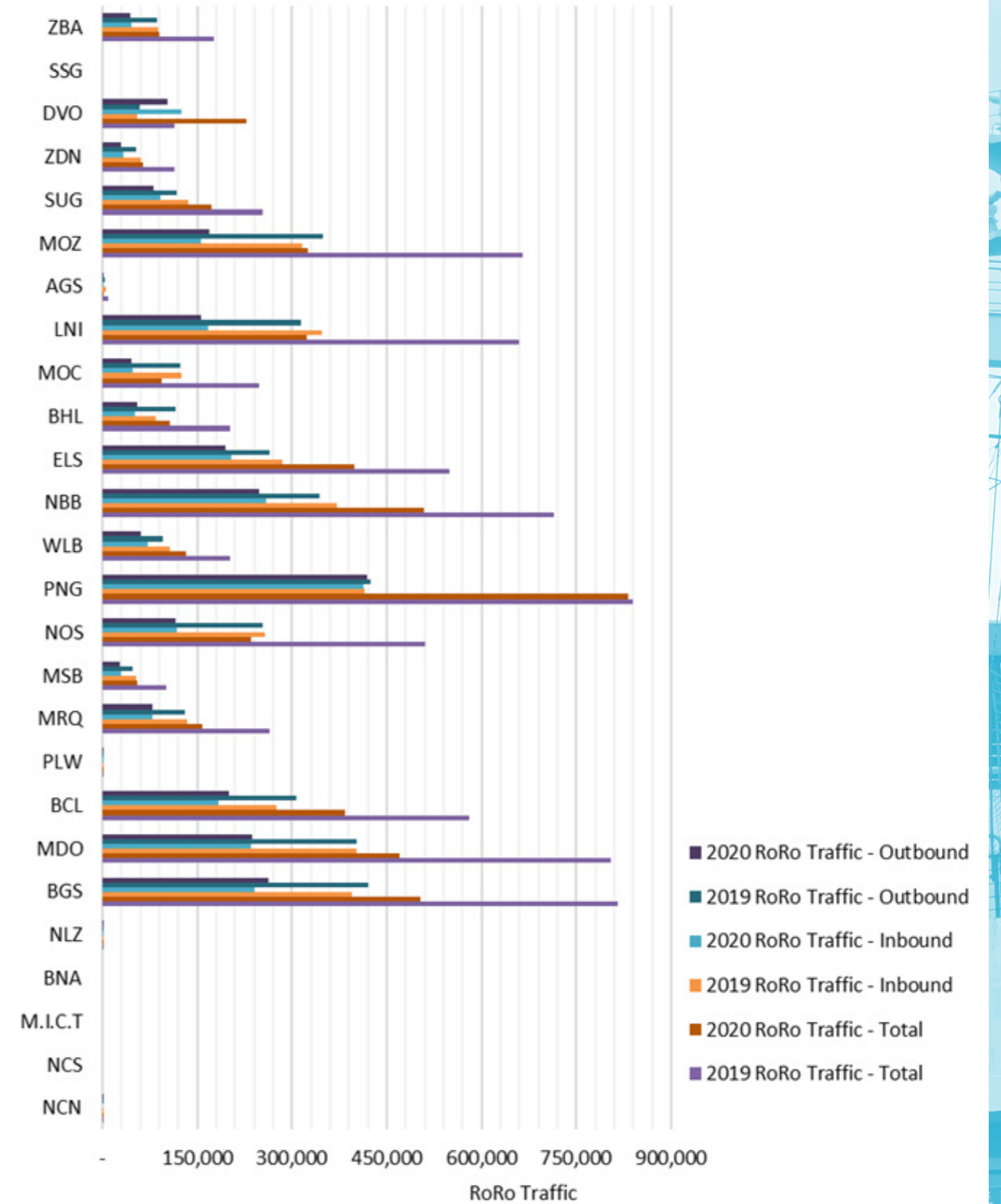


Figure 9. RoRo Traffic at PPA Port Maintenance Offices and at MICT in 2019 and 2020 (Philippine Statistics Authority, 2020; Philippine Statistics Authority, 2021)



SOLID WASTE MANAGEMENT PLANS, PROGRAMS, PROTOCOLS, AND POLICIES

The protection of the marine environment is a shared responsibility and accountability of the international community.

Laws and policies, therefore, are generally replicated from the international level to the national level. National level policies are replicated as much as possible in local government units (LGUs) and other government agencies.

International Plans, Programs, Protocols, and Policies

The International Convention for the Prevention of Pollution from Ships (MARPOL) and the London Convention and Protocol are among the legal efforts done internationally to address marine pollution.

MARPOL aims to prevent pollution from ships caused by operational or accidental causes and was adopted by the International Maritime Authority in 1973. Annexes I to V of MARPOL 73/78 was ratified in the Philippines

on 2001; while, the Instruments of Accession of the MARPOL Annex VI has been deposited to the International Maritime Organization (IMO) Secretary General on April 24, 2018 (Maritime Industry Authority, 2020). Amendments to the MARPOL were made through the Marine Environment Protection Committee (MEPC) with the latest amendment finalized in March 2020.

MARPOL Annex V, entitled “Regulations on Prevention of Pollution by Garbage from Ships,” completely bans the disposal of all forms of plastic into the sea (International Maritime Organization, 1988). Wastes discharged are also to be recorded following a set of categories (Table 3).

Table 3. Garbage Categories Recorded in Ships (Marine Environment Protection Committee, 2016)

Assigned Letter	Waste Category
A	Plastics
B	Food Wastes
C	Domestic Wastes
D	Cooking Oil
E	Incinerator Ashes
F	Operational Wastes
G	Animal Carcasses
H	Fishing Gear
I	E-Waste
J	Cargo Residues (non-HME)
K	Cargo Residues (HME)

Plastics including synthetic ropes, fishing nets, and plastic bags are prohibited from being disposed outside and inside special areas⁹. This prohibition is to be applied to all vessels including fixed or floating platforms¹⁰ and associated vessels based on MARPOL 73/78 Annex V.

The Garbage Record Book should be utilized to record the date, time, position of the ship, description of the wastes, and the estimated amount incinerated or discharged according to Annex V of MARPOL with the data to be kept for up to two years after the date of the last entry. The annex also states that only those cargo residues that cannot be recovered using commonly available methods

for unloading could be considered for discharge. Cargo residue that contains substances that are harmful to the marine environment¹¹ (HME) must be taken to port reception facilities.

The Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, known as the “London Convention and Protocol,” regulates what materials can be dumped at sea and what materials are not permitted. Persistent plastics and other persistent synthetic materials are among the materials prohibited from being dumped into the sea as stated in Annex I of the London Convention and Protocol (Table 4).

Table 4. Kinds of Waste Prohibited from being Dumped into Sea (London Convention and Protocol, 1972)

Annex I of the London Convention and Protocol
Organohalogen compounds
Mercury and Mercury Compounds
Cadmium and Cadmium Compounds
Persistent Plastics and Other Persistent Synthetic Materials
Crude Oil and accompanying wastes
Radioactive Wastes or Other Radioactive Matter (Unless Contains Exempt Levels of Radioactivity as Defined by the International Atomic Energy Agency)
Materials Produced for Biological and Chemical Warfare
Substances that make Edible Marine Organisms Unpalatable, or Endanger Human Health or that of Domestic Animals
Industrial Waste

⁹ Special areas under Annex V are the Mediterranean, Baltic, Black, Red, and North Seas areas and the Gulfs area (Maritime Industry Authority, 2020).
¹⁰ Fixed or floating platforms and associated vessels includes all fixed or floating platforms engaged in exploration, exploitation or associated offshore processing of seabed mineral resources, and all ships within 500m of such platforms (United States Coast Guard, 2014).
¹¹ Harmful to Marine Environment (HME) is a designation for cargo residues containing hazardous chemicals, restricting release and discharge of these residues to the sea (Marine Environment Protection Committee, 2016).



A wide range of land-based and sea-based activities is recognized by the IMO Action Plan to Address Marine Plastic Litter from Ships as the main entry modes of plastics to the marine environment; and, this was adopted by the MEPC in 2018. The plan highlights the negative effects of large plastic items, small plastic particles, and microplastics on biodiversity, marine life, and human health impacting fishing, shipping, and tourism. This plan then aims to build on the policies that have been established by MARPOL and the London Convention and Protocol with the agreed actions that affect ships and fishing vessels to be completed by 2025 (International Maritime Organization, 2018).

The Coordinating Body on the Seas of East Asia (COBSEA) Regional Action Plan on Marine Litter (RAP MALI) was originally adopted at the 19th Intergovernmental Meeting of COBSEA in Cambodia in 2008. It focuses on enabling the participating countries¹² to deliver the targets of SDG-14 and to prevent and significantly reduce all kinds of marine pollution particularly from land-based activities including marine debris and nutrient pollution. The plan specifically aims to prevent and reduce marine litter, foster sustainable consumption and production considering a whole lifecycle

¹² The East Asian countries participating in the action plan are Cambodia, Indonesia, Malaysia, the People's Republic of China, the Philippines, the Republic of Korea, Singapore, Thailand, and Vietnam (COBSEA, 2008).

approach, remove existing marine litter through environmentally acceptable methods, improve monitoring and assessment of marine litter, enhance collaboration and awareness on the impacts of marine litter, and support existing efforts at the national level in coordination with regional and international cooperation (COBSEA, 2019). RAP MALI includes four critical actions: prevent and reduce marine litter from land-based sources, prevent and reduce marine litter from sea-based sources, monitor and assess marine litter, and support the implementation of COBSEA RAP MALI (Annex B).

The ASEAN Regional Action Plan for Combatting Marine Debris in the ASEAN Member States (ASEAN Regional Action Plan) was developed to provide a bold set of actions to tackle the plastic waste littering and marine debris issues in the ASEAN and aims to make the vision of a more sustainable approach to plastics a reality (ASEAN, 2021). It has four components namely policy support and planning, research innovation and capacity building, awareness, education and outreach, and private sector engagement. It also includes an implementation plan for the effective implementation of the regional action plan.

Philippine Plans, Programs, Protocols, and Policies

For land-based sources of solid waste, RA 9003: Ecological Solid Waste Management Act of 2000 is the national law governing the implementation of a systematic, comprehensive, and ecological solid waste management plan down to the barangay level (Republic Act No. 9003, 2001) with the National Solid Waste Management Commission (NSWMC) as the government entity in-charge of properly implementing the rules and regulations (IRR) of the act. RA 9003 implements solid waste management from the national level to the local barangay level by outlining the responsibility at each level¹³. At the provincial level, municipal SWM plans are reviewed with coordination between LGUs encouraged where possible. At the city/municipal levels, a municipal solid waste management (SWM) plan must be prepared, implemented, and monitored. At the local level, barangays are required

to handle waste collection, to establish materials recovery facilities (MRFs), and to conduct educational campaigns and seminars (WWF Philippines, 2020). The currently being formulated Philippine Action Plan for Sustainable Consumption and Production (PAP4SCP) being led by the National Economic Development Authority (NEDA) and the currently being processed House Bill (HB) No. 6279: Extended Producers Responsibility for Plastic Waste Act introduced by Representative Rufus B. Rodriguez are expected to augment the provisions of RA 9003 through sustainable consumption and production (SCP) and recycling and waste and chemicals management (Department of Environment and Natural Resources, 2021) and through addressing the collection of plastic wastes (Extended Producers Responsibility for Plastic Wastes Act, 2020), respectively.

¹³ Levels include solid waste management boards at both the provincial and city/municipal levels and barangay officials (Republic Act No. 9003, 2001).

For sea-based sources of solid waste, policy support is provided by Presidential Decree (PD) No. 979: Maritime Pollution Decree of 1976. PD No. 979 is a national policy to prevent and control the pollution of the seas that considers waste dumping and waste discharging into the marine environment unlawful. The National Pollution Control Commission (NPCC) – now the Environmental Management Bureau (EMB) – was empowered by this decree, along with the Philippine Coast Guard (PCG) to promulgate national rules and policies governing marine pollution.

For the management of all designated protected areas (PAs), RA 11038: Expanded National Integrated Protected Areas System Act of 2018 provides for the maintenance of essential ecological processes and life support systems and maintenance of their natural conditions to the greater extent possible. It prohibits the dumping of any waste products and leaving refuse or debris in ground or in bodies of water and provides for deputation of support for enforcement and inclusion of waste, sewerage, and septage management in PA management plans (Department of Environment and Natural Resources, 2021).

EO 533, Series of 2006: Integrated Coastal Management (ICM) Policy adapts user-fee schemes for waste management and inter-LGU cooperation as it promotes integrated waste management along with basin-wide management approaches, environmental protection measures at ports, and involvement of the private sector in ICM. EO 57, Series of 2011: National Coast Watch System established the coordination between agencies for maritime concerns and the National Coast Watch Council (NCWC) for the provision of strategies and policy directions to be carried out by the National Coast Watch Center (Department of Environment and Natural Resources, 2021).

The NSWMC Resolution No. 1441, Series of 2021: Resolution Adopting the National Plan of Action for the Prevention, Reduction, and Management of Marine Litter (NPOA-ML) resolved the issuance of appropriate documents for the implementation and dissemination of the resolution on May 12, 2021. NPOA-ML has six strategies under its programmatic cluster of actions and four strategies under its enabling/cross-cutting cluster of actions (Table 5).



Table 5.NPOA-ML Cluster of Actions (NSWMC Resolution No. 1441, Series of 2021)

Strategy	Details
Programmatic Cluster of Actions	
Strategy 1	Establish science- and evidence-based baseline information on marine litter
Strategy 2	Mainstream circular economy (CE) and sustainable consumption and production (SCP) initiatives
Strategy 3	Enhance recovery and recycling coverage and markets
Strategy 4	Prevent leakage from collected or disposed waste
Strategy 5	Reduce maritime sources of marine litter
Strategy 6	Manage litter that is already existing in the riverine and marine environments
Enabling/Cross-Cutting Cluster of Actions	
Strategy 7	Enhance policy support and enforcement for marine litter prevention and management
Strategy 8	Develop and implement strategic and targeted social marketing and communications campaigns using various media
Strategy 9	Enable sufficient and cost-effective financing and other institutional resource requirements for the implementation of the NPOA-ML
Strategy 10	Strengthen local government unit (LGU) capacities and local level implementation of NPOA-ML

The NSWMC Resolution No. 1363: Resolution Directing the Department of Environment and Natural Resources (DENR) to Prepare and Implement the Banning of the Use of Unnecessary Single-Use Plastics by National Government Agencies (NGAs), Local Government Units (LGUs) Offices and Other Government Controlled Offices is a state policy on the adaptation of a systematic, comprehensive, and ecological solid waste management system which shall set the guidelines and targets for solid waste avoidance and volume reduction. Plastic cups of thickness

lower than 0.2 mm, plastic drinking straws, plastic coffee stirrers, plastic spoons, plastic forks, plastic knives, plastic labo, and thin-filmed sando bags are considered unnecessary single-use plastics (SUPs) under this resolution. As of 2019, there are 59 cities and municipalities with ordinances on bans and/or regulations on plastic use (Figure 10).

These national plans, programs, protocols, and/or policies are then supplemented by memoranda and orders from PPA and PCG.

PPA Memoranda and Orders

The PPA has around 10 memoranda and/or orders pertaining to solid waste management.

PPA Memorandum Circular (MC) No. 07-1995: Anti-Pollution Measures with the Port Zone aims to ensure clean, safe, and environmentally friendly port, to ensure effective enforcement of relevant regulations against pollution in the port, to extend all possible assistance to the Philippine Coast Guard (PCG) for the effective enforcement of PCG and PPA issuances against pollution in ports and harbors, and to undertake measures in ports designed to control pollution and promote protection of the port and environment. It has guidelines related to the IMO Regulations against the discharge of wastes and under pollutants, particularly MARPOL 73/78 and to the following PCG Anti-Pollution Regulations.

- PCG MC No. 01-91: Prevention, Containment, Abatement and Control of Marine Pollution
- PCG MC No. 02-91: Dumping and Discharges of Wastes and Other Harmful Matter at Sea

PPA Administrative Order (AO) No. 16-1995: Rules and Regulations on the Prevention/ Control of Oil, Garbage, and Sewage Waste through the Use of Reception Facilities/ Collection of Vessels Refuse applies to all foreign and domestic vessels calling at any government or private port within the jurisdiction of PPA. This AO aims to keep harbor clean and prevent/minimize the pollution of marine life through proper disposal of vessel waste and to implement the provisions of MARPOL 73/78. It also includes guidelines on the mandatory disposal of waste at reception facilities and monitoring and inspection of certificates including the International Garbage Pollution Prevention Certificate (IGPPC).

PPA MC No. 29-2004: Guidelines to Implement the Solid Waste Management System in the PPA and Directing its Strict Monitoring and Compliance aims to maintain an environment-friendly and healthy working



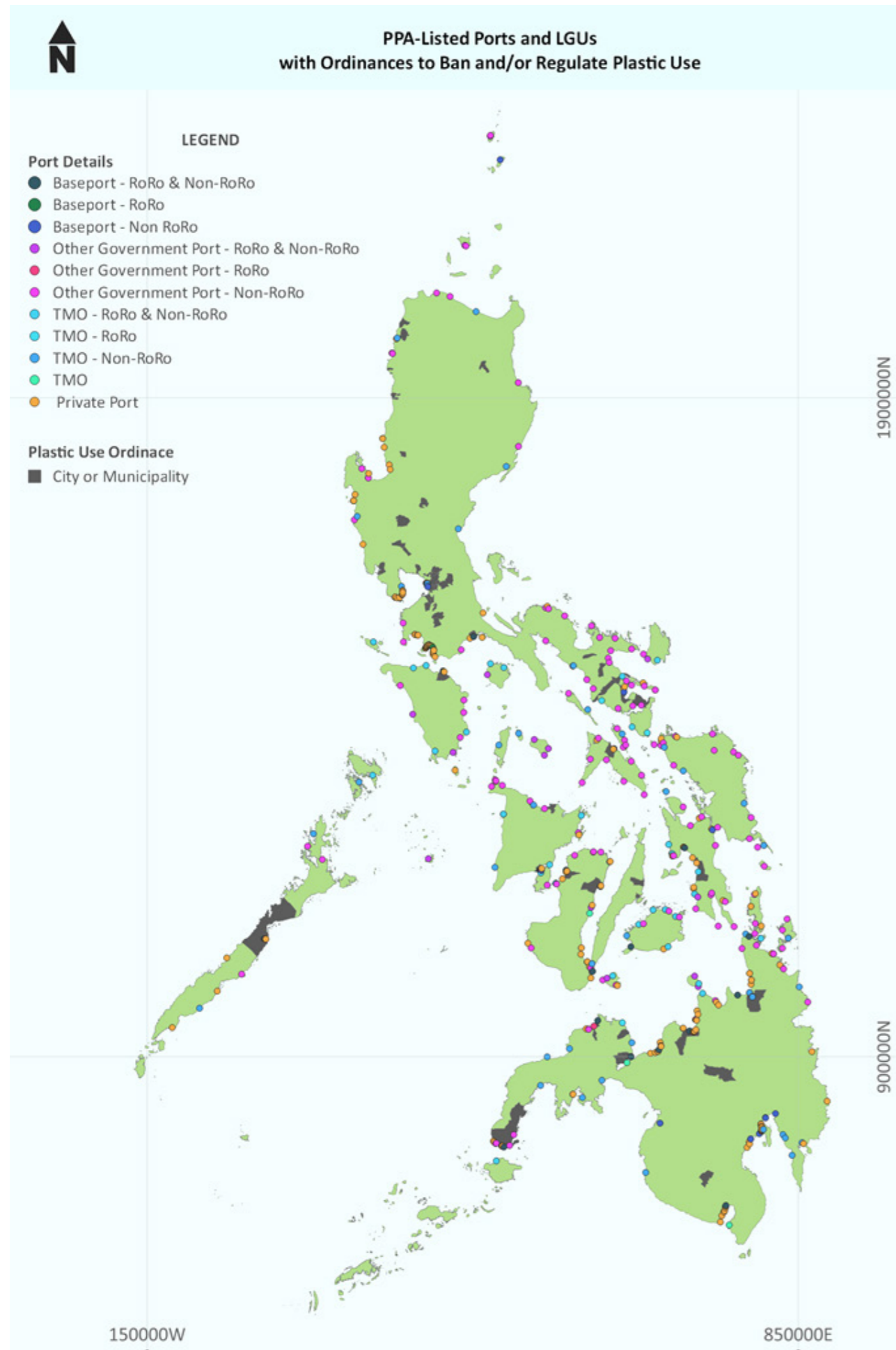


Figure 10. PPA-Listed Ports and the Cities and Municipalities with Plastic Bans and/or Regulations on Plastic Use (The Nerve, 2019; NAMRIA, 2020)

atmosphere in all areas within PPA jurisdiction, to instill environmental consciousness in the PPA, particularly through the proper solid waste management in all ports, to utilize environmentally sound methods and maximize the utilization of valuable resources and encourage resources conservation and recovery, to encourage all levels of PPA to contribute to national efforts on conservation and environmental protection through education, information dissemination and implementation of a workable waste management system, to ensure the proper segregation, collection, transport, storage, and disposal of solid waste, to reduce by 10% the volume of solid waste generated in all the PPA Responsibility Centers, to minimize operating costs by about 5% annually from the present level through conservation and austerity measures, to attain for PPA officials and employees, in particular, and for the port community, in general, a cleaner and healthier environment, and to encourage greater private sector participation in solid waste management. It includes the classification of solid wastes: biodegradables, non-biodegradables, bulky wastes, and hazardous wastes, a 3-Step Solid Waste Management: sorting at source, packaging of wastes, and 3Rs – reduce, reuse, and recycle, the sanitary requirements for the segregation and storage of refuse/solid wastes, a matrix for solid waste management in PPA (Table 6), and reporting – semestral – and monitoring provisions.

PPA MC No. 16-2005: Strict Implementation of PPA Administrative Order No. 02-2003 Entitled “Implementing Guidelines on MARPOL 73/78 Requirements for Shore Reception Facilities (SRF)” is in response to Civil Case No. 1851-99, an anti-sea pollution complaint against PPA and other co-defendant government agencies and to ensure full compliance to PPA AO. No. 02-2003. Under PPA AO No. 02-2003, Waste on Board Vessel Information Form (WOBVIF) should be accomplished and submitted by the shipping agent/line/company when applying for berth and that sanctions for vessels that fail to dispose of the garbage into the reception facility, to discharge the oily waste or noxious liquid substance into the reception facility after PCG’s verification, and to pay the required fees be applied.



Table 6. Solid Waste Management Matrix Under PPA MC No. 29-2004 (Philippine Ports Authority, 2004)

Waste Generation	Waste Discharge and Storage	Primary Collection	Communal Storage	Waste Disposal and Destination
Paper <i>all kinds of office paper, computer paper, newspaper, carton, corrugate or packing boxes</i>	Carton Boxes placed in each office	At Source: PPA official/employee For Storage: Utility Worker	Garbage Receptacle with Tight Lid	Paper Mill
Dry Recyclables <i>aluminum soft drink cans and tabs, plastic bottle containers, plastic utensils, plastic or glass containers/ bottles</i>	Blue Covered Bin in each office	At Source: PPA official/employee For Storage: Utility Worker	Garbage Receptacle with Tight Lid	Factory
Wet Garbage <i>food scraps</i>	Red Covered Bin in each office	At Source: PPA official/employee For Storage: Utility Worker	Compost Pit	Compost Pit or Garbage Dumb

PPA MC No. 13-2009: Supplementary Guidelines on Waste Management and other Environment - Friendly Practices in PPA includes the following supplementary guidelines in line with PPA MC No. 29-2004.

- Immediate practice of proper solid waste management, the most basic form of environmental responsibility
- Reduction of solid waste generation by fifty percent (50%) within the next six months through the full implementation of law on solid waste management
- Reduction by fifty percent (50%) the consumption of fossils fuels within two years from the issuance of RA 774

PPA AO No. 07-2015: Guidelines on the Implementation of PPA Orange Book on Safety, Health, Environmental Management and Handling of Dangerous Goods is for the proper implementation of port safety, health and environmental management in PPA ports nationwide for the compliance and guidance of all port users/stakeholders. The PPA Manual on Port Safety, Health and Environmental Management (SHEM) or the PPA Orange Book is divided into three parts: Book I – Safety and Health in Ports, Book II – Environmental Management in Ports, and Book III – Transport, Handling and Storage of Dangerous Goods in Ports. Book II includes provisions for collection of vessel wastes and for the installation of MRFs in PPA Head

Office, PMOs, TMOs, CHOs/Terminal Operators.

PPA AO No. 08-2018: Interim Guidelines on the Issuance of Permit to Operate (PTO) for “Shore Reception Facilities (SRF)/Waste Disposal Service Provider ensures the continuity of providing SRF/waste disposal service in ports under the jurisdiction of the PPA.

PPA AO 05-2018: The Port Environmental Policy (PEP) complies with the following and aims to define the corporate directions of PPA in support of its policy and strategy on environmental protection and preservation in the pursuit of its mandate, to encourage and provide guidance to and where necessary compliance by port stakeholders in adopting environmental protection and preservation while doing business inside the ports, to provide a framework for the formulation and design of capacity-building courses consistent with environmental protection, preservation and management, and to provide the legal basis and effective enforcement of PPA’s programs, projects and activities to implement and sustain the Green, Resilient, and Smart Port Strategy (GRaSPS).

- PD No. 857: Providing for the Reorganization of Port Administration and Operation Functions in the Philippines, Revising Presidential Decree No. 5050 dated July 11, 1974, Creating the Philippine Ports Authority, by Substitution, and for other Purposes
- PD No. 1586: Philippine Environmental Impact Statement System
- RA No. 8749: The Philippine Clean Air Act of 1999
- RA 9275: The Philippine Clean Water Act of 2004
- RA 9003: The Ecological Solid Waste Management Act of 2000
- RA 9279: The Climate Change Act of 2009
- RA 6969: Toxic Substances and Hazardous and Nuclear Waste Control Act of 1990
- Basel Convention on the Control of Transboundary Movement of Hazardous Wastes and Their Disposal
- United Nations Framework Convention on Climate Change (UNFCCC)
- Kyoto Protocol on Emission Reduction Targets



- 2015 Paris Agreement in the Evolution of UN Climate Change Regime
- International Convention for the Prevention of Pollution from Ships (MARPOL)
- Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter
- 1996 London Protocol
- International Convention on Oil Pollution Preparedness, Response and Co-operation of 1990
- Protocol on Preparedness, Response, and Co-operation to Pollution Incidents by Hazardous and Noxious Substances of 2000
- International Convention on the Control of Anti-Fouling Systems on Ships of 2001
- International Convention for the Control and Management of Ship's Ballast Water and Sediments of 2004

GRaSPS Framework hard infrastructure includes waste collection facilities such as sewer lines, drainage lines, waste collection/treatment facilities, and material recovery facilities; while, its soft infrastructure includes governance such as port rules and regulations, business processes and contract management that integrates environmental protection and preservation (Philippine Ports Authority, 2018).

PPA MC No. 19-2020: Collection of Ship Generated Wastes from Cruise and Passenger Ships aims to supplement the guidelines of the PPA in the

collection and disposal of wastes on board ships during Community Quarantine due to the COVID-19 pandemic and to report status of ships, information, type, and quantity of wastes received by SRF Provider.

PPA MC No. 11-2021: Ban on the Use of Unnecessary Single-Use Plastic Products is based on the NSWMC Resolution No. 1363 and is to be applied to all ports and port facilities under PPA, including all offices and establishments inside the ports. Reports on its implementation are to be submitted 30 days after issuance of the resolution and every month after.

PCG Memoranda

The Philippine Coast Guard implements at least four memoranda in safeguarding the Philippines waters from solid waste.

PCG MC No. 02-2005: Prevention of Pollution by Garbage from Ship specifically mandates Philippine registered vessels and small crafts engaged in either domestic or

international trade to abide by the rules in preventing pollution of Philippines waters. It explicitly states that any material made of plastic and any domestic, cargo-associated, maintenance and/or operational waster is considered unlawful to be disposed to any body of water in the Philippines. Vessels are mandated to dispose plastic garbage at respective

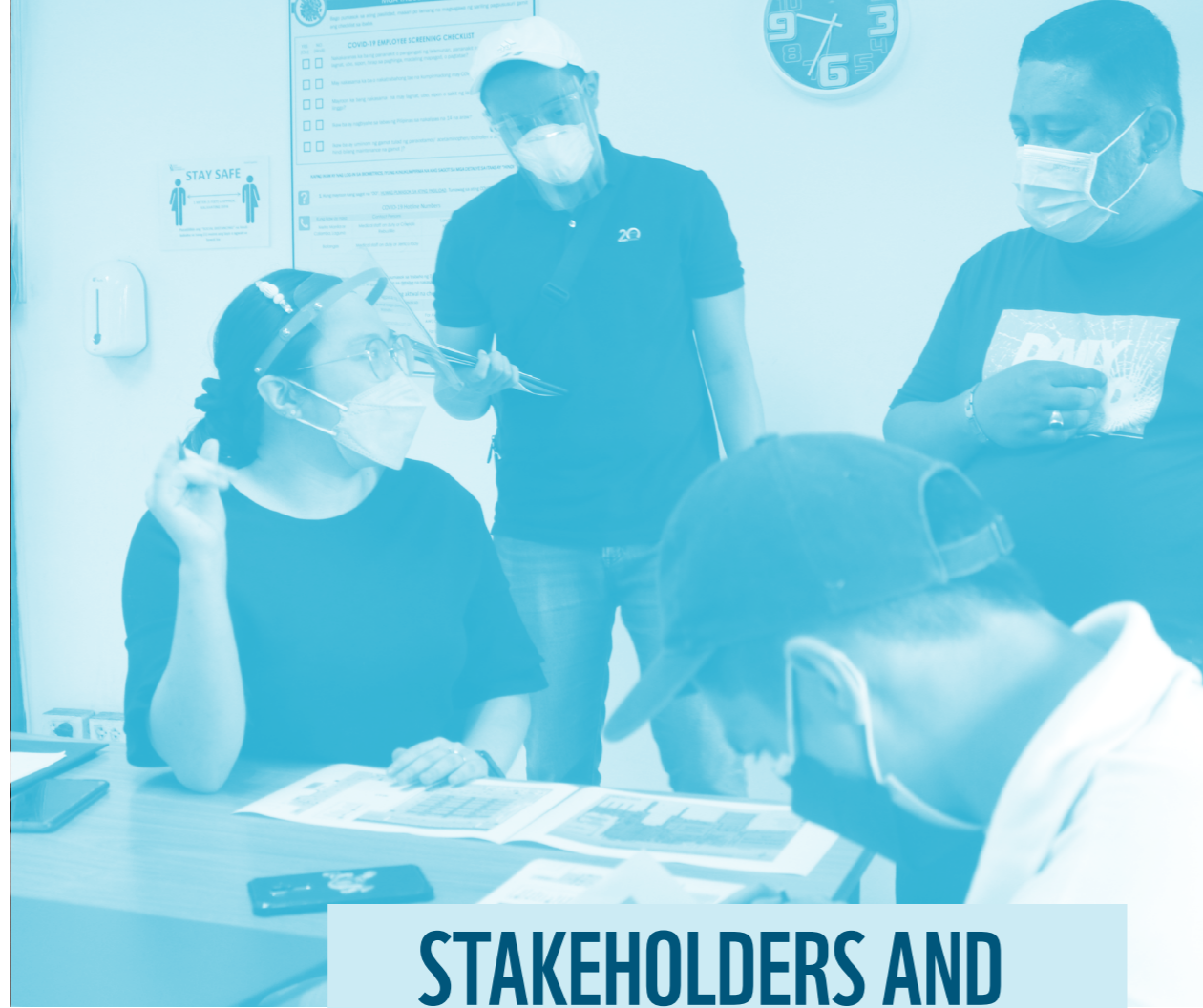
port reception facilities.

PCG MC No. 01-2006: Rule Prohibiting the Dumping and Discharging of Wastes and Other Harmful Matters mandates the procedures and policies for proper dumping of wastes and other harmful materials into Philippines waters to prevent pollution. It covers offshore plants, ships, and any entity that is a source of marine pollution. The list of materials that is prohibited from being dumped found in Annex I of the memorandum is the same as those listed in the London Convention and Protocol.

PCG MC No. 02-2006: Marine Pollution Inspection/Apprehension Report is to prescribe the policies and procedure implementing the provisions of MARPOL and PCG rules and regulations. Commanders, marine environmental protection command, and coast guard district/station are made in charge of the inspection and apprehension of persons and entities causing marine pollution.

PCG MC No. 07-2014: Prevention of Pollution from Garbage aims to provide rules and regulations to prevent pollution from garbage within the Philippine maritime jurisdiction and to prescribe fines and penalties. Under this memorandum, it is unlawful for any person to dispose into any Philippine waterbody any material made of plastic and any domestic, cargo-associated, maintenance, and/or operational wastes. Any person found violating the policies and requirements of the circular are liable to pay the administrative fine of Php 50,000.00 without prejudice to civil and/or criminal action/s which the PCG may file against the violated whenever warranted.





STAKEHOLDERS AND WASTE VALUE CHAIN

The solid waste management at the PPA-listed ports involves various primary and secondary stakeholders in its system (Figure 12). Primary stakeholders for the case of PPA-listed ports are the ones directly involved in the waste value chain (Figure 11); while, the secondary stakeholders are those involved in policy-making (Section III).

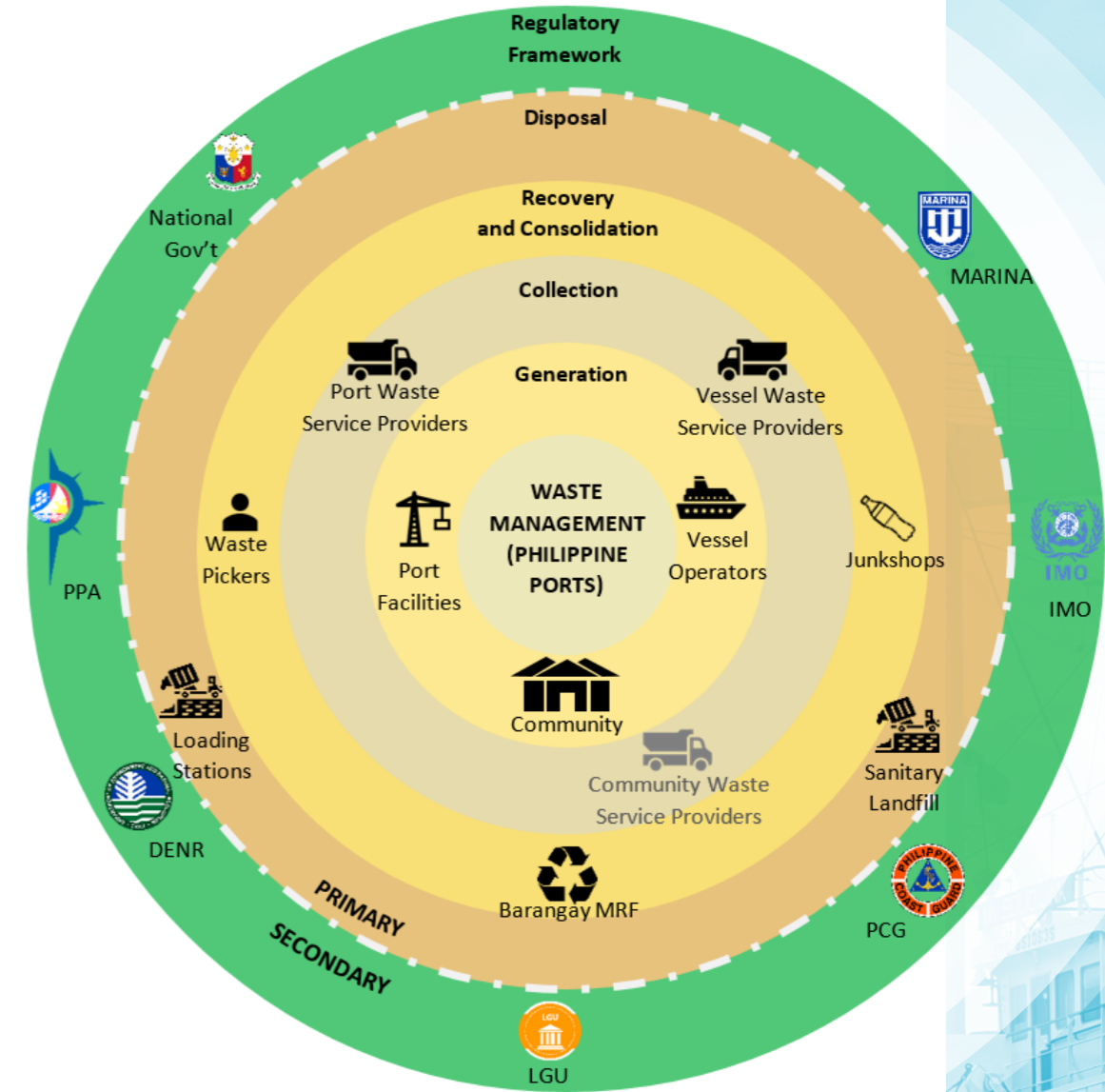


Figure 12. Waste Management System and the Involved Stakeholders in PPA-Listed Ports

Primary Stakeholders

The primary stakeholders of the PPA-listed ports in the Philippines include generators, collectors, recovery and consolidators, and landfill operators/residuals processor.

Generators

The waste generators¹⁴ at PPA-listed ports include the port facilities/operators, vessel operators/shipping lines, the communities found adjacent and/or inside the port as in the case of the Manila North Harbor, and other land-based sources.

¹⁴ Waste generation refers to the total municipal solid waste (MSW) generated by the population and their economic activities within the defined system boundary (UN Habitat, 2021).

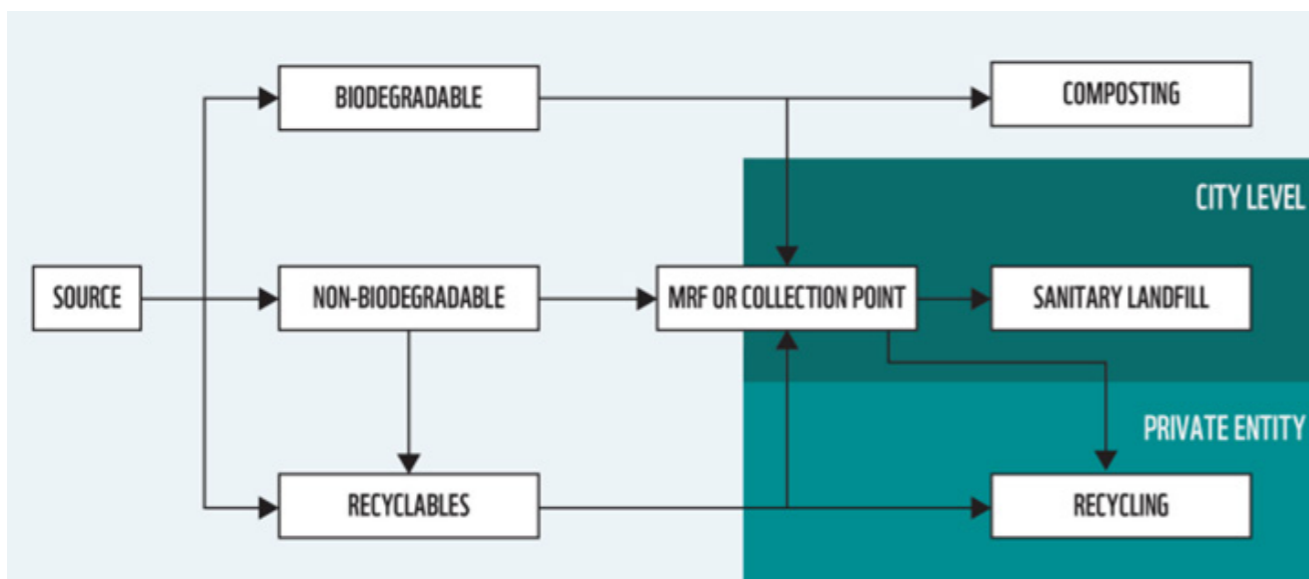


Figure 11. City Level Solid Waste Management (WWF Philippines, 2020)

Manila North Harbor is adjacent to two barangays: Barangay 20 – where Isla Putting Bato is part of – and Barangay 275. A portion of Barangay 29 (Figure 13) is also located inside the Manila North Harbor Port Incorporated (MNHPI) Port Facility (AMH Philippines, Inc., 2021).

Land-based sources contribute wastes to the ports through the drainage lines with outfalls located at the ports or through creeks, canals, and/or rivers with mouths at the vicinity of the port area such as in the case of the Port of Cagayan de Oro and its adjacent Bitan-ag Creek. Wastes dumped and/

or leaked towards the creek eventually end up to the premises of the Port of Cagayan de Oro. For Manila North Harbor, solid wastes from Barangay 29 end up at the storm drains within the port area (AMH Philippines, Inc., 2021).

The generators, generally, conduct waste segregation at source. Port operators and/or managements usually utilize color-coded bins such as in the case of the Port of Batangas (Figure 14), Port of Cagayan de Oro (Figure 15), and Manila North Harbor (Figure 16). Infographics may come with the bins.



Figure 13. Barangay 29 Compound within Manila North Harbor last October 21, 2021 (AMH Philippines, Inc., 2021)



Figure 14. Color-Coded Waste Segregation Bins at the Passenger Terminal 3 of the Port of Batangas last September 24, 2021 (AMH Philippines, Inc., 2021)



Figure 15. Color-Coded Waste Segregation Bins at the Transit Shed 2 of the Port of Cagayan de Oro last September 24, 2021 (AMH Philippines, Inc., 2021)



Figure 16. Color-Coded Waste Segregation Bins at Operations Center 1 of Manila North Harbor last October 20, 2021 (AMH Philippines, Inc., 2021)

Vessels are also expected to segregate their wastes¹⁵ in accordance to MAPROL provisions and in accordance to the protocols of the port reception facilities and/or solid waste collectors. Shore reception facility¹⁶ (SRF) checkers may assist in bringing the wastes out from the vessels and document the volume of vessel waste disposed using the Waste

¹⁵ Waste segregation is separating waste into specific categories, usually biodegradable and non-biodegradable, to utilize waste categories that can still be recycled or used for compost (NSWMC, 2016).

¹⁶ Shore Reception Facility (SRF) refers to a physical system ashore or afloat used for receiving discharges of oily wastes, noxious liquid substance, and waste from vessels (Philippine Ports Authority, 2021).

On-Board Vessel Information Forms (WOBVIFs)¹⁷ such as in the case at the Port of Batangas and Port of Cagayan de Oro (AMH Philippines, Inc., 2021). There are cases – specifically, for ports with communities, however, wherein segregation is not fully implemented due to certain limitations. In the case of the Manila North Harbor, the

communities are informal settlers with limited space, or no space at all, for storing segregated wastes to be collected by the LGU later – during the scheduled pick up of wastes. The households would therefore dump their wastes at an open space within their barangay.

Collectors

Collection¹⁸ of port wastes starts from the collection bins located strategically within the port area. Collectors of port wastes – port- and vessel-generated wastes – are taken care by the port operator-contracted service providers. Separate waste service providers may be available for the port- and vessel-generated wastes such as in the case of the Port of Batangas, of the Port of Cagayan de Oro, and of Manila North Harbor. Communities, if present within the port premises, are more likely served by the municipal solid waste collector

of the LGU such as in the case of the Manila North Harbor with Leonel Waste Management (Leonel). Wastes are generally brought to designated collection points within the port premises prior to collection which is based on a specific schedule such as in the case of of the Port of Batangas, of the Port of Cagayan de Oro, and of Manila North Harbor.

Compactor trucks (Figure 17) and dump trucks (Figure 18) may be used to collect wastes within the port area.



Figure 17. Compactor Truck of WasteCon used for Port Waste Collection at the Port of Batangas last September 25, 2021 (AMH Philippines, Inc., 2021)

¹⁷ WOBVIF is a form filled up by the shipping agent of any vessel upon docking at a port and disembarkment of its wastes and is submitted to the SRF (Philippine Ports Authority, 2020).
¹⁸ Collection refers to the amount of MSW generated that is moved from the point of generation, such as specific addresses or designated collection points, to facilities where the waste is recovered or disposed, regardless of collection modality (UN Habitat, 2021).



Figure 18. Waste Collection Truck for Pier 10 at Manila North Harbor last October 21, 2021 (AMH Philippines, Inc., 2021)

It will also be typical to find the wastes manually loaded from the collection points.

Recovery and Consolidation

Not all ports have its own material recovery facility¹⁹ (MRF) such as in the case of Manila North Harbor. Recyclable wastes may be recovered informally by janitors or formally by the waste service providers, which will be brought to the nearest barangay MRF and/or junk shops. Unfortunately, not all barangays are equipped with a properly functioning MRF or, worse, not equipped at all such as in the case of Barangay 20 at the Manila North Harbor (AMH Philippines, Inc., 2021).

There are also instances wherein the port has a designated MRF; but, the MRF is used more as a receptacle of wastes and not as a recovery facility where sorting, segregation, and utilization of wastes are being done like in the case of the facility tagged within the Port of Batangas (Figure 19 and Figure 20) as an MRF (AMH Philippines, Inc., 2021).

¹⁹ Waste recovery means any operation the principal result of which is waste serving a useful purpose by replacing other materials which would otherwise have been used to fulfil a particular function, or waste being prepared to fulfill that function, in the facility or in the wider economy (UN Habitat, 2021).



Figure 19. Passenger Terminal Collection Point Tagged as a Materials Recovery Facility at the Port of Batangas as of last September 24, 2021



Figure 20. Passenger Terminal Collection Point Tagged as a Materials Recovery Facility at the Port of Batangas as of last September 25, 2021

Disposal Facilities

The residual wastes from the ports are supposed to be disposed ultimately to sanitary landfills including the face masks and face shields currently being used to mitigate the spread of COVID 19. These face masks and face

shields, however, should be treated as healthcare wastes (Department of Environment and Natural Resources, 2021). The distance of sanitary landfills from ports varies (Figure 21).

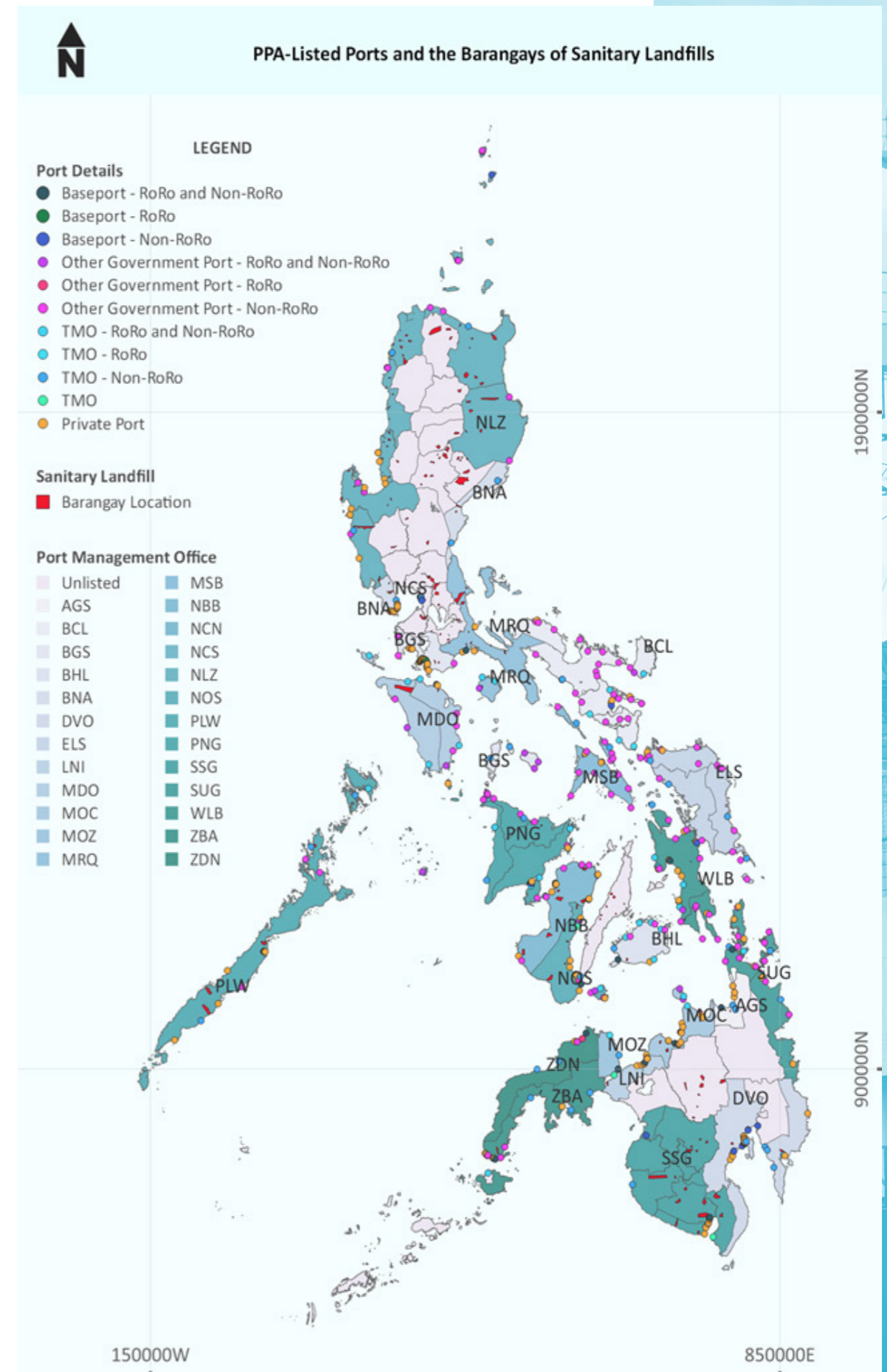


Figure 21. PPA-Listed Ports and the Barangays of Sanitary Landfills (Philippine Ports Authority; NAMRIA, 2020)

Secondary Stakeholders

The whole system of solid and plastic waste management in PPA-listed ports is governed by laws, policies, regulations, and ordinances implemented by various institutions (Section III) including those set by the International Maritime Organization (IMO) and by the local government unit (LGU) where the port is located. IMO is a specialized agency of the United Nations that imposes measures to improve the safety and security of international shipping and to prevent pollution from ships (International Maritime Organization, 2019).

In the Philippines, the administration, financing, operations, and maintenance of the ports is handled by the Philippine Ports Authority (PPA), which is under the Department of Transportation and Communication (DOTC), as mandated by the Presidential Decree No. 505 and Executive Order No. 159 (Philippine Ports Authority, 2021); while the management of wastes in the ports, such that port-related and vessel-related activities do not heavily impact the surrounding marine ecosystem, is being handled by the Department of Environment and Natural Resources (DENR). DENR is responsible for the

conservation, management, and development of the environment and natural resources of the country within the framework of sustainable development (Department of Budget and Management, 2007). MARINA, another agency under the Department of Transportation (DOTr), is responsible for integrating development, promotion, and regulation of the maritime industry in the country and is mandated to ensure the safety and integrity of the vessels and enforce compliance with safety standard and other regulations (Maritime Industry Authority, 2006). MARINA also assists the national government in terms of the plastic waste management system by enforcing compliance of the ports with safety standard and other regulations – including the policies in handling vessel-generated wastes. Philippine Coast Guard (PCG), a national government body, enforces maritime law, maritime safety, marine environmental protection, and maritime security in addition to maritime search and rescue operations (Philippine Coast Guard, 2020).

The Philippine Navy, PCG, Philippine National Police Maritime Group (PNP-MG), Bureau of Customs (BOC) of the Department of Finance (DOF), and Bureau of Fisheries and Aquatic Resources (BFAR) of the Department of Agriculture are among the agencies to support the National Coast Watch Center that shall implement the inter-agency strategies and policies (Section III.B) related to maritime concerns (Department of Environment and Natural Resources, 2021).

All stakeholders and sectors are enjoined to implement, influence, support, and monitor the implementation and achievement of the goals of the NPOA-ML (Section III.B). DENR serves as the overall lead and EMB as the secretariat support – both providing oversight and steering to various stakeholders for the programmatic cluster of actions and enabling/cross-cutting cluster of actions. Other non-government agencies (NGAs), the private sector, non-government organizations (NGOs), civil society organizations (CSOs), the academe and research institutions, local communities – including the youth, and development organizations are to provide support to implementation and technical inputs (Figure 22).

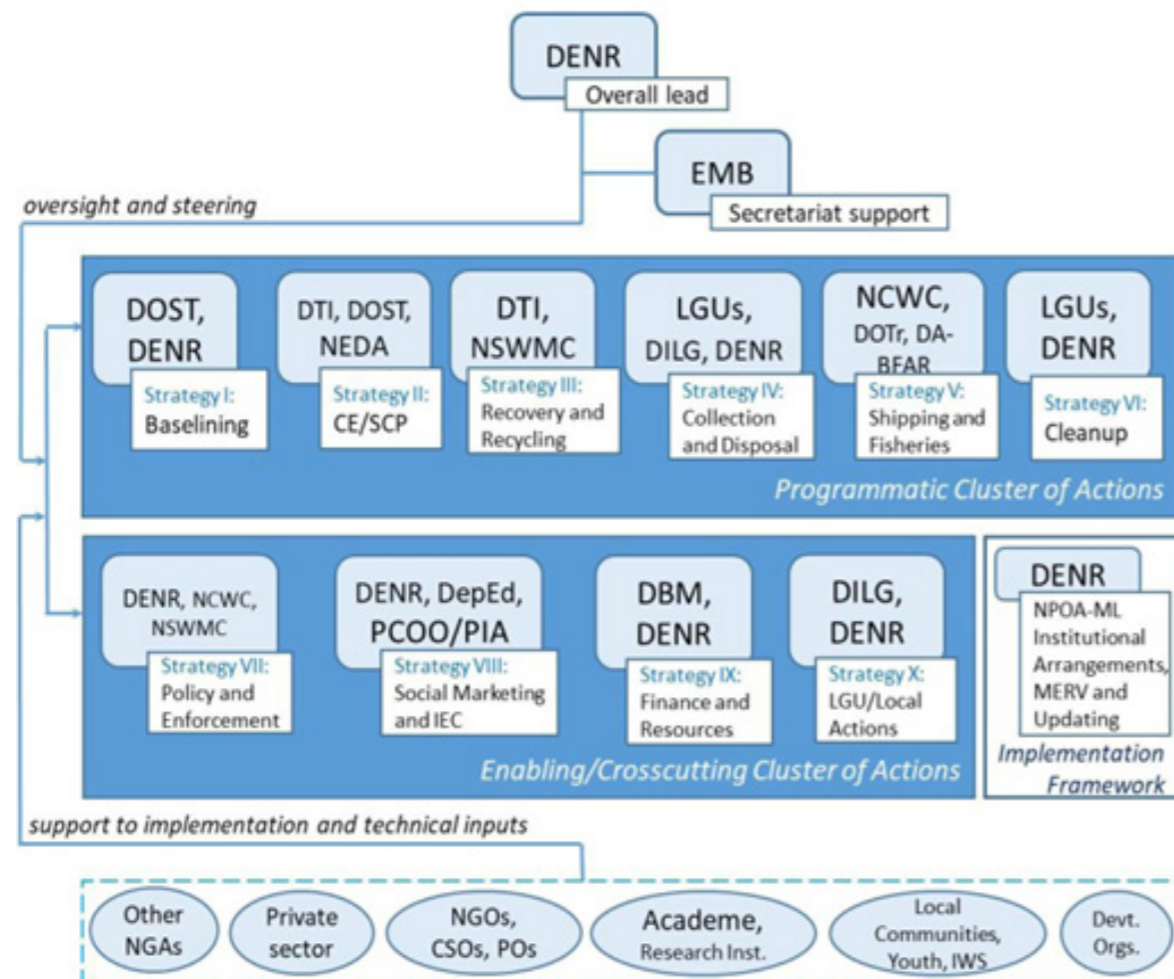


Figure 22. National Marine Litter Prevention, Reduction and Management Council or Convergence Forum (Department of Environment and Natural Resources, 2021)



Cost Recovery System

The funds for SWM in the Philippines come from the general budgetary appropriations, external sources, cost-recovery of SWM-related activities, and the national solid waste management fund (NSWMF). The budgetary appropriations include locally generated taxes, fees and charges, internal review allotment, and other income to which the LGUs are entitled. The external sources include countryside development funds (CDFs), credit finance instruments, local and foreign-funded loans and grants, and private sector participation (DENR and ADB, 2003). The costs recovery for the SWM in the Philippines, including the ports, is dependent on the collection of waste fees and imposition of fines for violations (Section III.B to Section III.D) and generally adheres to the “polluter pays” principle, which allows

the government to require all waste generators to pay for the full costs of waste management services (DENR and ADB, 2003).

In 2001, the waste-related fees in Metro Manila are around 1.49% of the local income of the LGUs; while, the SWM-related expenses are at 12.95% of the total expenditures (Table 7). Waste fees are from the business sector although some first-class subdivisions and villages incorporate waste fees in the association annual dues. The waste fees from the subdivisions and villages are generally for their waste handling especially when they are the ones responsible for waste collection. With these, LGUs in Metro Manila are not recovering the full cost of waste collection service (DENR and ADB, 2003; Figure 23).

Table 7. 2001 Income and Expenditures of LGUs in Metro Manila (DENR and ADB, 2003)

LGU	Waste Fees ^a	Local Income ^b	SWM Expenses ^c	Total Expenses ^d
Caloocan	20,714.00	657,435.00	42,716.00	1,491,883.00
Las Piñas	12,820.00	414,004.00	22,067.00	4,467,316.00
Malabon	3,777.00	136,081.00	76,361.00	1,219,353.00
Valenzuela	10,427.00	429,423.00	2,988.00	292,386.00
Quezon City	56,107.00	2,368,986.00	52,804.00	1,358,644.00
Manila	57,589.00	2,815,984.00	574,990.00	4,558,818.00
Navotas	1,850.00	94,290.00	52,370.00	432,394.00
Pateros	406.00	2,251.00	94,123.00	430,373.00
Marikina	7,053.00	460,673.00	91,377.00	850,009.00
Taguig	4,040.00	275,560.00	160,458.00	1,814,072.00
Muntinlupa	7,012.00	491,287.00	46,701.00	1,059,651.00
San Juan	3,137.00	292,276.00	941,828.00	1,129,801.00

LGU	Waste Fees ^a	Local Income ^b	SWM Expenses ^c	Total Expenses ^d
Mandaluyong	7,247.00	730,947.00	357,077.00	5,270,998.00
Pasay	5,473.00	609,778.00	43,974.00	778,475.00
Pasig	11,414.00	1,519,402.00	418,577.00	348,800.00
Makati	13,835.00	3,187,442.00	243,807.00	734,606.00
Parañaque	3,114.00	730,607.00	182,893.00	62,186.00

NOTES:

- a) Total waste fees collected from business establishments
- b) Local income includes taxes, fees, and charges collected by the LGU and excludes IRA, borrowings, and grants
- c) Total expenses for SWM
- d) Total current year expenses for LGU



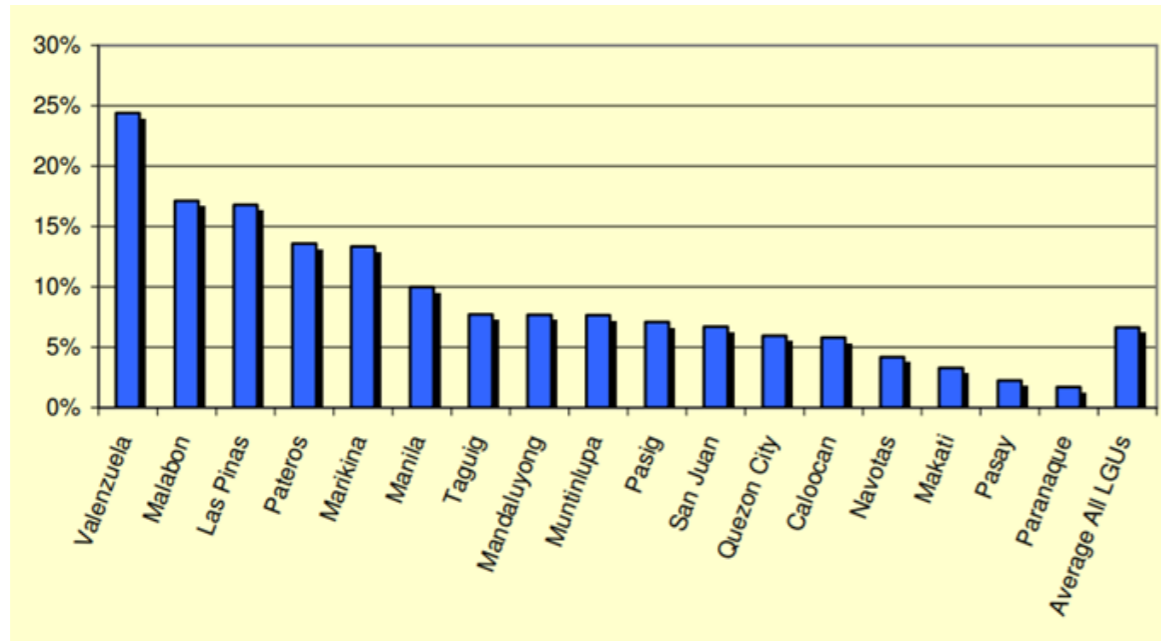


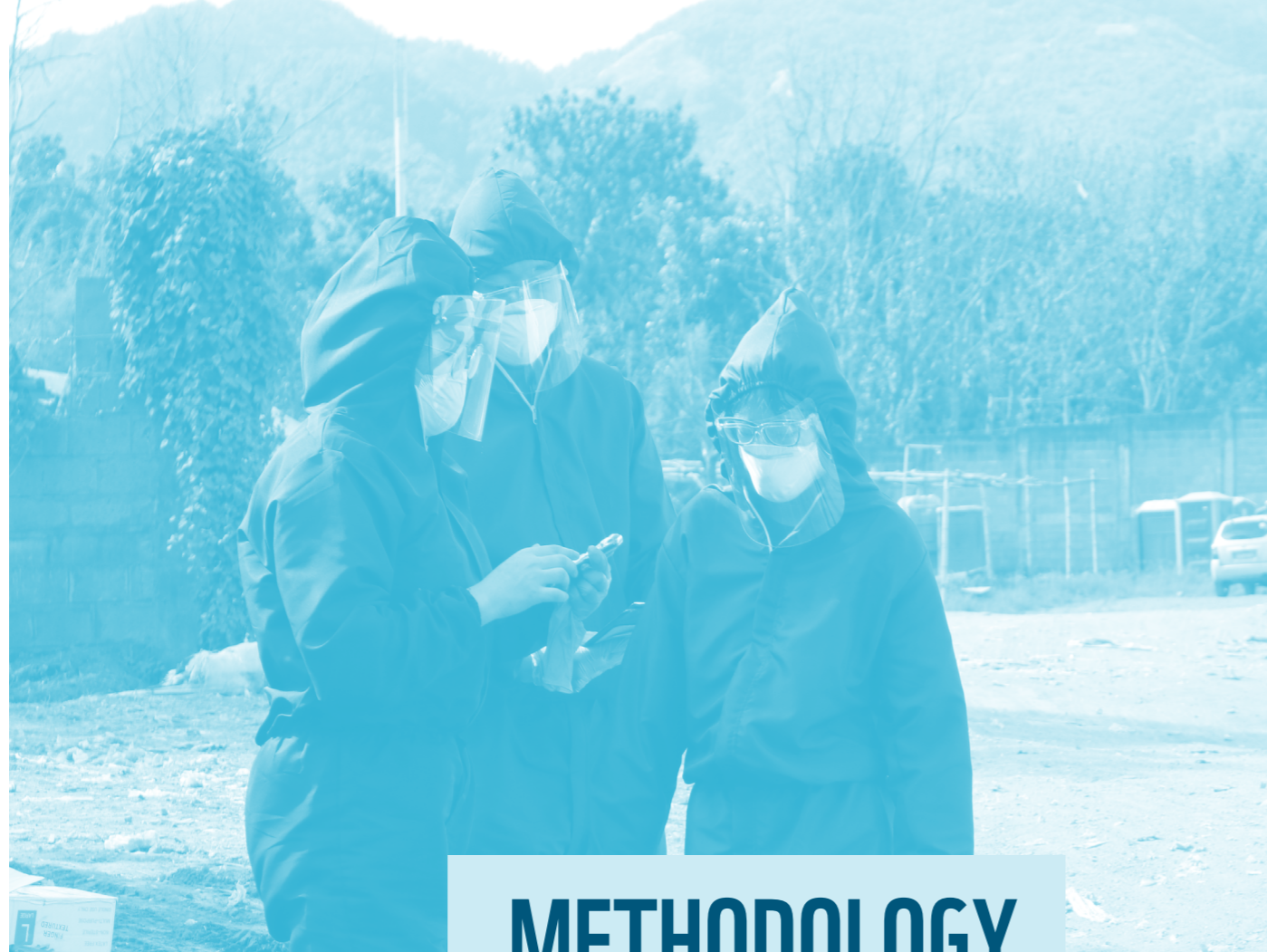
Figure 23. 2001 SWM Cost Recovery Rate in Metro Manila and Other LGUs of the Philippines (DENR and ADB, 2003)

The lower SWM-related cost recovery rate in the Philippines leads to less investment costs for the needed facilities and infrastructure (Section IV.A) and, ultimately, to the poor management of solid and plastic wastes in the country which can highly affect the marine environment. In terms of the disposal facilities, fully engineered, integrated sanitary landfill service has lower service cost per ton of solid waste when the volume of solid waste managed is larger. This makes having larger

facilities make more sense than many small ones and ultimately leads to the option of having clustering²⁰ to enable small LGUs attain the large solid waste volumes needed for cost efficiency. The high transaction costs associated with negotiations to locate an LGU willing to host a disposal facility and the “not-in -my backyard” (NIMBY) attitude, however, are among the constraints for this scheme (NEDA, NSWMC, International Bank for Reconstruction and Development, 2008).

¹⁹ Waste recovery means any operation the principal result of which is waste serving a useful purpose by replacing other materials which would otherwise have been used to fulfil a particular function, or waste being prepared to fulfill that function, in the facility or in the wider economy (UN Habitat, 2021).





METHODOLOGY

The national baseline study considered the results of the conducted baseline assessments of three select PPA-managed ports – Port of Batangas, Port of Cagayan de Oro, and Manila North Harbor. It also considered solid waste management system reports provided by PPA for the first semester of 2018 to the second semester of 2020 for all the ports under their authority (Figure 24).

The selection of select ports were done by WWF-Philippines together with WWF-Norway and Grieg Group (Grieg). Secondary data collection and literature review were then conducted prior to the conduct of waste characterization and analysis study (WACS) of port, vessel, and/or community related wastes at the select ports. Leakage factors were assessed during the observation of the waste management system of

the select ports. Perception surveys – including interviews with stakeholders (Annex A) – were also conducted. The WACS results, along with the leakage factors assessment and stakeholder interactions, were then used to assess the waste value chain of each select ports, which led to sets of recommendations the related agencies may adapt.

Additional data were gathered, reviewed, and processed to augment the results of the select ports studies and to calculate projections of waste generation at a national level. The results were then processed into maps using GIS to better illustrate the current national baseline of PPA-listed ports when it comes to solid waste management. Recommendations were made accordingly following the observed current practices.

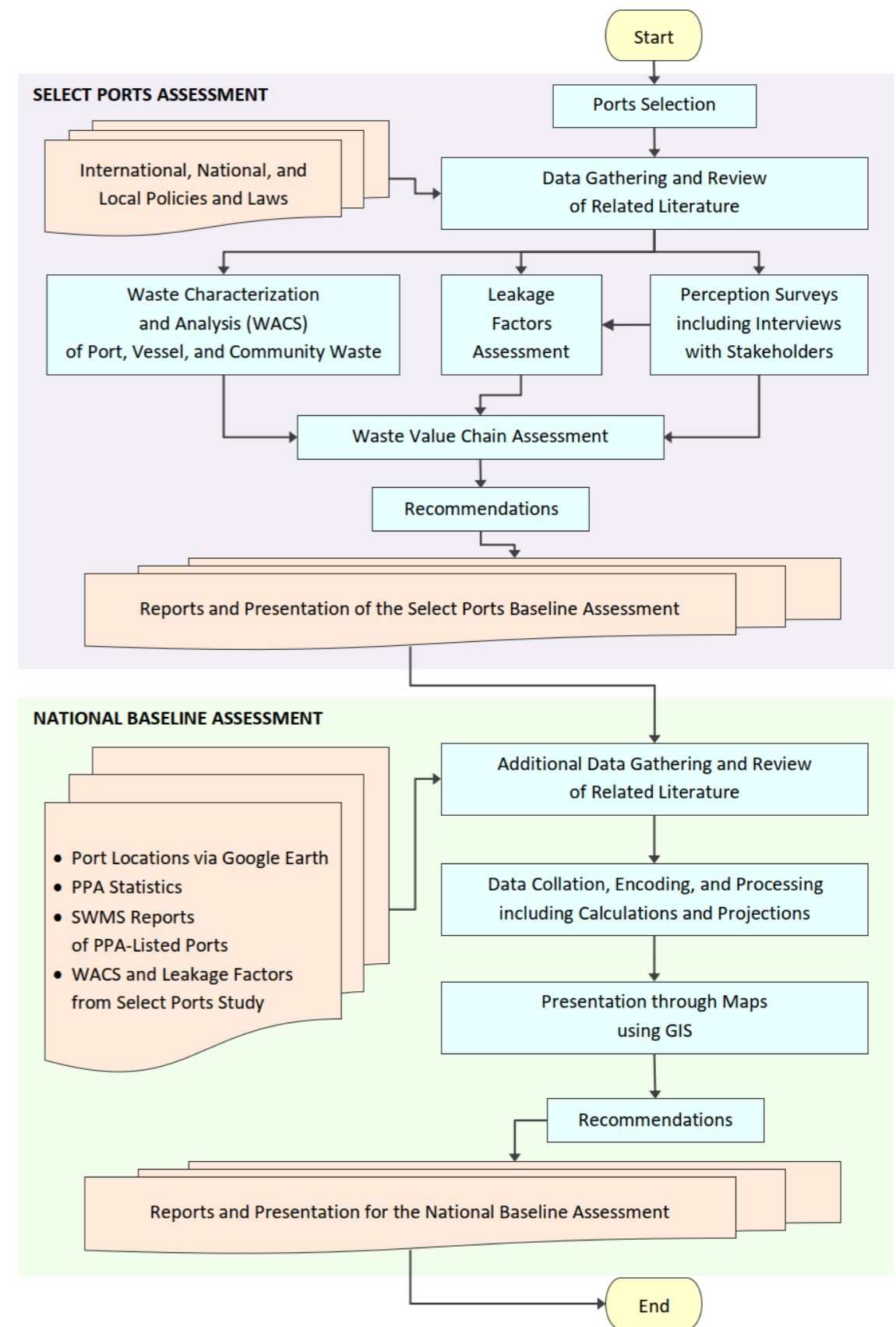


Figure 24. Select Ports Baseline Assessment and National Baseline Assessment Methodology



WASTE ANALYSIS AND CHARACTERIZATION STUDY (WACS) RESULTS

The amount of solid wastes leaked to the environment is affected by the level of the collection services, during transportation of wastes, at the disposal facilities, and at the storm drains.

The results of the select ports baseline study showed that with these factors considered, the port-generated and vessel-generated wastes from the Port of Batangas, Port of Cagayan de Oro, and Manila North Harbor significantly contributed leaked wastes to the water environment at 15,722.36 kg per year and to the terrestrial environment at 11,164.35 kg/year in 2021 even with the decreased

shipcalls, container traffic, passenger traffic, and RoRo Traffic due to the effects of the restrictions brought about by the pandemic (Section II). The three ports contributed 2.87% of the total wastes generated from all ports in 2021 with the Port of Batangas contributing most of the totals from the three select ports of study (Table 8 and Section VII and Section VIII).

Table 8. Leaked Solid Wastes Weights to the Environment at the Select Ports of Study (AMH Philippines, Inc., 2021)

Port	2021 Leaked Solid Waste Weight to the Water Environment (kg/year)	2021 Leaked Solid Waste Weight to the Terrestrial Environment (kg/year)	2021 Total Leaked Solid Wastes to the Environment (kg/year)	2019 Leaked Solid Waste Weight to the Water Environment (kg/year)	2019 Leaked Solid Waste Weight to the Terrestrial Environment (kg/year)	2019 Total Leaked Solid Wastes to the Environment (kg/year)
Batangas	9,639.00	7,701.00	17,340.00	26,854.00	21,455.00	48,309.00
CDO	361.00	642.00	1,003.00	982.00	1,745.00	2,727.00
Manila North Port (without community)	5,722.36	2,821.35	8,543.71	6,288.40	5,743.86	12,032.26
Total	15,722.36	11,164.35	26,886.71	34,124.40	28,943.86	63,068.26

Specific details per port of study can be accessed through the reports submitted per port.

Port of Batangas

The Port of Batangas generates waste from port facilities and offices, and vessels. The waste from port facilities and offices are brought into the designated collection points within the port area at the Passenger Terminal, Batangas Container Terminal, and Old Administration Building. The Passenger Terminal Collection Point collects the waste generated by the three passenger terminals and its respective offices and establishments. The Batangas Container Terminal Collection Point caters the wastes generated in Phase 2 and the container yard. The Old Administration Building Collection Point collects the wastes from the offices in the building. The port-generated wastes are collected by WasteCon Inc. (WasteCon).

Vessel waste unloaded at the port come from domestic and foreign vessels of passenger, RoRo, and container vessel types. The vessel-generated wastes of Port of Batangas are collected by iPrudential.



Waste Flow Diagram

During the COVID-19 pandemic in 2021, the projected waste generation at the Port of Batangas is at 539,160 kg (Figure 25). 59% of these wastes are generated from vessels while the remaining 41% are from port facilities.

All generated wastes are collected by the compactor and dump trucks based on the conducted interviews, site visit, and tailgating activity. The observed leakages during the collection and transportation of waste to the disposal site, however, resulted to the decrease of waste managed at the disposal site to about 536,186.5 kg. Only 521,483.5 kg of this are disposed by WasteCon to the landfill every

year (Figure 25). Higher leakage rate in the disposal area were due to the presence of a water body near the landfill site which makes it prone to flooding.

Generated waste per year in a pre-covid scenario is around 1,423,283 kg wherein 71% of the wastes comes from the vessels and the remaining 29% from the port facilities. Like the current solid waste management system, majority of the generated waste are collected, transported, and directly disposed to the landfill. 1,374,038.2 kg of wastes are landfilled (Figure 26).

Observations

PMO Batangas has existing policies on minimizing the use of single-use plastic bags in the ports, especially with food and dry goods vendors in passenger terminals. Asian Terminals, Inc. (ATI), the Port of Batangas operator, also has waste segregation bins with infographics distributed around the port. Most wastes are also contained in garbage bags when being brought to the collection points, which helps reduce the amount of waste that can leak from the collection points. The collection points are properly fenced and the area where waste can be placed is defined; but, can still be improved with the addition of divisions for segregating the waste brought to these points. The use of color-coded trash bags at the segregation bins can help ensure that segregation is maintained at the collection point. The inclusion of a formal recovery system for port-generated waste, however, is needed to help divert

recyclables and biodegradable wastes from the disposal site.

Vessel waste collection is facilitated by personnel wearing proper protective equipment and collection bins are disinfected before and after waste collection. The area around vessel waste receptacles is generally clean during the site visit. iPrudential checks the vessel waste service provider, records unloaded vessel waste through the WOBVIFs. The amount of waste recorded in the WOBVIFs, however, lacks accuracy and can be improved by measuring waste per vessel in terms of weight rather than volume.

Both port- and vessel-generated waste are disposed at the WasteCon Landfill, which can still be further improved with better fencing, supplying waste pickers with PPEs, and procurement of compactors.



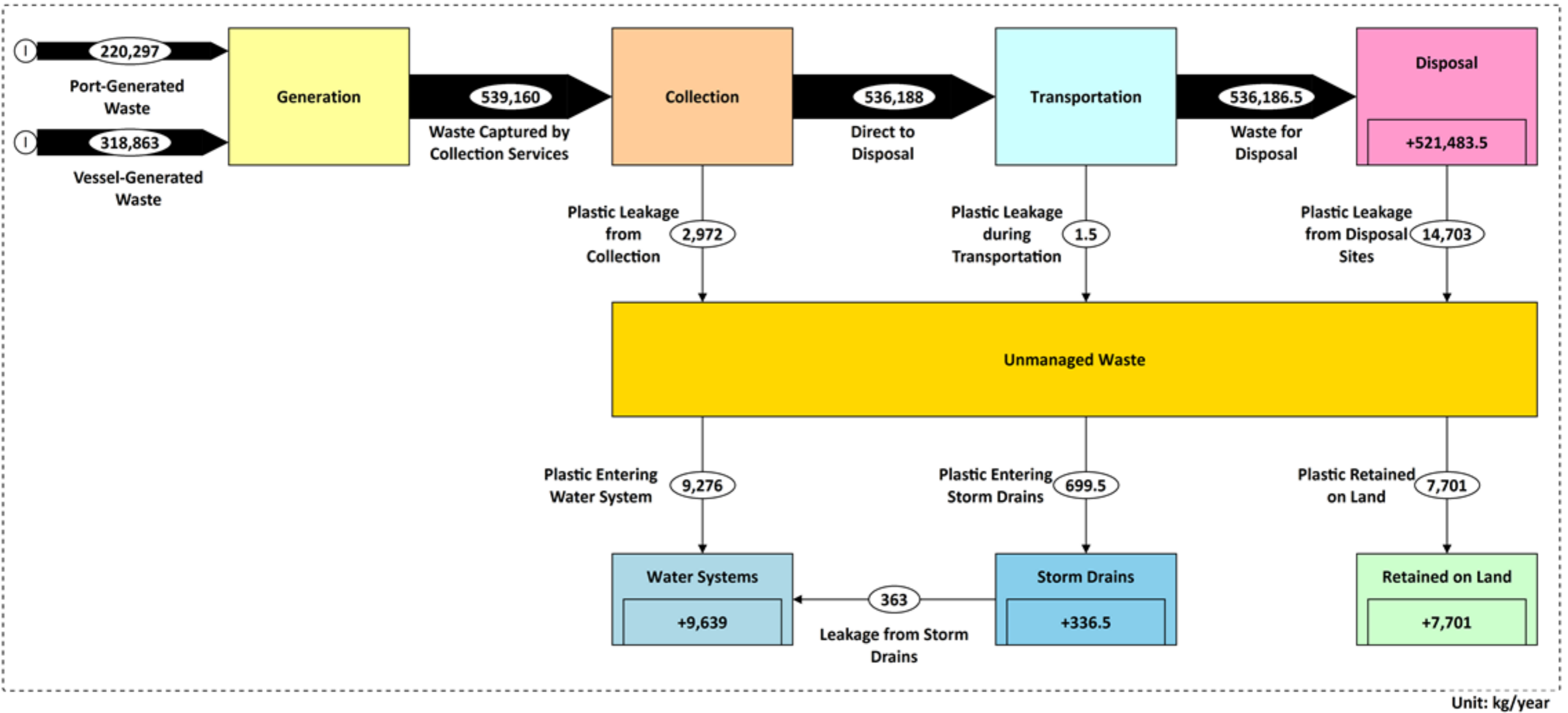


Figure 25. 2021 Solid Waste Flow Diagram for Port of Batangas (AMH Philippines, Inc., 2021)

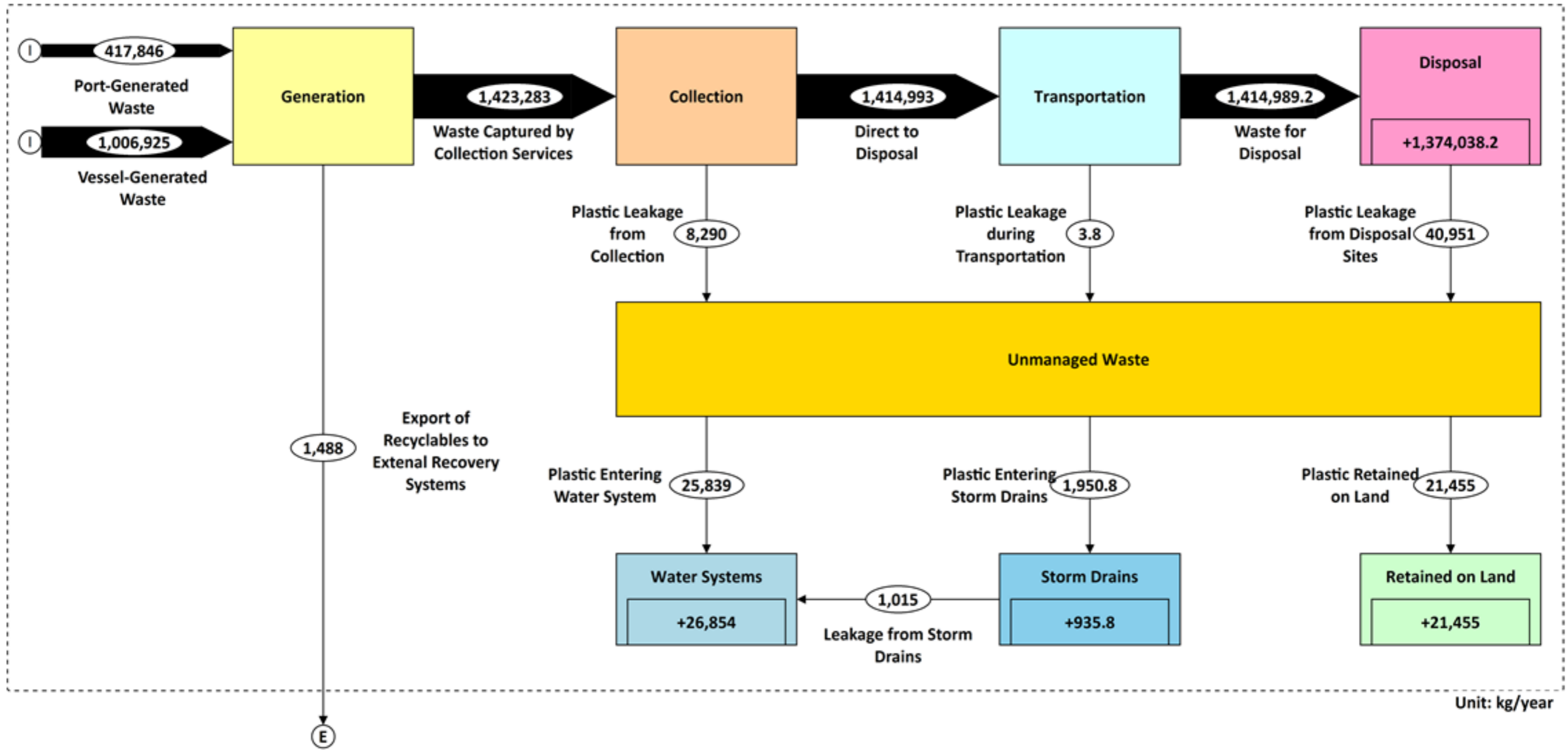


Figure 26. Pre-COVID Solid Waste Flow Diagram of the Port of Batangas (AMH Philippines, Inc., 2021)

Port of Cagayan de Oro

The generated wastes at the Port of Cagayan de Oro comes from port operations and docking vessels. Waste at the port come from the Administration Building/Building 1, cargo facility/Building 2, passenger terminal complex, and Oro Port facilities. The administration building and cargo facility include administrative and operations offices. The passengers and food vendors contribute wastes to the passenger terminal buildings. The Oro Port facilities include the container yard and crane operations.

Vessel waste unloaded at the port come from domestic and foreign vessels of passenger, RoRo, container, and liquid bulk vessel types.

Vessel-generated wastes and wastes from Building 1 and Building 2, PPA office, and passenger terminal complex are collected by Far East Fuel Corporation (Far East). All other port-generated wastes are collected by Oro Port Cargo Handling Services Inc. (Oro Port).

2018 that sets guidelines for vessel waste segregation. WOBVIFs are also utilized in recording the unloaded waste per vessel. This, however, can still be improved by recording unloaded waste in terms of weight rather than volume. Recording the vessel waste weight with a weighing scale provides data more reliable than estimated volume. The dump truck that collects vessel wastes are also covered, which can be a point of improvement for the port waste collection truck.

Both port- and vessel-generated wastes pass through two different sorting areas for waste recovery. Port-generated waste recovery is conducted in a sorting area inside the port; which can be further improved through proper fencing, roofing, and divisions for segregated waste containment. Vessel-generated waste recovery is done in Pontillas Junkyard, which can still improve in its waste recovery process since waste recovery is currently done via waste pickers climbing into dump trucks to manually pick out recyclables.

Waste Flow Diagram

During the COVID-19 pandemic in 2021, 360,293 kg of wastes is projected to be generated (Figure 27). 81% of these wastes are generated from port facilities while the remaining 19% are from vessels.

All generated wastes are collected by the service providers based on interviews, site visit, and tailgating activity. Leakages, however, were observed during the collection of both port and vessel-generated waste resulting to the decrease of waste of about 359,919 kg being transported to the MRFs. About 48,092 kg or 13% of the waste are recovered in the MRFs and 311,138 kg of waste are disposed in the EcoWaste Landfill

every year. There is no waste recovery before disposal, hence, most of the biodegradable and residual waste that are collected are transported to the landfill (Figure 27).

Pre-pandemic secondary data showed that the generated waste per year in a pre-covid scenario is around 901,820 kg wherein 72% of the wastes comes from the port facilities and the remaining 28% from the vessels. Like the current solid waste management system, majority of the generated waste were collected, transported, and directly disposed to the landfill. 771,320 kg of wastes were landfilled (Figure 28).

Observations

The Port of Cagayan de Oro implements mandates on usage of single-use plastics in its port operations with the reporting of solid waste generation accomplished regularly. Color-coded waste segregation bins with infographics are also available in multiple locations in the port. Most wastes in collection

bins are contained in garbage bags and disinfection of collection bins is done before and after collection of waste.

Vessel waste collected are mostly in garbage bags. There is also the existence of PPA-PMO Operations Memorandum Circular No. 018-



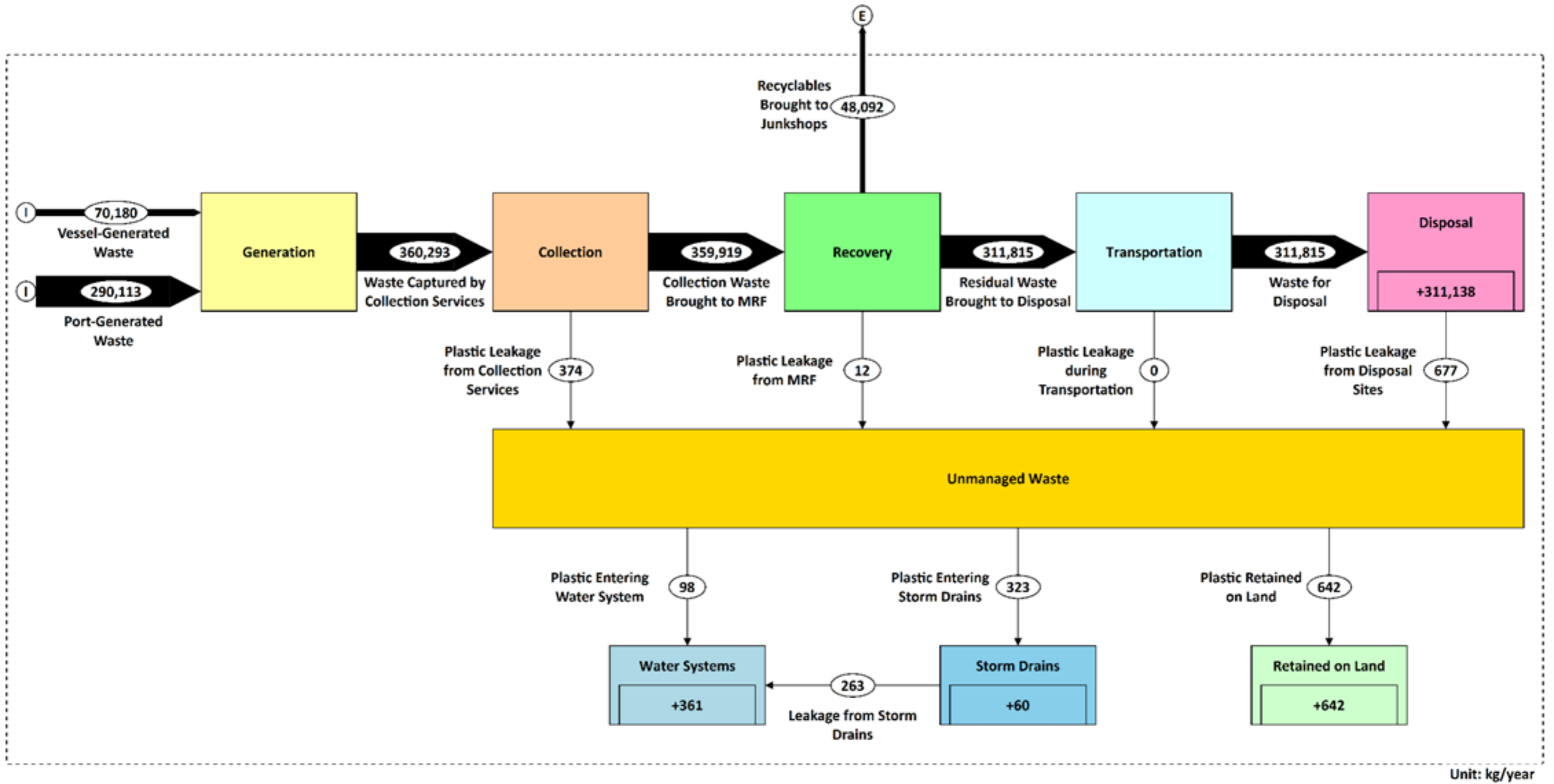


Figure 27. 2021 Solid Waste Flow Diagram for the Port of Cagayan de Oro (AMH Philippines, Inc., 2021)

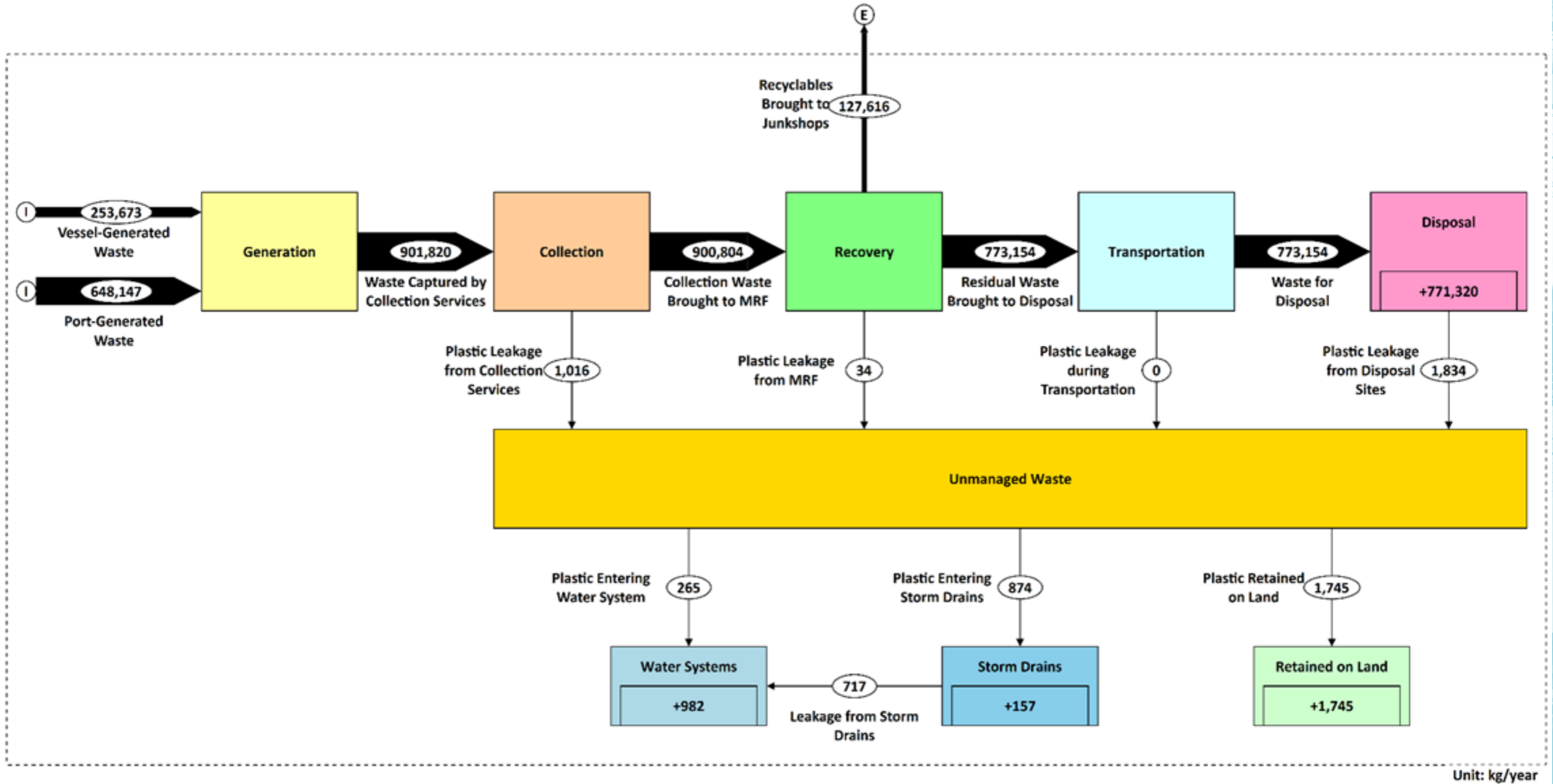


Figure 28. Pre-COVID Solid Waste Flow Diagram for the Port of Cagayan de Oro (AMH Philippines, Inc., 2021)

Manila North Port

Manila North Harbor considers the port facilities, vessels, and communities in its vicinity as waste generating sources. The port-generated waste of Manila North Harbor comes from the operation of the different facilities and offices of the port, including a passenger terminal, two operations centers, container yard, multiple pier yards, and government offices. The service provider for port-generated waste is Cleanenvironment Waste Management

Services Inc (Cleanenvironment). The vessel waste is generated by domestic passenger and container vessels, but, since the start of the Covid-19 pandemic, vessels have not been allowed to unload waste at Manila North Harbor. Vessel-generated waste were handled by iPrudential Stevedoring and Port Services Inc. (iPrudential). Community-generated waste are from Barangay 20, Barangay 275, and the portion of Barangay 29 in Manila North Harbor.

Waste Flow Diagram

During the COVID-19 pandemic in 2021, 1,150,920 kg of wastes is projected to be generated in a year from Manila North Harbor with the inclusion of the results from the community (Figure 29). 95% of these wastes are generated from IPB and Barangay 29, while the remaining 5% are from Port Operations.

The collection rate is determined to be 97% based on interview, and site visit. The remaining 3% of waste are recyclables sold to junkshops by households in IPB. Remaining generated wastes are collected by the dump trucks. There were observed leakages, however, during the collection and transportation of waste to the Navotas SLF resulting to the decrease of waste transported to the SLF at 1,044,319 kg. Only 939,606 kg of this wastes are disposed at the Navotas SLF every year. There is no waste recovery before disposal; hence,

most of the generated waste that are collected are transported directly to the landfill (Figure 29). Higher leakage rate at the disposal area was imposed due to the presence of a water body near the landfill site which makes it prone to flooding.

Generated waste per year in a pre-covid scenario is at 2,195,875 kg wherein 99.8% of the wastes comes from IPB and Barangay 29, while the remaining 0.2% from the port operations. The port operations waste generation rate is based on the monthly solid waste monitoring reports in 2019 from PMO. Around 70,082 kg are recyclables and are sold to junkshops by the households in IPB. Like the current solid waste management system, majority of the generated waste are collected, transported, and directly disposed to the landfill. 1,877,621 kg of wastes are landfilled (Figure 30).

Observations

MNHPI has a waste management system that is focused on waste segregation and is manifested through the presence of segregation waste bins with infographics. These covered segregation bins are color-coded and are also the subject

of IEC Campaigns conducted by the pollution control office of the port operator. Plastic cages are also available, specifically for PET bottle collection, in some locations. Increasing the number of these covered segregation bins and plastic

cages distributed in the port area is seen as a possible improvement moving forward. They also have a separate collection for hazardous and special wastes, ensuring that this is not mixed with the solid waste brought to the Navotas SLF. MNHPI also manages the waste collection at Barangay 29 (Section IV.A.1) through a payloader. The same payloader is used to collect waste from government offices and to load the waste collection truck when collecting from the Pier 10 collection point. It is observed that reporting the waste that is collected from the Pier 10 collection area can be a point of improvement in managing port waste. Improvements to the Pier 10 collection area can also be done by providing covered segregation receptacles. Dump trucks that conduct waste collection in Manila North Harbor can also decrease its contribution to leakage by having a cover.

The adjacent communities of Barangay 20 and Barangay 275 have 78 volunteer residents called Eco-Patrols, Eco-Aides, or Eco-Warriors. These volunteers were trained on proper solid waste management through the Parola Solid Waste Management Project of ICTSI Foundation (ICTSI Foundation Inc., 2020) and are at the forefront of practicing proper solid waste management in their respective areas. They facilitate collection and clean-up drives for their assigned areas. The additional support from the barangay and from the LGU can help them further their impact to the community.

Barangay 275 has an MRF that sorts all solid waste from Barangay 275 for collection. The MRF can still be improved in its containment of their sorted residuals that are for disposal. The storm drains and shorelines of the barangays, however, are observed to still have a lot of plastic wastes, especially laminates and clear sachets. Providing accessible residual waste containers in the community can help decrease the amount of waste ending up in the storm drains and adjacent water bodies.



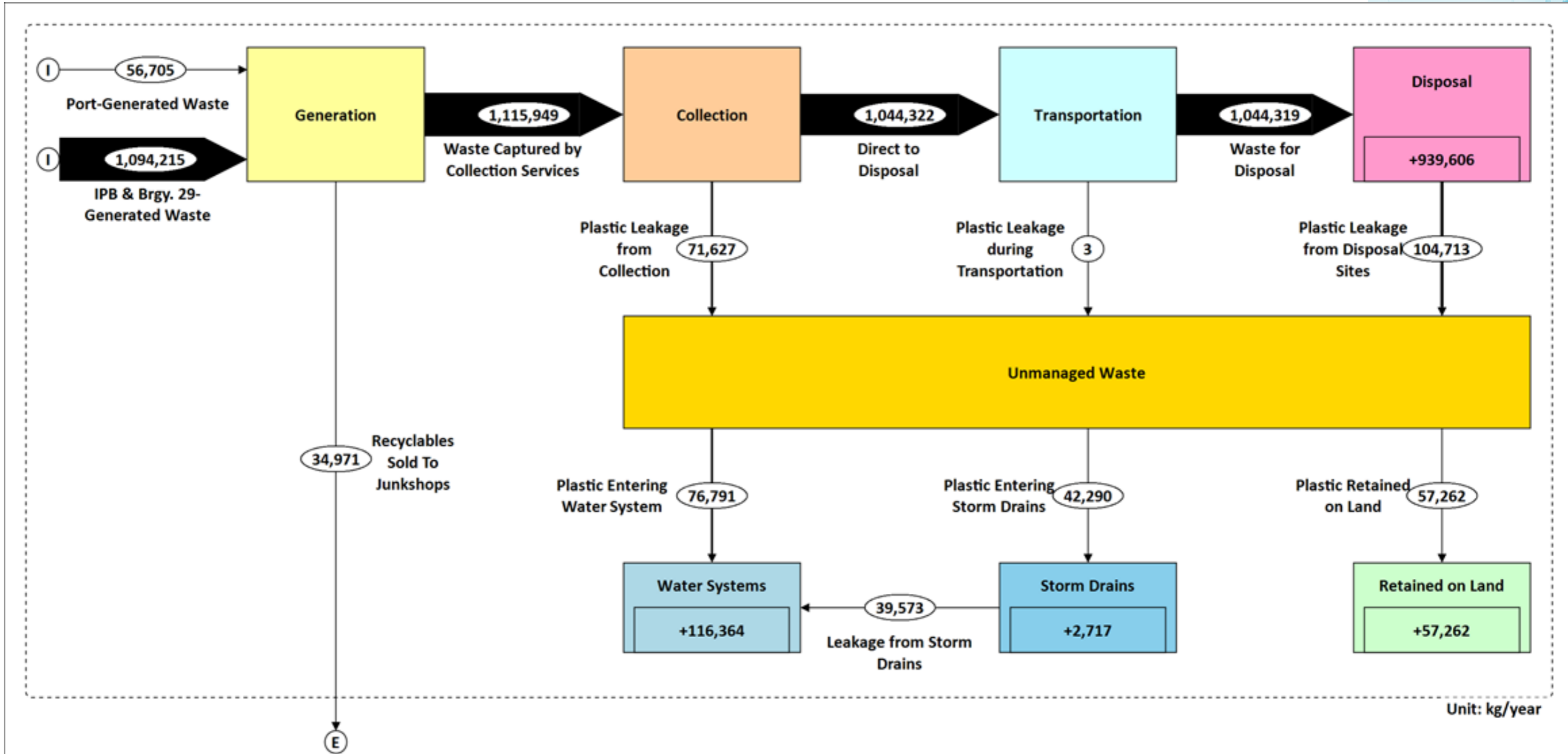


Figure 29. 2021 Solid Waste Flow Diagram for Manila North Harbor (AMH Philippines, Inc., 2021)

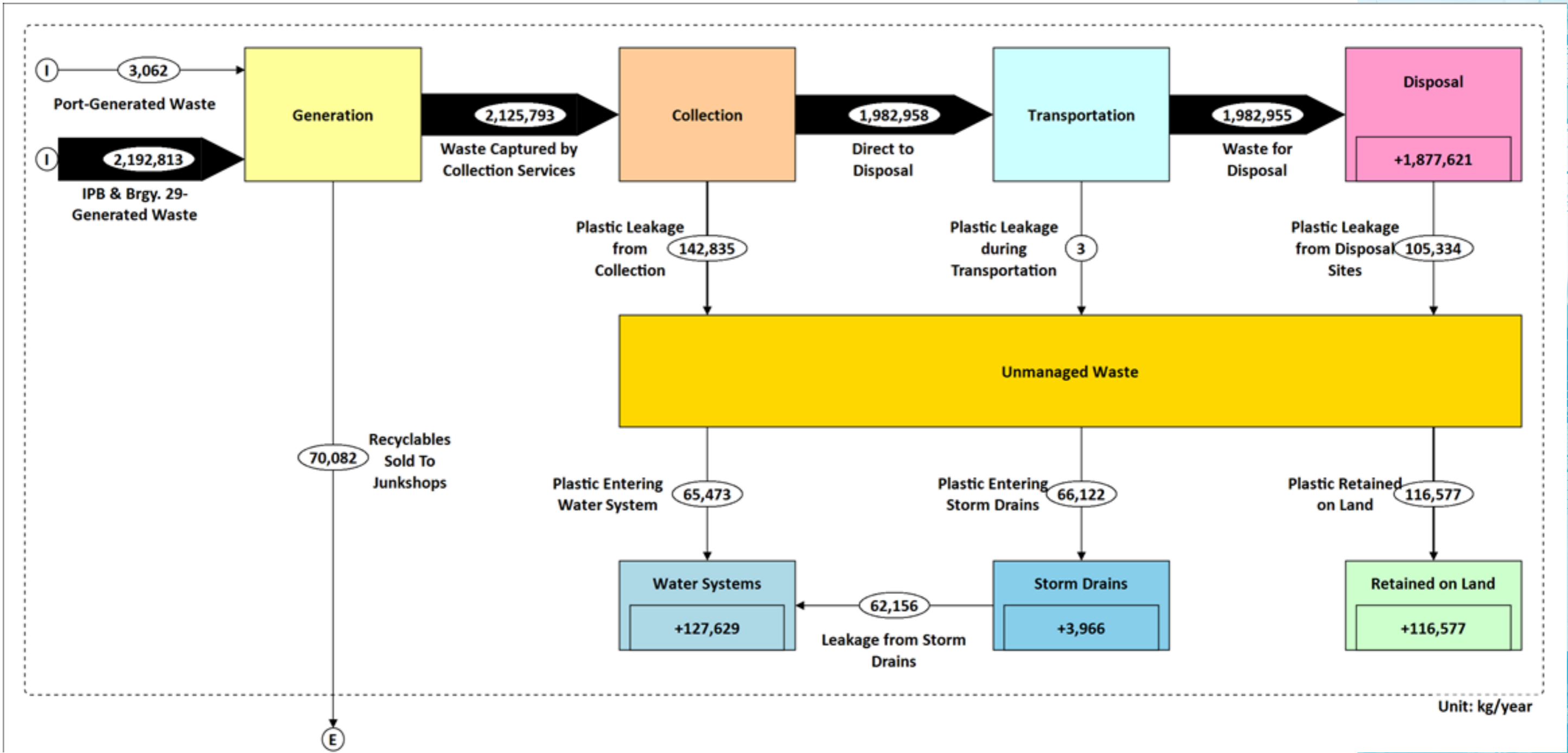


Figure 30. Pre-COVID Solid Waste Flow Diagram for Manila North Harbor (AMH Philippines, Inc., 2021)



SOLID WASTE MANAGEMENT DATA FROM PPA

PPA-listed ports submit their solid waste management system reports to PPA on a bi-annual basis as required by PPA MC No. 29-2004 (Section III.C). Of the 552 ports, 20% submit their reports after collation with their respective PMO; while, 5% submit their reports after collation with their respective TMOs. Private ports are currently not being monitored (Table 9 and Figure 32).

Table 9. PPA Ports with Solid Waste Management System Reports for 2018 to 2020

Item	Number of Ports
Data Collated per PMO	111 - 20%
Data Collated per TMO	28 - 5%
Private Ports – Without PPA-Monitored SWMS Data	275 - 50%
Other Government Ports – Unknown if Monitored	136 - 25%
Other Government Ports with PPA-Monitored SWMS Data	2 - 0%

The reports consider “recyclables” and “non-recyclables” as the main waste categories. The recyclables are further categorized as paper, plastic containers, and other recyclables; while, the non-recyclables are further categorized as

food or biodegradable wastes and other wastes. For the calculations, the other wastes were considered as the residuals.

Most of the port wastes generated in 2019 are recyclables, followed by biodegradables. Paper comprises most of the recyclables, followed by plastics (Table 10 and Figure 31).

Table 10. Total Port-Generated Wastes of PPA-Listed Ports in 2019

Waste Category	Weight (kg)
Recyclables	70,290.50
Plastics	23,468.44
Paper	30,164.41
Others	16,657.65
Residuals	15,008.00
Biodegradables	29,628.88
Total	114,927.38

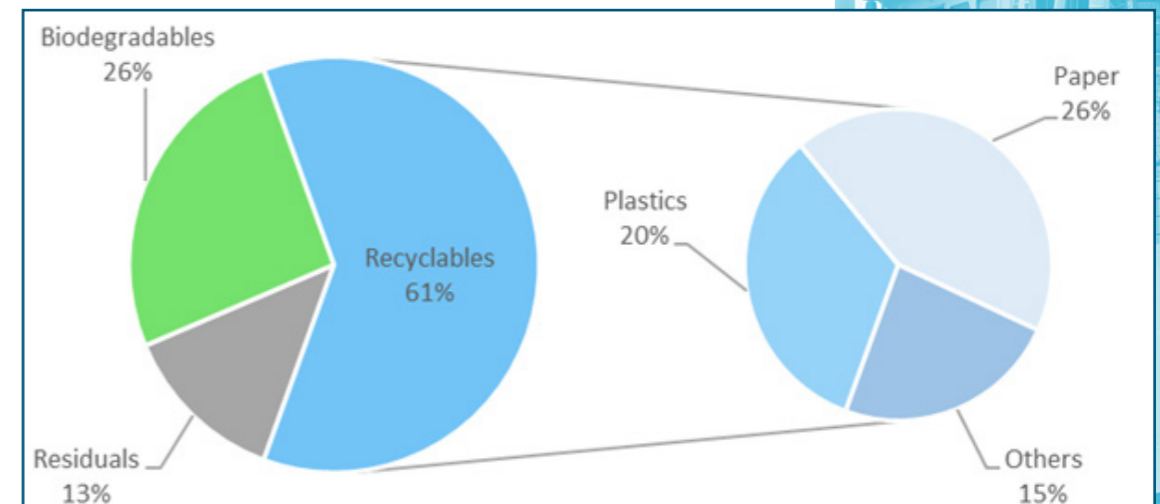


Figure 31. Distribution of Port-Generated Wastes of PPA-Listed Ports in 2019

Most ports produced recyclables mostly in 2019 and NCR South, Lucena Baseport, PMO Panay/ Guimaras (PNG), and PMO Zamboanga (ZDN) produced most of the residuals (Figure 33).

Considering the average of the leakage factors used for the select ports study, the total port-generated waste of 114,927 kg in 2019 – pre-pandemic - was calculated to contribute 604 kg of wastes to the water environment and 732.2 kg to the terrestrial environment (Figure 34).

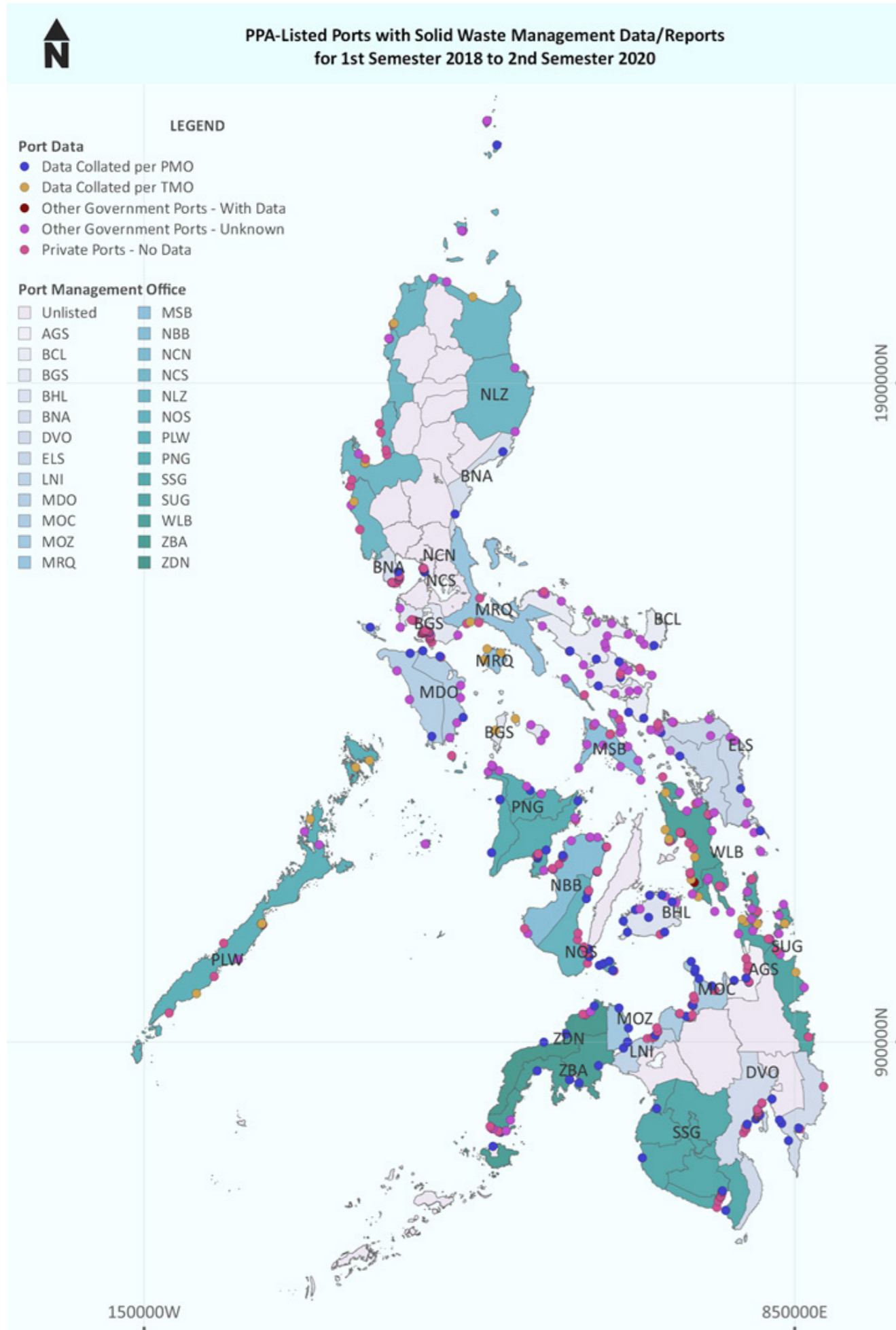


Figure 32. PPA-Listed Ports with Solid Waste Management Data/Reports for 1st Semester 2018 to 2nd Semester 2020

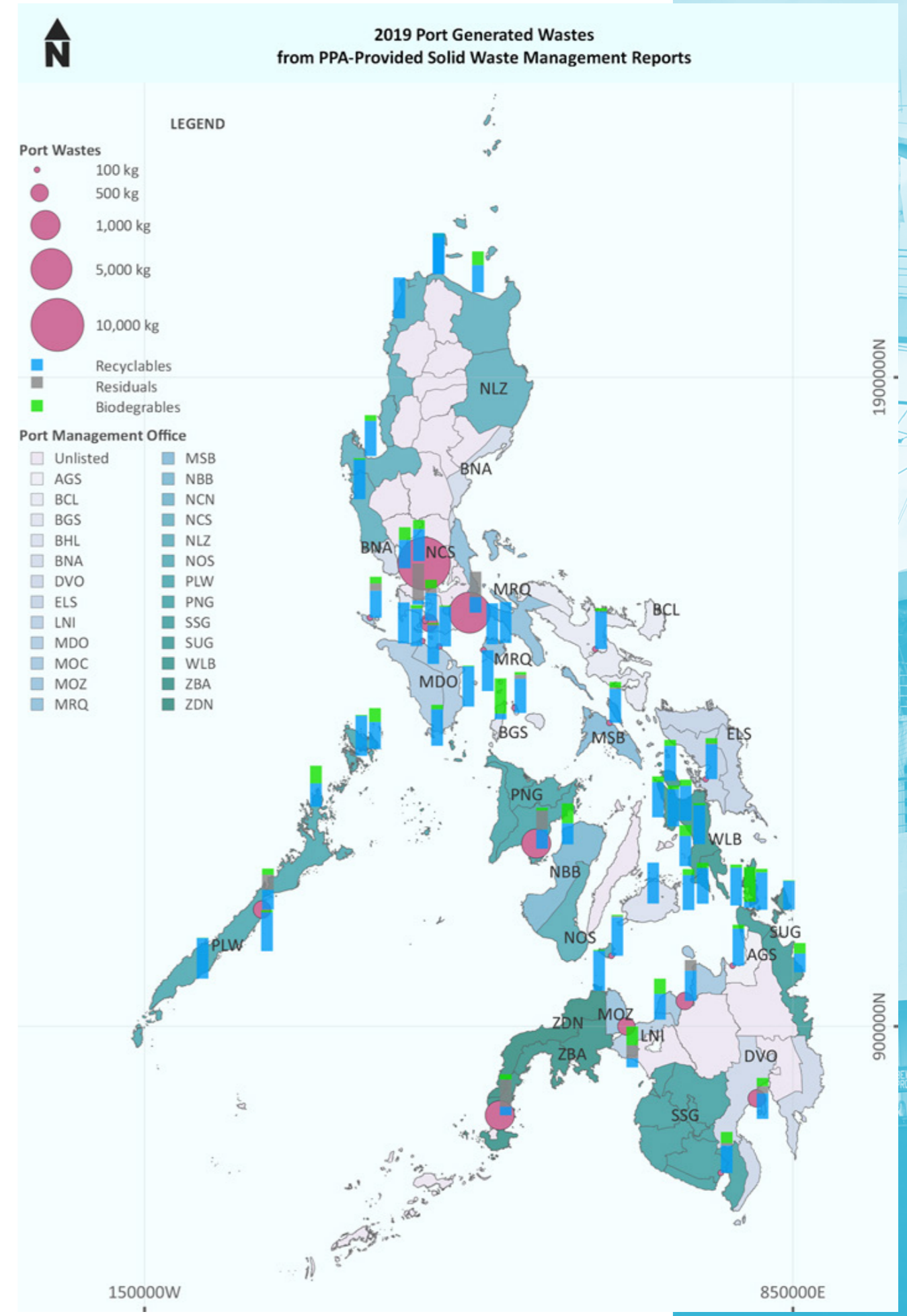


Figure 33. 2019 Recorded Port-Generated Wastes

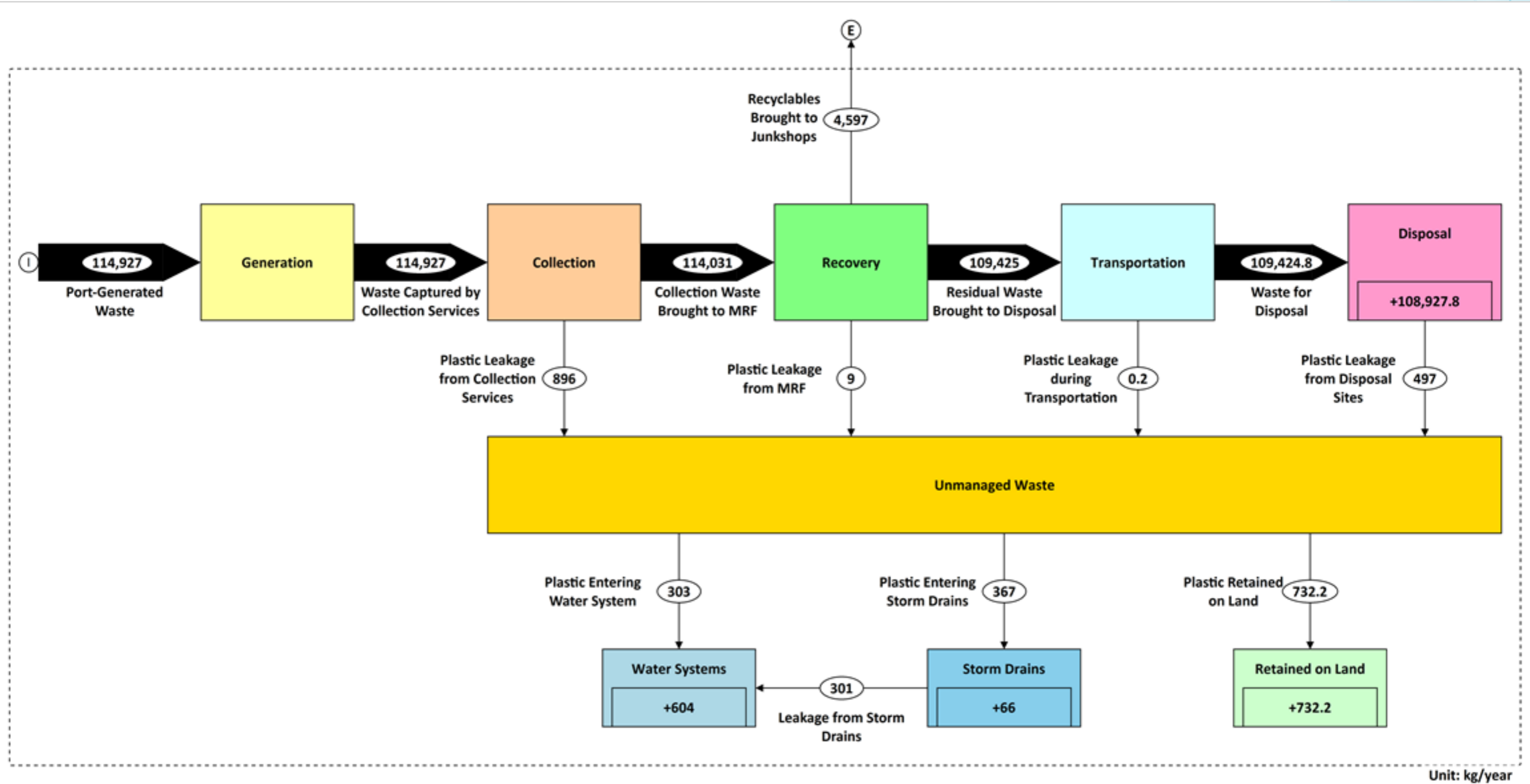


Figure 34. 2019 Port-Generated Solid Waste Flow Diagram



EXTRAPOLATED WASTE GENERATION

Only a fraction of the total PMOs were able to provide data for the second semester of 2020 considering the restrictions brought about by the pandemic.

Port-waste generation rate during the pandemic was therefore computed using the average of the actual ratio of port-generated waste in 2021 taken from the actual WACS conducted by AMH to the port-generated waste in 2019 taken from the SWMS reports of PPA for the Port of Batangas and for the Port of Cagayan de Oro, which is at 0.60 (Table 11). The data from Manila North Harbor was not used due to its great difference from the other two ports. Actual data for the Port of Batangas, Port of Cagayan de Oro, and Manila North Harbor were used for these ports.

Table 11. Ratio of 2019 Recorded Port-Generated Wastes to 2021 AMH-Gathered Port-Generated Wastes

Port	2019 Port-Generated Waste (kg/day)	2021 Port-Generated Waste (kg/day)	2021 to 2019 Port-Generated Waste Ratio
Port of Batangas	1,144.00	603.14	0.53
Port of Cagayan de Oro	1,181.80	794.29	0.67
Average			0.60

The calculated total port-generated wastes of PPA-listed ports in 2021 is at 595,043.17 kg considering the results of the select ports of study (Table 12, Figure 35, and Figure 36).

Table 12. Calculated Total Port-Generated Wastes of PPA-Listed Ports in 2021

Waste Category	Weight (kg)
Recyclables	157,377.16
Plastics	38,511.53
Paper	70,929.11
Others	47,936.52
Residuals	138,776.68
Biodegradables	298,889.33
Total	595,043.17

Considering the average of the leakage factors used for the select ports study, the total port-generated waste in 2021 – during the pandemic - was calculated to contribute 281.4 kg of wastes to the water environment and 341 kg to the terrestrial environment (Figure 37).

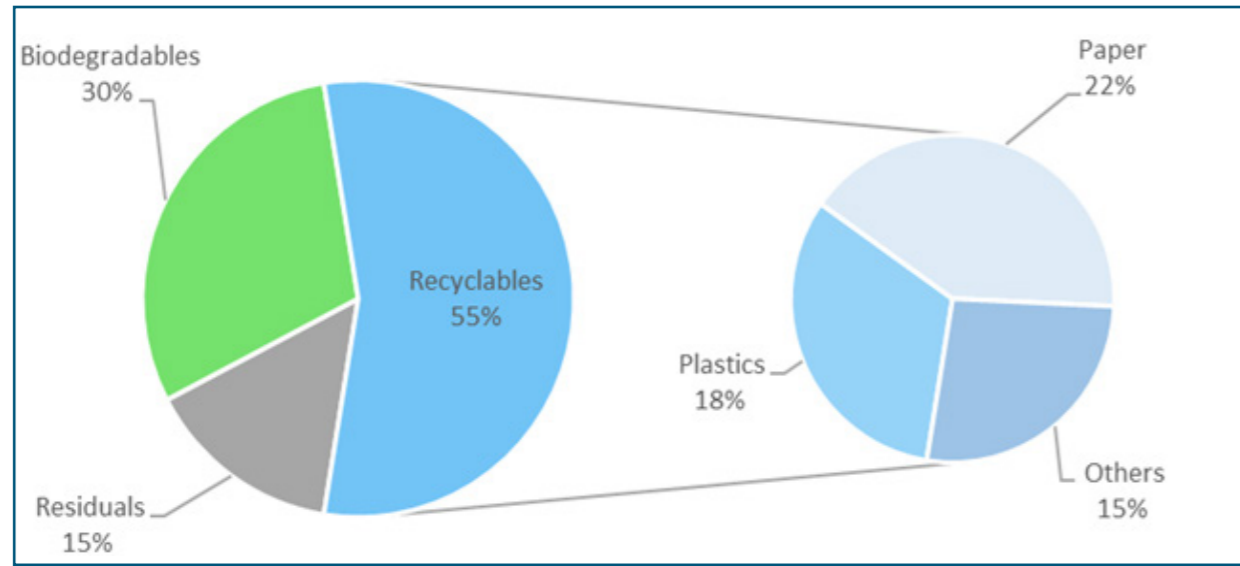


Figure 35. Distribution of Calculated Port-Generated Wastes of PPA-Listed Ports in 2021

The vessel-generated wastes are recorded in WOBVIFs; but, due to the absence of collated data for the considered years, simplification was made by considering the ratio of port-generated wastes to the vessel-generated wastes at the Port of Batangas and at the Port of Cagayan de Oro for 2019 and during the sampling in 2021, which were calculated to be at 1.06 and 2.41, respectively (Table 13).

Table 13. Port-Generated to Vessel-Generated Ratio for 2019 and 2021

Port	2019 Port-Generated Waste (kg/day)	2019 Vessel-Generated Waste (kg/day)	2019 Port to Vessel Waste Ratio	2019 Port-Generated Waste (kg/day)	2019 Vessel-Generated Waste (kg/day)	2021 Port to Vessel Waste Ratio
Port of Batangas	1,144.00	2,756.81	0.41	603.14	873.33	0.69
Port of Cagayan de Oro	1,181.80	694.52	1.70	794.29	192.00	4.14
Average			1.06	Average		2.41

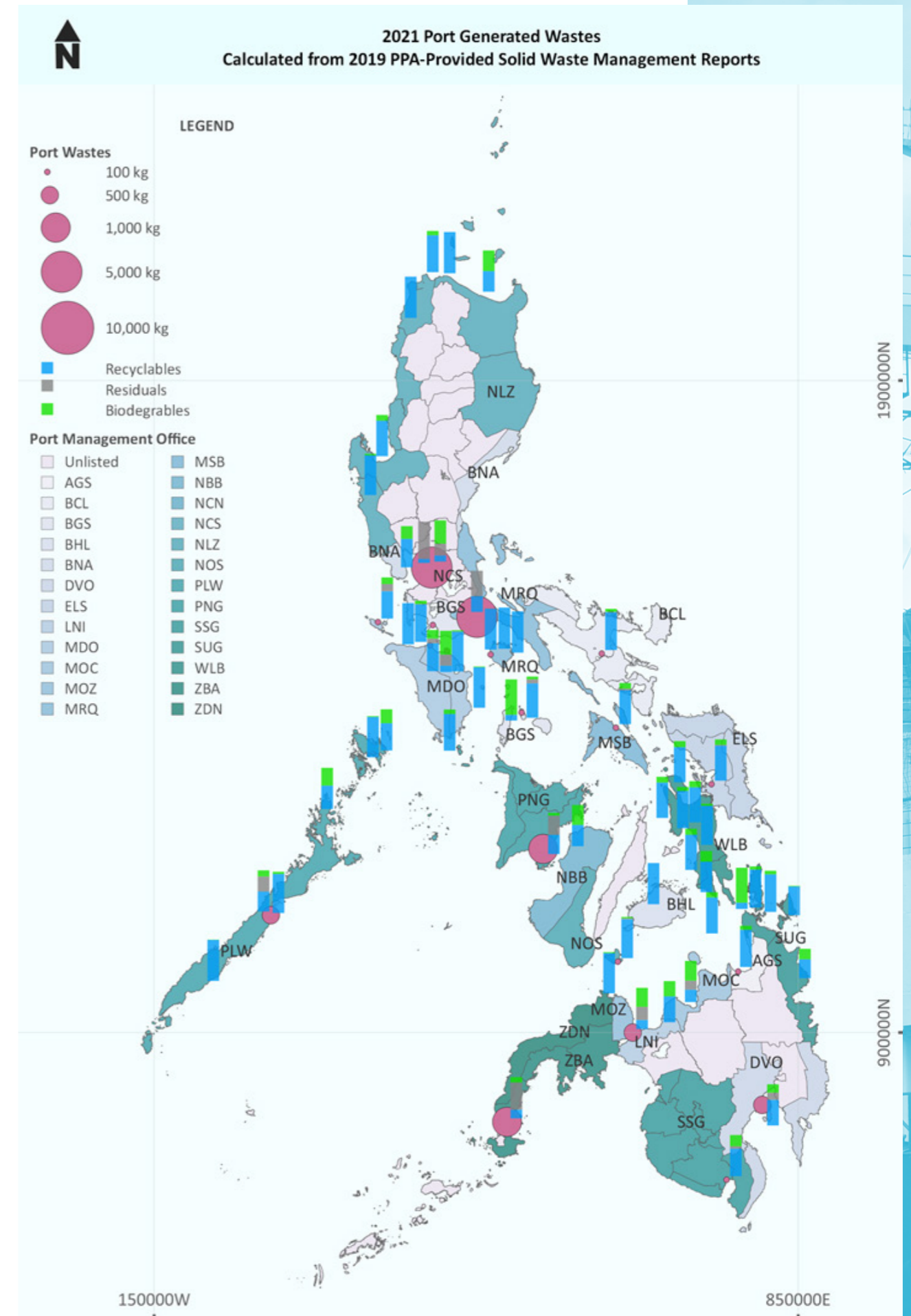


Figure 36. 2021 Calculated Port-Generated Wastes

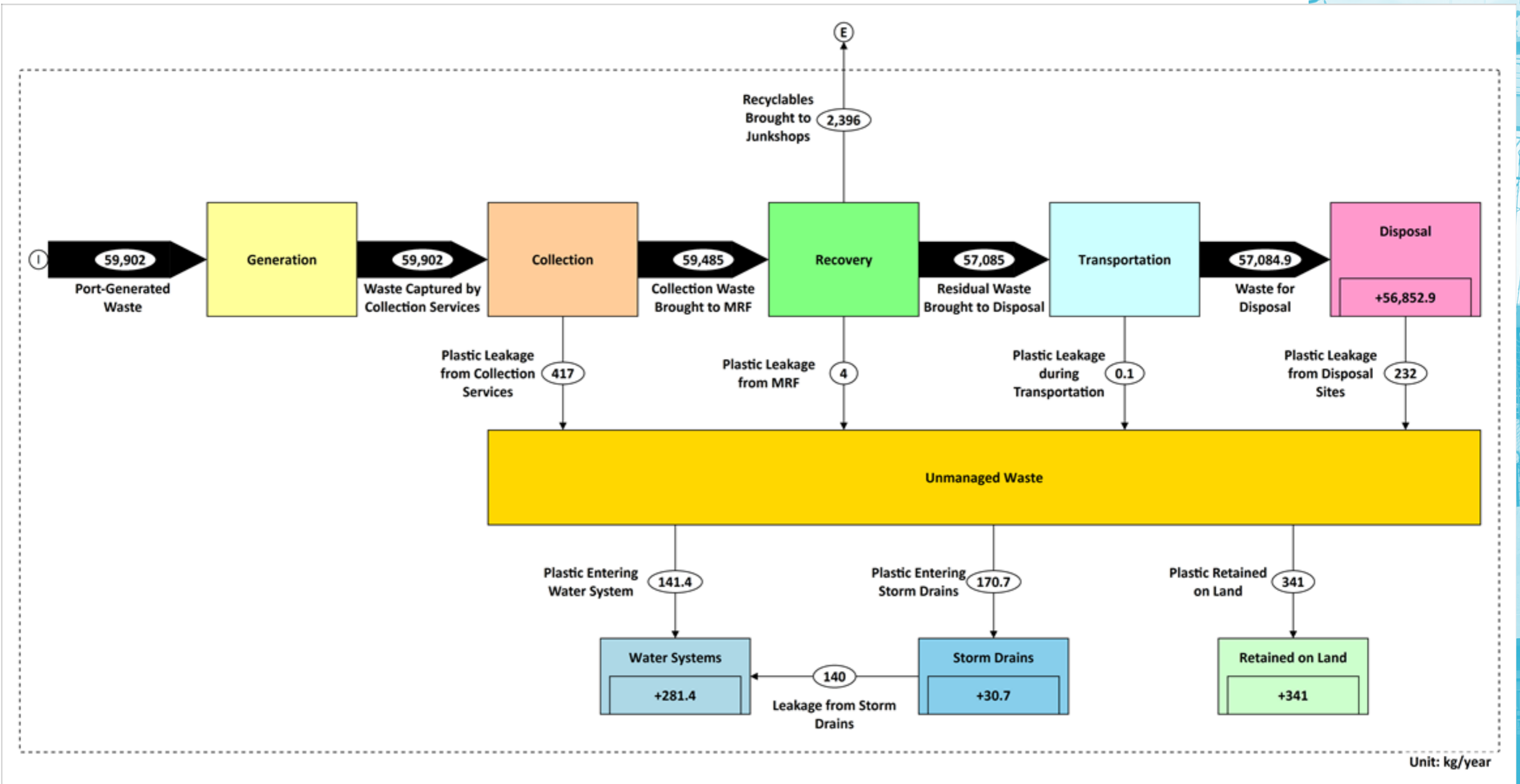


Figure 37. 2021 Port-Generated Solid Waste Flow Diagram

The calculated total vessel-generated wastes of PPA-listed ports in 2019 is at 128,970.40 kg (Table 14). Since the vessel-generated wastes had a fixed ratio with the port-generated wastes except for the select ports of study, the 2019 vessel-generated recyclables, residuals, and biodegradables generally followed the distribution of port-generated wastes for 2019 (Figure 38 and Figure 39).

Table 14. Calculated Total Vessel-Generated Wastes of PPA-Listed Ports in 2019

Waste Category	Weight (kg)
Recyclables	85,689.28
Plastics	29,421.49
Paper	38,128.68
Others	18,139.12
Residuals	14,534.81
Biodegradables	28,746.30
Total	128,970.40

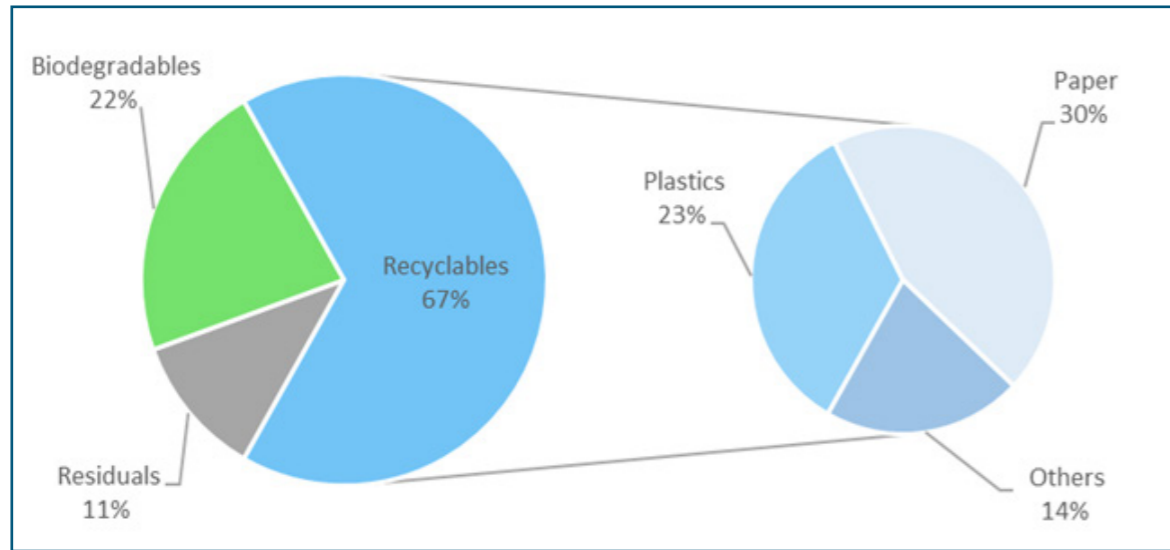


Figure 38. Distribution of Calculated Vessel-Generated Wastes of PPA-Listed Ports in 2019

Considering the average of the leakage factors used for the select ports study, the total vessel-generated waste in 2019 – pre-pandemic - was calculated to contribute 743.3 kg of wastes to the water environment and 900 kg to the terrestrial environment (Figure 40).

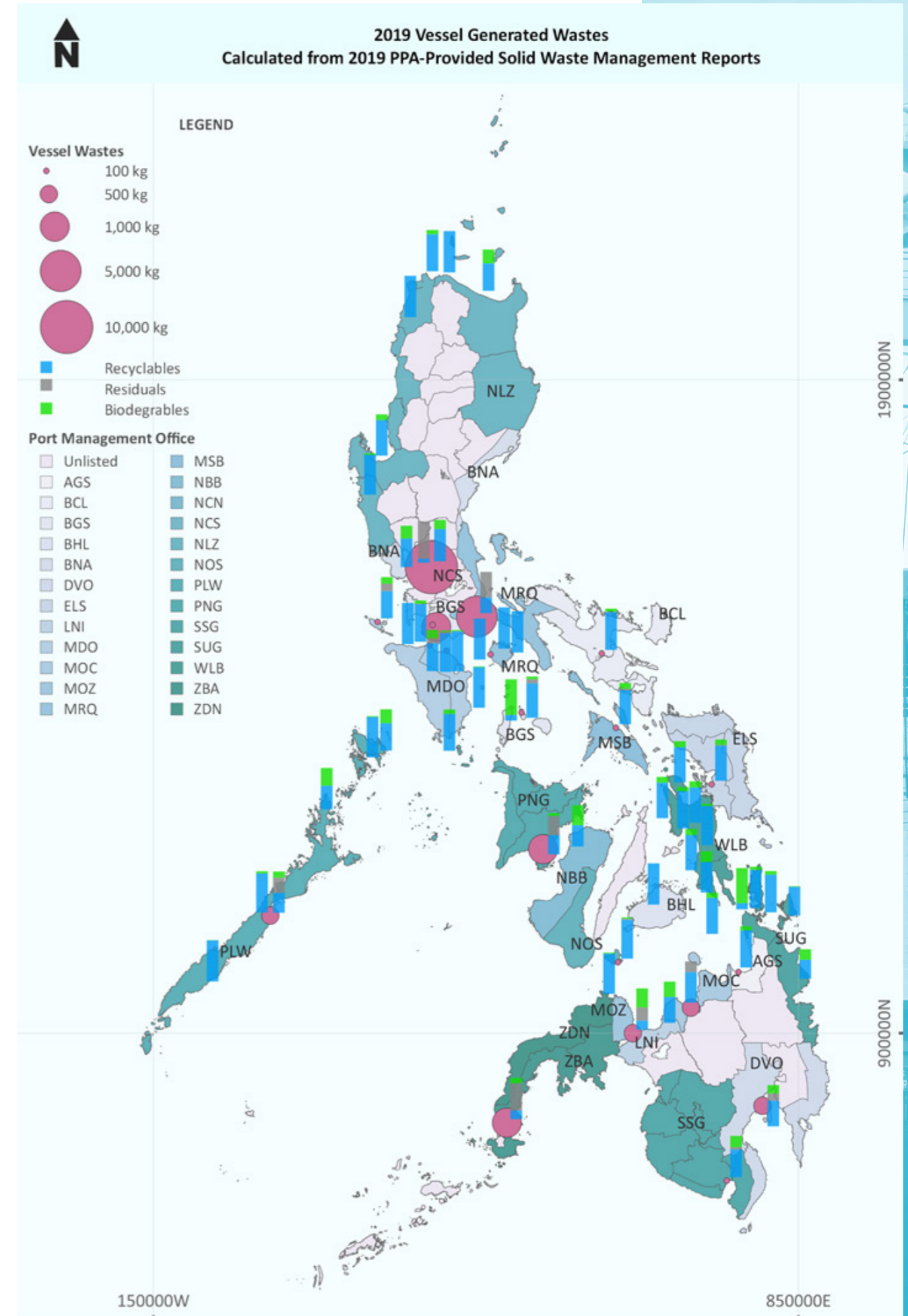


Figure 39. 2019 Calculated Vessel-Generated Wastes

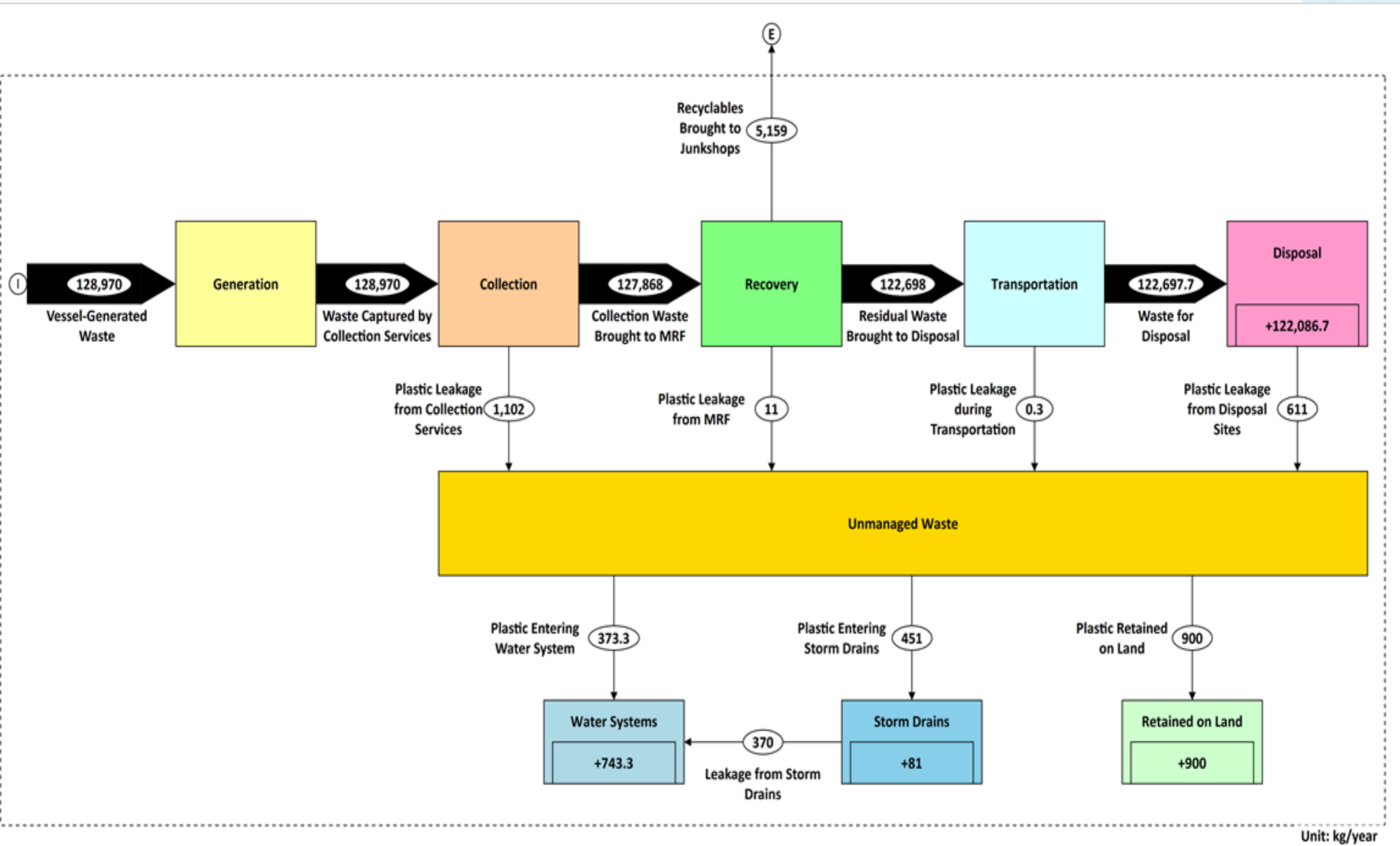


Figure 40. 2019 Calculated Vessel-Generated Solid Waste Flow Diagram

The calculated total vessel-generated wastes of PPA-listed ports in 2021 is at 341,824.97 kg (Table 15). Since the vessel-generated wastes had a fixed ratio with the port-generated wastes and that the 2021 port-generated wastes had a fixed ratio to the 2019 port-generated wastes except for the select ports of study, the 2021 vessel-generated recyclables, residuals, and biodegradables generally followed the distribution of port-generated wastes for 2019 (Figure 41 and Figure 42).

Table 15. Calculated Total Vessel-Generated Wastes of PPA-Listed Ports in 2021

Waste Category	Weight (kg)
Recyclables	105,450.73
Plastics	48,224.20
Paper	34,001.35
Others	23,225.18
Residuals	153,790.15
Biodegradables	82,584.09
Total	341,824.97

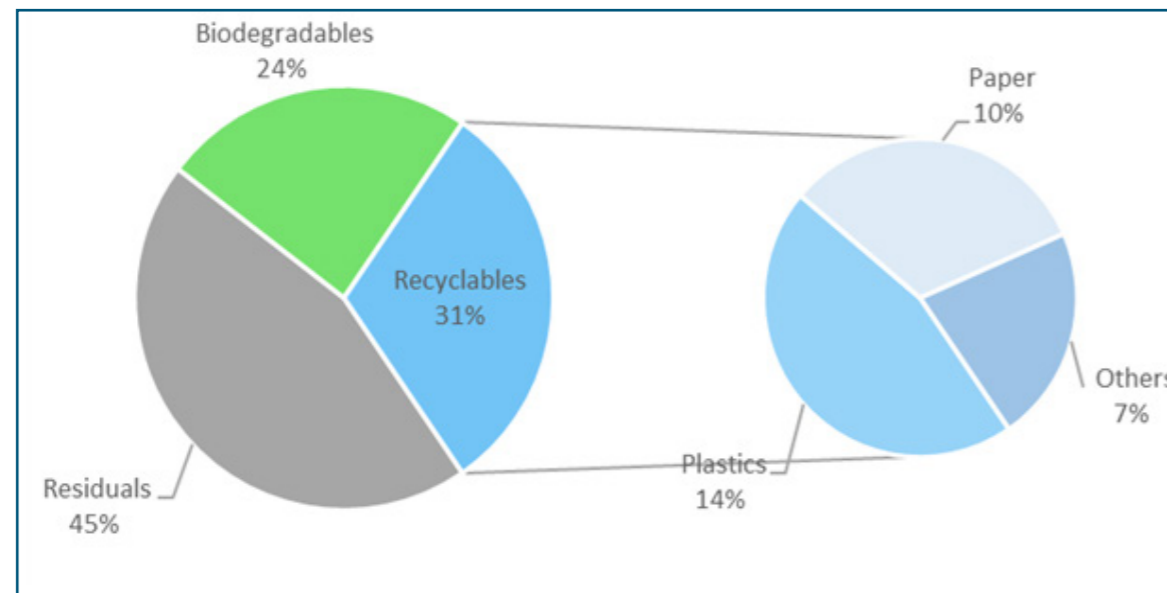


Figure 41. Distribution of Calculated Vessel-Generated Wastes of PPA-Listed Ports in 2021

Considering the average of the leakage factors used for the select ports study, the total vessel-generated waste in 2019 – pre-pandemic - was calculated to contribute 119.05 kg of wastes to the water environment and 145 kg to the terrestrial environment (Figure 43).

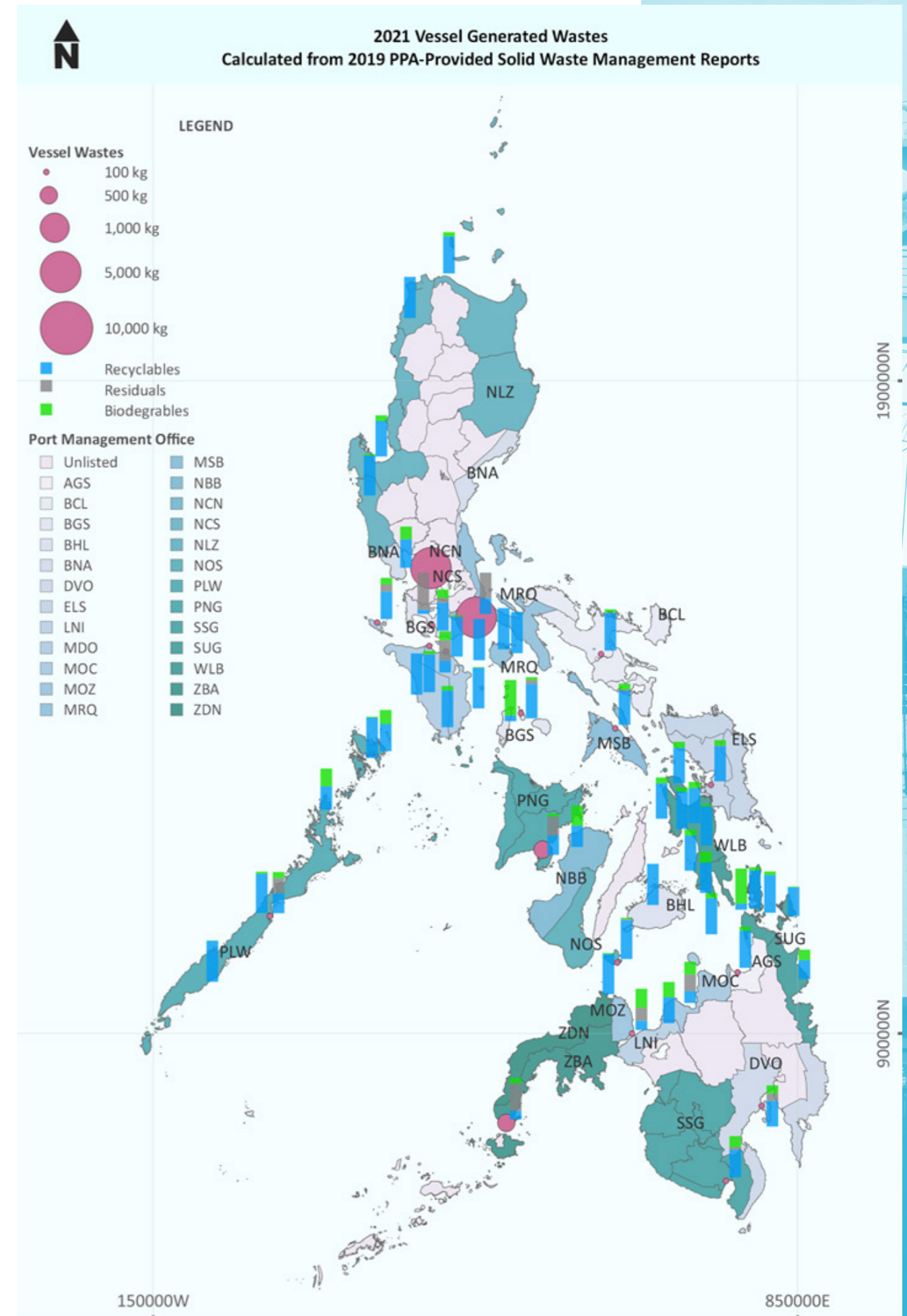


Figure 42. 2021 Calculated Vessel-Generated Wastes

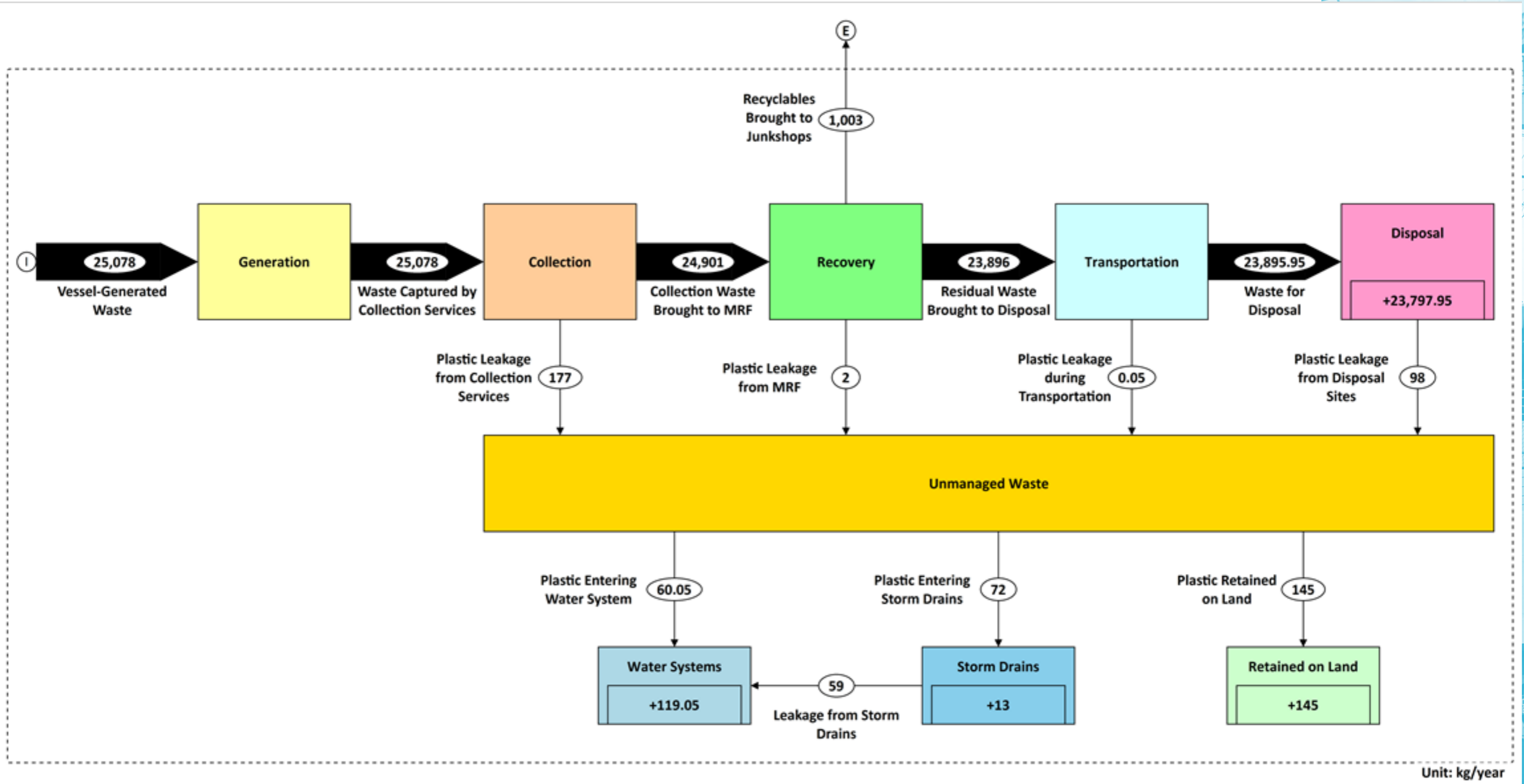
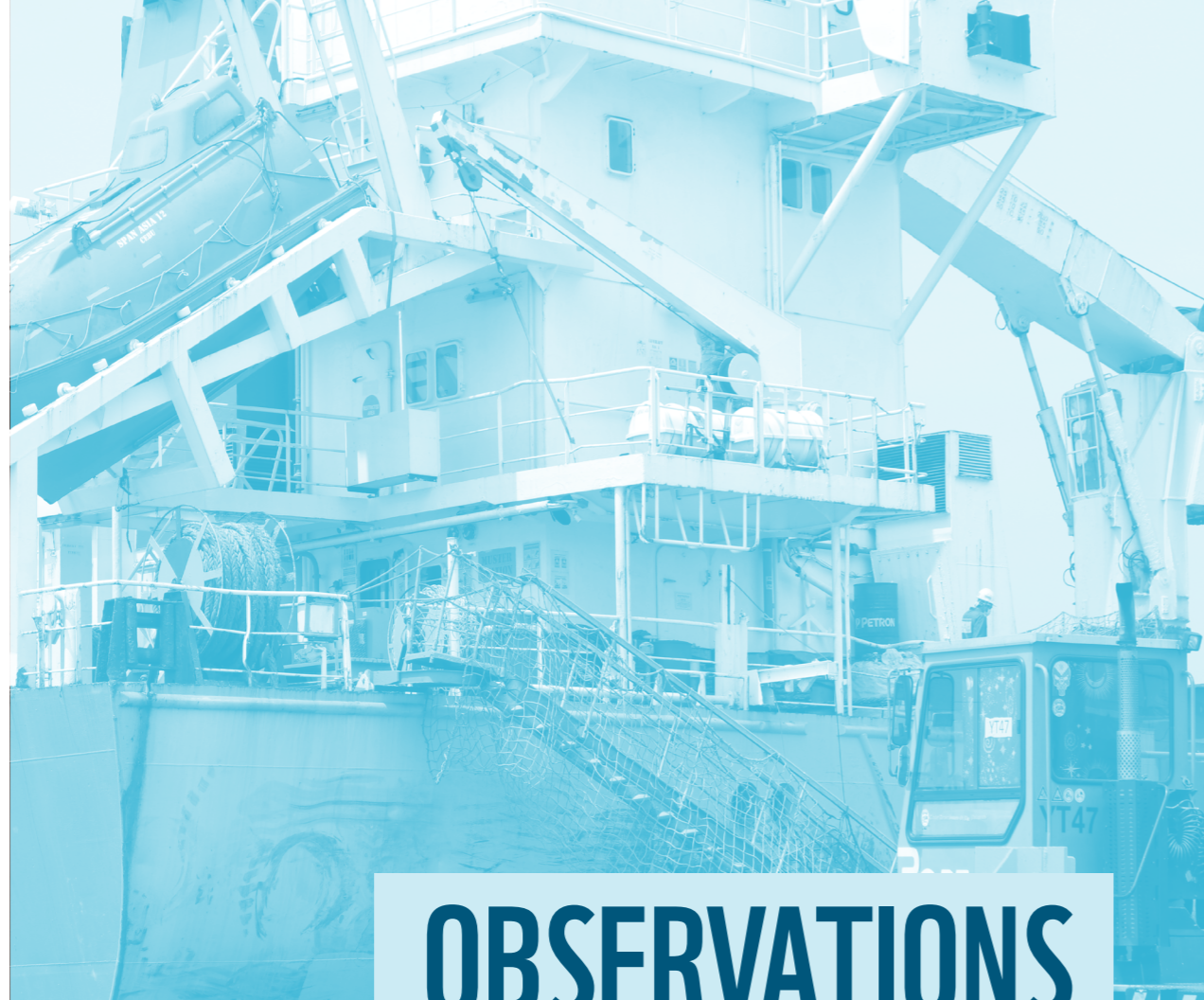


Figure 43. 2021 Calculated Vessel-Generated Solid Waste Flow Diagram



OBSERVATIONS

Observations on the good practices and areas for improvement of all the PPA-listed ports (Table 16) were based on the publicly available plans, programs, policies, and laws – especially of the national government and government agencies such as PPA and PCG (Section III), on the solid waste management reports given by PPA (Section VII), and to the observed practices during the conduct of the select ports assessment (Section VI) considering the port performance in 2019 to present (Section II) and the relationship of all stakeholders and sectors involved (Section IV). Observations for the select ports of study may be accessed through the individual reports submitted per port.

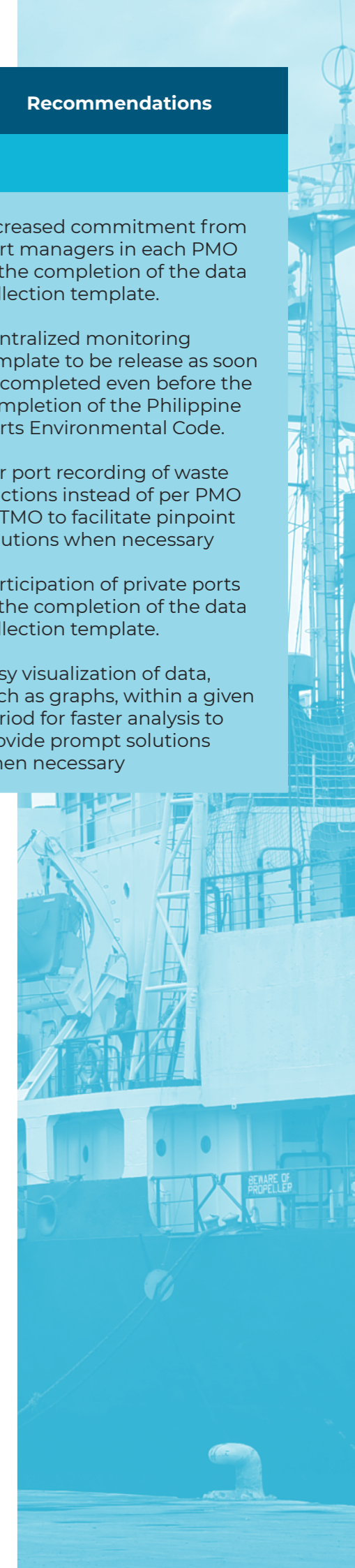
Table 16. Solid Waste Management Related Good Practices and Areas for Improvement of the PPA-Listed Ports

Observations	On Going PPA Interventions	Recommendations
Policies, Regulations, and Programs		
Conduct of baseline assessment studies – select ports and national baseline – which can determine their way forward in accordance to the NPOA on Marine Litter and other policies, protocols, and programs.	Participation, with memorandum of agreement, to the Clean Ports, Clean Oceans: Improving Port Waste Management in the Philippines	Explore the possibility of applying the recommendations in line with the goals of NPOA-ML

Observations	On Going PPA Interventions	Recommendations
Policies, Regulations, and Programs		
Presence and synergy of international, national, and local policies, regulations, and programs to manage solid wastes and significantly reduce marine litter.	Crafting and enactment of policies – memoranda and orders – in line with the international, national, and local plans, programs, policies, and laws	Updates to existing policies in line with recent studies and international, national, and local policies, regulations, and programs
Easy access to PPA policies including those related to solid waste management	PPA website, Issuances, availability	Updating of website, as necessary
Despite the prohibitions and corresponding penalties included in RA 9003, the law remains poorly implemented (Enano, 2020), which leads to solid and plastic wastes entering the water environment.	Ongoing drafting of the Philippine Ports Environmental Code Inclusion of Integrated Management System (IMS) ISO 9001: 2015 Quality Management System (QMS) and ISO 14001:2015 Environmental Management System (EMS) in the performance scorecard of ports	Stricter Implementation of the provisions of the policies, regulations, and programs – including penalties/sanctions Use of proper and updated tools and equipment, such as purpose designed enclosed, multi-compartment, vehicles in collection of wastes, should be done. Proper maintenance should also be observed.
At-source segregation is often neglected since collection is not conducted according to waste type nor are collection vehicles compartmentalized as observed in the select ports – Port of Batangas, Port of Cagayan de Oro, and Manila North Harbor	IEC campaigns at ports and on-board vessels.	
The current solid waste management matrix in PPA MC No. 29-2004 does not directly identify segregation and material recovery while identified in the whole document and deals mostly with generation, storage, and disposal.	Ongoing drafting of the Philippine Ports Environmental Code	Revisit SWM Matrix to include provisions for segregation and recovery Update of stakeholders at the receiving end of the matrix in consideration of recent green technologies

Observations	On Going PPA Interventions	Recommendations
Policies, Regulations, and Programs		
Current waste categorization in the solid waste management matrix (Table 6) does not include biodegradables and other non-biodegradables.	Ongoing drafting of the Philippine Ports Environmental Code	Update waste categorization guide in consideration of the latest data requirements towards cleaner technologies on waste handling Waste categorization guide should facilitate synergistic approach on SWM between all stakeholders
Domestic vessels tend to disregard marine protection and/or circumvent policies, regulations, and programs more than foreign vessels.	Ongoing drafting of the Philippine Ports Environmental Code Inclusion of Integrated Management System (IMS) ISO 9001: 2015 Quality Management System (QMS) and ISO 14001:2015 Environmental Management System (EMS) in the performance scorecard of ports IEC campaigns at ports and on-board vessels.	Stricter Implementation of the provisions of the policies, regulations, and programs – including penalties/sanctions Proper and full documentation of wastes being unloaded – including their wastes fractions and issuance of receipts especially to vessels. Conduct of IEC Campaigns in more regular/frequent schedule especially with domestic vessel crew members. Definition and inclusion of solid waste management performance in the key performance indicators (KPIs) of Philippine ports
Data Management/Monitoring		
Lack of monitoring data for private ports, which consists of 50% of the total PPA-listed ports	25% of the PPA-listed ports monitors their solid waste generation per semester in accordance with PPA MC No. 29-2004. Voluntary efforts of some PMOs in collecting data from private ports.	Increase in manpower to facilitate data collection from private ports. Additional inter-agency policy to have the solid waste management monitoring data of private ports

Observations	On Going PPA Interventions	Recommendations
Data Management/Monitoring		
Lack of uniformity in data recording – waste characterization, per PMO/ per TMO, per port	Data collection template is being updated by PPA and being integrated in the current drafting of the Philippine Ports Environmental Code. Waste is recorded per waste fraction – biodegradables, recyclables, and residuals – in accordance with PPA MC No. 29-2004. Recyclables, generally, include plastics, paper, and others.	Increased commitment from port managers in each PMO in the completion of the data collection template. Centralized monitoring template to be release as soon as completed even before the completion of the Philippine Ports Environmental Code. Per port recording of waste fractions instead of per PMO or TMO to facilitate pinpoint solutions when necessary Participation of private ports in the completion of the data collection template. Easy visualization of data, such as graphs, within a given period for faster analysis to provide prompt solutions when necessary





RECOMMENDATIONS

The movement against marine litter has clearly reached certain milestones in the Philippines. Stricter implementation and review of existing plans, programs, policies, and laws, better coordination and teamwork between stakeholders, better data management, monitoring and utilization of plastic wastes, installation of properly designed and fully functional MRFs, and conduct of IEC campaigns can hasten the progress towards a more sustainable solid and plastic waste management in the Philippines – especially in its ports.

Stricter Implementation of Plans, Programs, Policies, and Laws

Several plans, programs, policies, and laws are already in place in line with solid waste management in ports and on-board vessels, along with the prevention, reduction, and management of marine litter. The need to synchronically implement these strictly, however, must be done.

Stricter imposition and expansion of the current plastic ban and regulations in the country can help reduce the plastic waste generation and can also assist in promoting the use of environmentally friendly alternatives. There shall be less to nil use of single use plastics such as clear and laminated sachets and disposable products such as PET bottles, PP containers, plastic utensils evident in the results of the WACS. The alternatives should be made available and that an analysis of the target population – including purchasing power – be made before banning a plastic product. Alternative modes of delivery such as refilling stations should be considered.



Review of Existing Plans, Programs, Policies, and Laws

The existing plans, programs, policies, and laws – especially the internal memoranda and orders of all agencies involved in maritime issues including PPA and PCG – must be revisited regularly to ensure that improvements on the system-wide solid waste management system be made. Provisions might need to be updates, as in the case of PPA MC No. 29-2004, to reflect results of recent studies and/or technologies. Ordinances should be cohesive enough to be seamlessly implemented by various agencies.

Better Coordination and Teamwork Between Stakeholders

The success of the solid and plastic waste management (Figure 43) and of reduction marine litter from the ports not only lies with the crafting and enforcement of quality plans, programs, policies, and laws; but, relies on the cooperation, teamwork, and coordination of all stakeholders. Synchronization of activities in line with implementation and provision of better venues of

communication between the implementing agencies and other players should be made available. With the advancement in communication technology, this can be easily achieved nowadays.

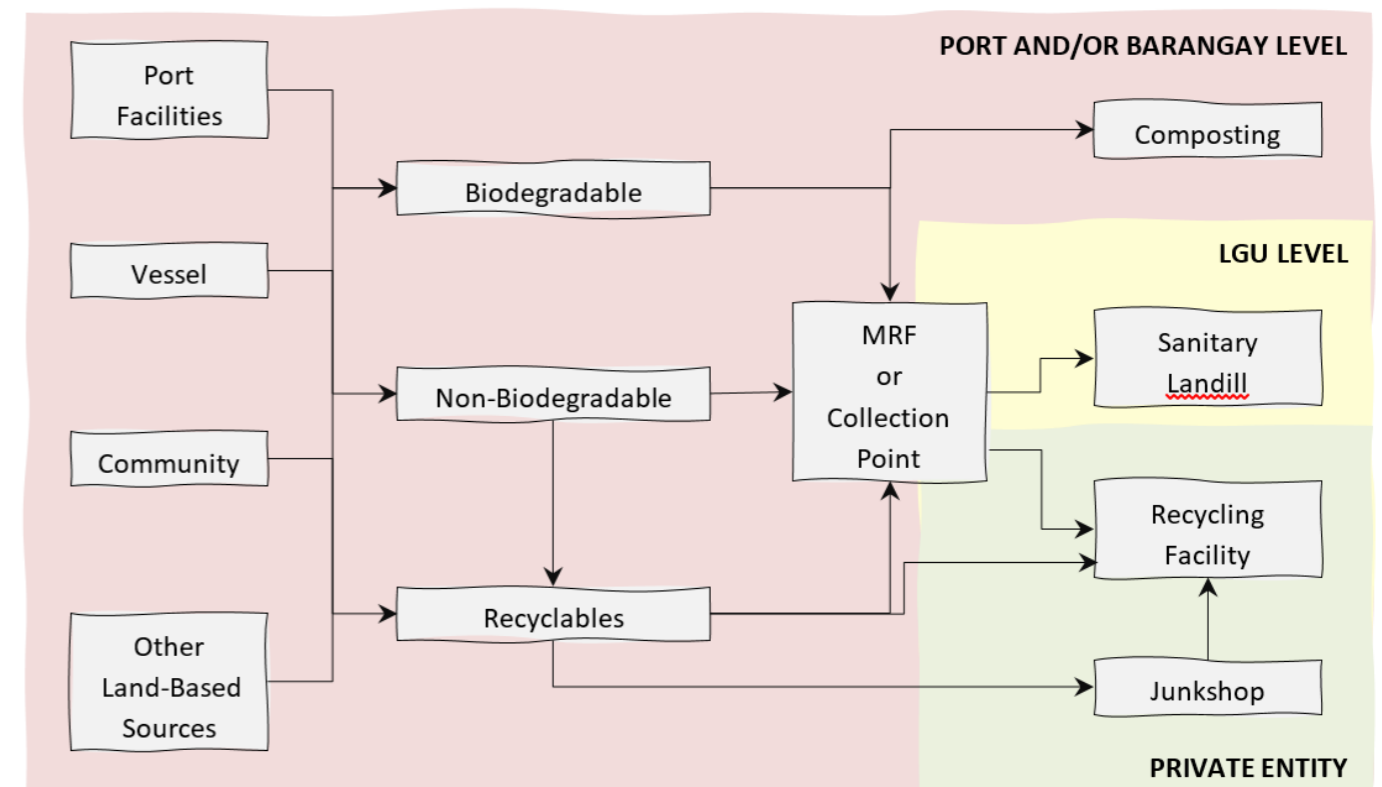


Figure 44. Management of Wastes from Ports and Vessels



Better Data Management Framework

The observation on the current data management in terms of solid waste reporting calls for a better data management framework within PPA and between all agencies involved in marine litter. The use of an information system to update the real-time status of solid waste management per port may be explored. This can also include real-time monitoring of solid waste fractions and fate of recyclables – to examine its circularity.

Installation of Properly Design and Fully Functioning MRFs

Barangays are mandated by RA 9003 to sort and collect recyclable wastes and establish an MRF within their vicinity. Unfortunately, not all barangays have a properly designed and fully functioning MRF due to various reasons. To address the need for MRFs of Philippine Ports, partnerships may be made between private and public entities such as the LGUs, DOST, DENR, PPA, MARINA, landfill operators, NGOs, and other environmental groups to install MRFs within the barangays in which the ports are located and/or a centralized MRF within the ports. Waste technologies such as shredders, plastics molders should also be present in the facility. While waiting for the construction of MRFs, it is recommended that the recyclables from the ports be brought to

the nearest junkshop or existing MRF of the LGU to minimize the waste ending up in the sanitary landfill.

Financing mechanisms should be discussed in parallel with the development of the program involving MRFs to ensure maintenance of the MRFs and health, safety, and wage of MRF workers.

Installation of Trash Traps at Drainage Outfalls When Necessary

The installation of storm drainage trash traps in the form of flexible nets (Figure 45) may be explored to manage debris from storm drains coming into the water environment. It is, however, recommended that upstream interventions for generation, segregation, and collection be prioritized or be made in parallel to the installation of these trash traps. Trash traps should also be designed accordingly such that it would not impede the flow of stormwater runoff especially in areas prone to flooding.



Figure 45. StormXTM Storm Water Runoff Trash Traps (Storm Water Systems, 2020)



Figure 46. The Circular Plastics Economy (UN PRI, 2019)

Monitoring and Utilization of Plastic Wastes

Data management can lead to better monitoring of solid waste management including that of plastics. With better monitoring comes the possibility of utilizing plastic wastes in line with the principles of circular economy which promotes recycling and resource efficiency along with employment and development of resilience, growth, and skills (Figure 46). Used plastic has value as a raw material and production of raw materials from non-virgin feedstock is currently being explored by companies operating at each stage in the plastics value with plastic manufacturers starting to redesign their products to be recyclable and increasingly using recycled materials (UN PRI, 2019).

While the plastic circularity is a long-term mechanism of managing plastic wastes, its results can be evidenced within a short period (Figure 47).

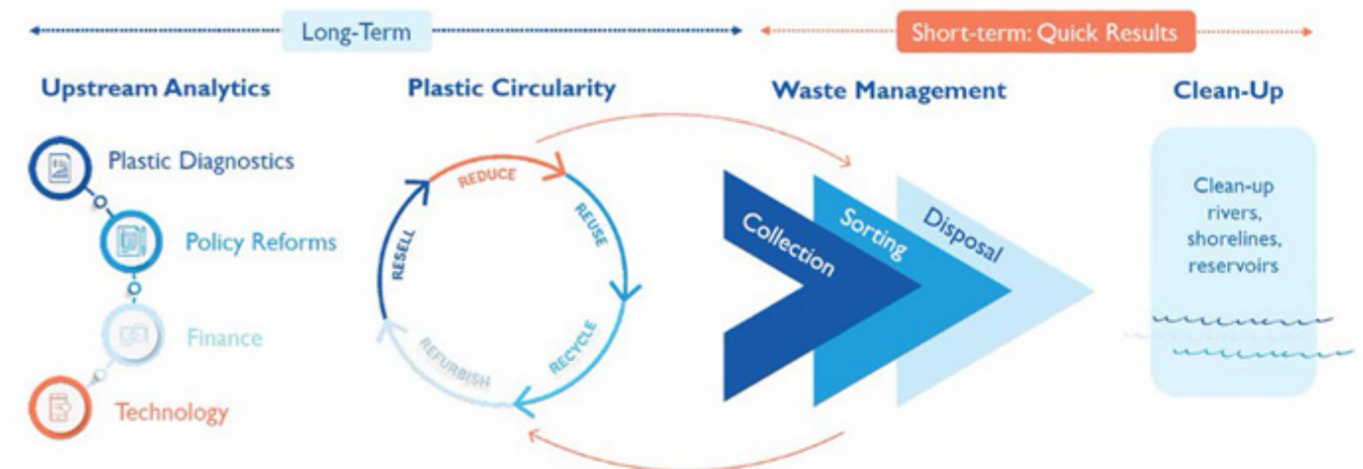


Figure 47. Financing Opportunities Across the Waste Chain (World Bank Asia Pacific, 2020)



Conduct of Information, Education, and Communication Campaigns

IEC campaigns can help strengthen the establishment of waste management plans and related mandates in port facilities and vessels. Port facility employees and regular passengers are the target audience for IEC campaigns within the port area, which can mainly focus on segregation. The target audience can also be more knowledgeable of mandates of the PPA such as on the recent single-use plastic bans. Both vendors inside the port area and onboard the vessels can be encouraged to participate in educational seminars. Existing alternatives to plastics that are relevant to their businesses can also be shared with them. PPA or port management may use policy incentives such as command-and-control regulations, social-psychological incentives like certification and recognition, and economic incentives to prompt the establishments and businesses to use alternative products for plastics.

Standardization of Waste Bin Color-Coding Scheme

The select ports – Port of Batangas, Port of Cagayan de Oro, and Manila North Harbor – follow different color-coding scheme for the waste bins, which may hold true for all the ports within the Philippines. It is then recommended that a standard color-coding scheme be adopted by all ports.

There is no current standard on the colors to be used for bins per type of wastes. This may be addressed by NSWMC to ensure uniform application within all sectors in the Philippines.



Detailed Study per Recommendation Presented including Their Cost Recovery System

The cost recovery system per recommendation provided, which will also consider the social and economic costs not only to the port authorities, but to the society in general, is necessary to holistically implement the “polluter pays” principle. Detailed studies/analyses per recommendation provided is therefore recommended to determine the costs of the recommendations and the appropriate fees to gain a return of investment since costs will vary highly on the extent/particulars to be implemented per recommendation.

The range of options for the full cost-recovery can include the lumping of the charges of waste collection, treatment, and disposal into a single municipal management service charge (DENR and ADB, 2003) or into the service charges

of PPA. Portion of the collected municipal management service charge may be given to the government port authorities to properly manage the wastes from the port facilities and vessels entering the Philippine area of responsibility.

The strict implementation of penalties specified in the laws (Section X.A) is also needed to eventually lead to a better cost recovery system in SWM aspect of the country and in ports. Perhaps, the inclusion of solid waste management fees in the utility bills of the community may also be done; but, thorough studies on the amount should be done to ensure that the socio-economic standing of the citizens are considered accordingly.

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ANNEX A.**LIST OF STAKEHOLDERS
AND DATE OF INTERVIEW**

Stakeholders	Date of Interview
2GO	June 30, 2021
Asian Terminal Inc.	August 17 and September 24, 2021
Barangay 20 Barangay Captain Manila	July 26, 2021
Barangay 20, Barangay 29, and Barangay 275 Residents	October 20 and 21, 2021
Barangay 275 Materials Recovery Facility	October 21, 2021
Barangay Macabalan, Cagayan de Oro	July 26, 2021
Barangay Puntod, Cagayan de Oro	July 26, 2021
Centralized MRF c/o Ms. Evelyn Bahian	October 13, 2021
Cleanvironment	August 27 and October 20, 2021
Far East Fuel Corporation	June 30, 2021
GreenAntz - Cagayan de Oro	July 21, 2021
International Container Terminal Services Inc.	July 7, 2021
iPrudential - Batangas	June 23 and September 24, 2021
iPrudential - Manila	June 23, 2021
Junkshop c/o Mr. Rodilo Ancho	October 13, 2021
Junkshop in Manila	October 20, 2021
Manila North Harbour Port, Inc.	October 20, 2021
Montenegro Shipping Lines, Inc.	September 24, 2021
Norwegian Training Institute	June 16, 2021
Oro Port	October 13, 2021
Philippine Liner Shipping Association	June 22, 2021
Philippine Port Authority	October 20, 2021
PMO Cagayan de Oro	June 28, 2021
Port of Batangas Passenger Terminal 2 Dry Goods Vendor	September 24, 2021
Port of Batangas Passenger Terminal 2 Food Vendor	September 24, 2021
Port of Batangas Passenger Terminal 3 Janitorial Service	September 24, 2021
Port of Batangas Phase II Janitorial Service	September 24, 2021
Royal Caribbean	July 8, 2021
San Jose Sico Cooperative in Batangas	September 25, 2021
Starlite Enterprise	September 29, 2021
WasteCon	July 15 and September 25, 2021

WWF-Philippines

December 2021

