

Reducing Marine Plastics in the East Asian Seas Region Project
funded by the
Ministry of Oceans and Fisheries (MOF) of the Republic of Korea

**PROPOSED PILOT PROJECT IN
PUERTO PRINCESA, PALAWAN**



**HABAL: Smart Waste Collection in
Congested Barangays to
Prevent Ocean Pollution**

PROJECT PROPOSAL SUMMARY

PROJECT TITLE	HABAL: Smart Waste Collection in Congested Barangays to Prevent Ocean Pollution (Acquisition of Small Vehicles for Waste Collection)	
SUBMITTED BY	Puerto Princesa City	November 2024

Location	Bgy. Sicsican, Bagong Silang (urban), and Cabayugan (rural)
Background	The City of Puerto Princesa has been providing regular waste collection in different areas within the City. Barangays were grouped into clusters to ensure a systematic collection of waste and have also partnered with NGOs. However, areas with narrow roads and streets become inaccessible to these collection trucks, thus leaving unsegregated waste on streets and vacant areas that are prone to leak into nearby streams and sea. Small collection vehicles shall be acquired to ensure collection in all areas to ensure segregated waste collection.
Objectives	Enhance waste segregation and collection services by small-scale vehicles capable of navigating narrow streets and roads. <ul style="list-style-type: none"> • Purchase six (6) small collection vehicles. • Deploy collection vehicles in target areas.
Resources	The procurement of the vehicles shall be financed from the ODA project, but the maintenance, and operations, including repairs, shall come from the city.
Budgetary Requirement	The pilot project is estimated to be around Php 3.5M
Timeline	Two years
Monitoring and Reporting	As one of the Project Sites of the ODA-PEMSEA project in the Philippines on Reducing Marine Plastics in the East Asian Seas Region, regular reporting and updates shall be provided to the Project Team, Funding Agency and the Philippine Government.

Contents

- I. INTRODUCTION 4
- II. PROJECT DESCRIPTION 4
 - A. Project Background 4
 - B. The Proposed Pilot Project..... 7
 - C. Timeline 10
 - D. Co-Financing Arrangements 10
- III. BENEFITS OF THE PROPOSED INTERVENTION 11
 - A. Project Impacts 11
 - B. Other Benefits 12
- IV. BARRIER ANALYSIS..... 12
- V. PROJECT MONITORING 13
- VI. SUSTAINABILITY AND CONCLUSION 14

I. INTRODUCTION

Puerto Princesa City, located in Palawan, Region IV-B, is a highly urbanized first-class city with a population projected at 345,223 in 2023, of which 95% reside in its 51 coastal barangays. The city comprises 66 barangays, divided into 35 urban and 31 rural barangays. Major economic activities include tourism, agriculture, fisheries, and commerce, supported by its abundant coastal resources. Many residents depend on fishing for their livelihood. The city has robust waste management overseen by various government offices, ensuring compliance with environmental standards through funding, logistical support, education campaigns, and program implementation.

In 2023, Puerto Princesa City generated 240.851 metric tons of waste daily, with a per capita rate of 0.7 kg/day. Waste sources include households, businesses, industries, and institutions, with 42% biodegradable and 32% recyclables. Efforts to manage waste include public education campaigns, waste segregation ordinances, and the provision of waste bins. Residents practice waste segregation, often for economic benefits, yet challenges remain due to inconsistent enforcement, limited infrastructure, and inadequate public participation.

II. PROJECT DESCRIPTION

A. Project Background

The city's waste collection is managed by the OCM-SWM Program, which serves all barangays except for two remote areas. In urban barangays, waste is collected through door-to-door services and mobile bins, with 34 out of 35 barangays covered by a three-shift system. In contrast, rural barangays rely on barangay officials for less frequent and more informal waste collection, with intervals depending on the volume of waste generated. Despite these efforts, challenges persist, as some areas in most of these urban barangays remain inaccessible to regular collection trucks, resulting in a significant amount of waste improperly disposed of, often ending up in water bodies.

The acquisition of eco-friendly garbage collection vehicles is essential to enhance the city's waste collection and recovery efforts. These small-scale vehicles shall be designed to navigate the narrow streets and roads inaccessible to regular garbage trucks, ensuring improved waste collection in underserved areas. This initiative aims to increase the efficiency of the LGU's waste management system while minimizing the leakage of waste into marine environments. The proposed funding will support the purchase of six (6) such vehicles to address this critical need.

Puerto Princesa City has enacted key ordinances focused on improving environmental protection and waste management as indicated in the table below. One particular enactment that pertains to plastics is CO-993 which regulates the use of single-use plastics.

1. Issued Ordinances Related to Waste Management

Ordinances	Title	Main Provision
City Ordinance 396 (2008)	Environmental Code	Discusses the types of wastes covered under this Code
City Ordinance 993 (2019)	Regulating the Utilization of Single-use Plastic and Polystyrene foam	Regulation on the Utilization of Single-use Plastic and Polystyrene Foam in the City of Puerto Princesa, and Providing Penalties for Violations Thereof.
City Ordinance No. 640 (2015)	Posting of City Ordinance No. 163-91	Posting of Anti-Littering Ordinance in all tourism establishments
City Ordinance 163-91 (1991)	Anti-Littering Ordinance	Prohibiting the Dumping of Waste in any Place in the street and other places not otherwise designated as dumping place and Providing Penalties Thereof.

2. Existing Facilities for Waste Management

The city operates a fleet of equipment to support its waste management and operational needs. The city has seven compactors, and 13 dump trucks with varying capacities that are all operational except for one. The equipment inventory also includes one excavator, one man-lift truck modified into a stake truck, and one mini dump truck. These vehicles and machinery contribute significantly to the efficiency of waste collection, transport, and other related operations in the city.

The city has a variety of waste management facilities to address its waste disposal and recycling needs. There are no open dumpsites, reflecting compliance with environmental regulations. However, there is one controlled dump site located in Barangay Cabayugan on the west coast, managed by the Protected Area Management Unit of the City government. The city also operates a sanitary landfill in Barangay Sta. Lourdes, which was previously a mercury mining site, has raised health and safety concerns for workers due to potential exposure to hazardous substances.

The city has made notable progress in the establishment of Barangay Materials Recovery Facilities (MRFs), achieving 74% compliance. As of 2022, 128 MRFs are operational across 49 barangays—23 in urban barangays and 26 in rural barangays. These facilities serve as temporary storage for mixed wastes and as collection points for recyclable materials like plastic bottles, cartons, paper, aluminum cans, metals, and glass, which are sold to junkshops, as well as biodegradable materials for composting. During scheduled collection days, waste generators deposit their mixed wastes in sacks or garbage bags at these MRFs. However, there are no central MRFs or specific data on the functionality of MRFs overall.

Additionally, the city hosts three private recycling facilities (junk shops) located in Barangays San Jose and Seaside. These facilities process recyclable materials and ship them to major hubs like Manila and Cebu, contributing to the broader recycling network.

3. Existing SWM Programs/Projects

The city implements several notable plastic waste management programs and projects that significantly contribute to reducing pollution and fostering environmental sustainability.

One such initiative is the "Save the Puerto Princesa Bays" program, which aims to rehabilitate coastal areas through community-led cleanups, particularly in urban barangays. By engaging individuals from diverse sectors, the program emphasizes raising public awareness about marine conservation. As of July 2024, the program has conducted nine events, successfully collecting 920.65 tons of trash. Another significant effort is the city's participation in the International Coastal Cleanup, which diverts approximately 19,615 kg of plastic waste annually. This program exemplifies collaboration for a cause that transcends borders, fostering a collective effort to combat pollution.

Existing Plastic Waste Management Programs/Projects in the City/Municipality	Estimated Diverted Plastic Wastes (in Kg) per Annum	REMARKS
Save the Puerto Princesa Bays	<u>813,195.267 kg/Yr</u>	This is a community-led clean-ups, specifically in the urban barangays
Participation in the International Coastal Cleanup	19,615 kg/Tr <i>(only conducted every 3rd Saturday of September)</i>	The International Coastal Cleanup with the common goal of collecting and documenting the trash littering their coastline.

4. Existing Partnerships

In achieving its waste management goals, Puerto Princesa City collaborates with various organizations to implement its environmental initiatives.

The Puerto Princesa City Sanitary Waste Management Board (PPCSWMB), guided by national laws such as RA 9003, RA 9275, RA 8749, and RA 6969 was reconstituted and expanded its scope to include wastewater and hazardous materials. It develops and updates waste management plans

and provides support for improved waste collection and community concerns like wastewater disposal.

Project Zacchaeus-Eco Kolek (PZC-Eco Kolek), launched in 2018, is one of the most active groups that helps in managing plastic waste in the city. It supports Purok Masikap in Barangay Banca-Bancao, where informal waste collection is a livelihood for many. Through the Samahan ng mga Mamamayan ng Jacana (SMJ), 60 active members collect 3,000 recyclable plastics weekly, aided by small collection vehicles to improve efficiency and income.

The Puerto Princesa Subterranean River National Park-Management Office (PPSRNP), via its Protected Area Management Board (PAMB), co-manages waste initiatives in Barangay Cabayugan with two collection vehicles. Local involvement is key, with 80% of its 50-member staff from nearby communities.

B. The Proposed Pilot Project

1. Budgetary Requirement: PhP 3.5M

- Six small vehicles: PHP1,200,000.00
 - Six units @ 200, 000.00 each

- Customization for waste collection & eco-friendly modification, licensing & registration & construction of parking facilities: PHP 1,440,000.00
 - 6 units @ 240,000.00 each

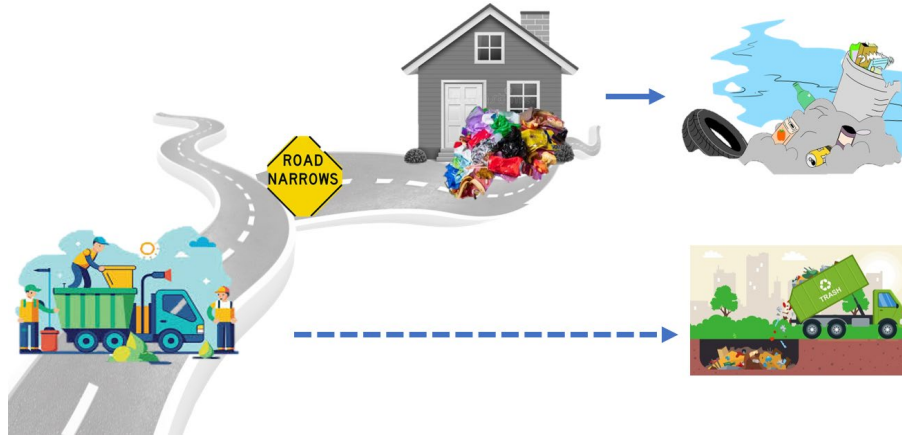
- Training and provision of a Complete set of uniforms for the collectors/drivers (Bioman and Biowoman): PHP 774,000.00

2. Current Waste Collection & Disposal Path

The City of Puerto Princesa currently implements a regular waste collection schedule, systematically grouping barangays into clusters to streamline the process. However, narrow roads and streets in some areas remain inaccessible to regular garbage trucks, often resulting in unsegregated waste accumulating on streets and vacant lots. This lack of regular collection and segregation results in a significant portion of the trash flowing directly into streams, rivers, and drainage systems, especially during heavy rains or flooding. Over time, this waste accumulates and is carried downstream to coastal areas, contributing to the growing issue of marine litter.

Introducing agile, small-scale collection vehicles offers an effective solution to these challenges by providing additional and reliable waste collection services in hard-to-reach areas. These

vehicles can navigate narrow streets and remote locations where conventional waste trucks cannot operate, ensuring that waste is properly collected and managed. By extending waste collection coverage, this approach reduces the volume of unsegregated waste that might otherwise end up in open spaces or waterways.



Narrow roads are inaccessible to collection trucks, leaving household waste uncollected and unsegregated. This unmanaged waste often enters waterways and eventually reaches various bodies of water, contributing to the growing problem of marine litter.

3. Target Waste Collection & Disposal Path



The proposed project shall help address segregation at the source and scheduled collection of waste. Regular trucks collect waste from major roads, while small-scale vehicles shall handle scheduled pickups of the recyclables in inaccessible areas. Segregated waste is sent to partner junkshops and recycling facilities for recovery, with possible non-recyclable residuals disposed of in landfills. The system prioritizes recyclables for an efficient collection to minimize environmental impact.

4. Initial Target Routes of the Small-Scale Vehicles



Initially identified deployment routes. (Light Blue-Administrative boundary; Dark Blue-National Highway; Yellow-Narrow roads)

5. Target Waste Diversion

The project is expected to enhance the city's waste diversion efforts. This improvement is projected based on calculated estimates, which quantify the potential increase in the proportion of waste redirected from the final disposal site to recycling, and recovery facilities.

The current and estimated waste diversion of the city/municipality is shown in the table below.

Name of City: The City of Puerto Princesa	Tons/day	Tons/Year
a. Total Mixed Waste Generation	<u>95</u> T/day	<u>34,675</u> T/yr
b. Total Plastic Waste Generation	<u>29.5</u> T/day	<u>10,767.5</u> T/yr
c. Current Amount of Plastic Waste Diverted (Through the existing facilities and other initiatives)	<u>4</u> T/day <i>(just the average per day)</i>	<u>1,460</u> T/yr
d. Target/Estimated Additional Amount of plastic waste to be diverted through the project (meaning once the project is implemented or operationalized)	<u>2</u> T/day	<u>730</u> T/yr

e. Total Amount of plastic to be diverted once the project is implemented	<u>6</u> T/day	<u>2,190</u> T/yr
--	----------------	-------------------

Therefore:

f. Current Plastic Waste Diversion (c/b x 100) = **13.5 %**

g. Target Plastic Waste Diversion (d/b x 100) = **6.7 %**

Total Percentage of Plastic Waste Diversion after the project implementation = **20.2%**

C. Timeline

Pre-implementation activities will be undertaken before actual implementation. This will include a full-scale feasibility study and shall also consider short and long-term plans. The activities involved may consist of the validation of sites, and the development of plans, including areas to be covered, possible routes, and number of times. Canvassing of vehicles and customization of such would also be part of the activities prior to its implementation.

D. Co-Financing Arrangements

The Local Government of Puerto Princesa would co-finance the implementation of the project from its annual budgetary allocation for its waste management activities. They shall shoulder the maintenance of the vehicles, allowances, and provision of training and incentives for the men and women who will act as the seregators and collectors of the waste.

<i>Source of Funds</i>	<i>Program/Activity</i>	<i>Amount Allotted (yearly)</i>
Local Government of Puerto Princesa (funds are already allotted by the LGU for waste management activities annually)	Vehicles maintenance cost	PHP 300,000.00
	Daily allowance of collectors/drivers for the succeeding years	PHP 756,000.00
	Continuous training of the collectors/drivers	TBD
	Provision of incentives	TBD
		PHP 1.56++M

III. BENEFITS OF THE PROPOSED INTERVENTION

A. Project Impacts

The project aims to bring transformative improvements to Puerto Princesa City's waste management system through the targeted intervention.

1. *Reduction and Elimination of Illegal Dumps*

By ensuring regular and efficient waste collection in previously underserved areas, the project will significantly reduce and eventually eliminate illegal dumping in these zones. This improvement will mitigate environmental and public health risks associated with unmanaged waste.

2. *Enhanced Segregation at the Source*

With the introduction of additional collection vehicles and strengthened waste collection strategies (i.e. stricter collection, economic benefits) the project will promote better waste segregation practices at the source. Public awareness campaigns and consistent collection services will encourage households and businesses to sort waste according to type.

3. *Improved Plastic Waste Collection*

It is projected that there will be an increase in plastic waste collection by 2T/day equating to 730 tons annually—an 20% improvement compared to current levels. This will not only help reduce plastic pollution in the environment but also create opportunities for recycling and recovery initiatives, supporting the city's sustainability goals.

4. *Economic Benefits*

The project is expected to generate additional income which shall be derived from the increased recovery and direct sale of recyclable materials such as plastics, metals, and glass, contributing to the financial sustainability of the waste management program. These funds can be reinvested in further improving waste management infrastructure and services, creating a positive feedback loop for long-term impact.

Estimated Revenue Generation:

- Daily Revenue from PET & PP Sales: Php 4,700/day
- Monthly Revenue (assuming 25 days of operation): Php 117,500/month
- Annual Revenue: Php 1.41M - Php 1.7M/year

Note: These are just projected revenues which were based on what the LGUs have experienced and the current situation. These are just being put forward to emphasize that there are good possibilities and

benefits if the project pushes through. These figures have to be validated prior to actual purchase and operations.

B. Other Benefits

1. *Reduced Investment and Fuel Consumption*

The use of agile, small-scale collection vehicles requires a lower initial investment compared to traditional large garbage trucks. These smaller vehicles consume less fuel, translating to lower operational costs and reduced carbon emissions. This approach is not only cost-effective but also environmentally friendly, aligning with the city's sustainability goals.

2. *Efficient Routing and Increased Waste Pick-Ups*

The introduction of smaller vehicles allows for optimized routing through narrow streets and congested areas previously inaccessible to larger trucks. This efficient routing enables more frequent waste pickups, improving overall service coverage and reducing the risk of waste accumulation in underserved areas.

3. *Reduced Road Wear*

Smaller vehicles are lighter and exert less pressure on road surfaces compared to larger garbage trucks. This reduction in road wear decreases the frequency and cost of road maintenance, extending the lifespan of city infrastructure and freeing up funds for other municipal projects.

4. *Expandable and Scalable Operations*

The modular nature of this approach allows for easy scaling as the city's waste management needs evolve. Additional small vehicles can be integrated into the system incrementally, addressing growth in population, urbanization, and waste generation without requiring a full-scale overhaul of the waste management infrastructure. This flexibility makes the program adaptable and future-proof.

Altogether, the benefits extend beyond immediate waste management improvements. They include significant cost savings, environmental gains, infrastructure protection, and the ability to adapt and expand operations over time, ensuring the system remains effective and sustainable.

IV. BARRIER ANALYSIS

- 1. *Uncooperative Households*** - failure to segregate waste properly, non-compliance with collection schedules, or resistance to new practices. This non-compliance leads to inefficient waste collection, contamination of recyclable materials, and increased volumes of mixed waste.

- *Mitigating Measure:* Conduct intensive IEC campaigns to emphasize the importance of household compliance; Implement incentives, such as rewards for segregating waste correctly, or penalties for non-compliance, and Engage local leaders and community influencers to foster a sense of responsibility and community ownership of the program.
2. *Unmaintained Vehicles* - Neglecting the routine maintenance of collection vehicles can lead to breakdowns, reduced operational efficiency, and increased downtime.
- *Mitigating Measure:* Develop a preventive maintenance schedule to ensure vehicles remain operational and efficient; Allocate funds for maintenance and repair and; Train vehicle operators to recognize early warning signs of mechanical issues and address them promptly.
3. *Untrained “bio-men and bio-women”*- waste collection personnel and lacking proper training may struggle with efficient collection, safe handling of waste, and effective communication with households. This could lead to inefficiencies, increased workplace hazards, and poor service delivery.
- *Mitigating Measure:* Conduct regular training sessions; Provide “bio-man” with appropriate personal protective equipment (PPE) and training on its use; Establish a feedback system where “bio-man” can report challenges and suggest improvements to their workflow.
4. *Lack of Funds* - Insufficient funding poses a major barrier to the maintenance, training programs, and other necessary resources for successful implementation.
- *Mitigating Measure:* Implement cost-recovery mechanisms, such as user fees for waste collection services; Prioritize investments based on cost-benefit analysis to ensure efficient allocation of limited resources.

Addressing these barriers requires a multi-faceted approach, combining education, capacity building, robust maintenance protocols, and innovative financing strategies. Proactively managing these challenges will be essential to ensure the project’s success and long-term sustainability.

V. PROJECT MONITORING

Project activities and implementation needs to be monitored including periodical evaluation of the intended impact, thus the need for the establishment of a localized project management team or structure. This may involve representatives from the different departments of the LGU.

Such structure shall ensure proper implementation/operationalization, and shall also guarantee support from concerned departments.

VI. SUSTAINABILITY AND CONCLUSION

Once operational, the small-scale vehicles will become part of the city's regular waste collection fleet, with a guaranteed annual budget from the city for its operations, the sustainability of this undertaking is assured. The employed and trained "Bioman" shall ensure the longevity of the small-scale vehicles. The LGU will eventually increase this number of small-scale vehicles by the LGU to cover all areas and increase its total collection.

The benefits of this project extend well beyond immediate waste management improvements. They encompass substantial cost savings, environmental enhancements, infrastructure preservation, and the flexibility to adapt and scale operations over time, ensuring long-term effectiveness and sustainability. Overcoming the identified barriers requires a comprehensive strategy that integrates public education, capacity building, rigorous maintenance protocols, and innovative financing solutions. Proactive management of these challenges is vital to the project's success and lasting impact.

This initiative will not only tackle urgent waste collection and environmental issues but also pave the way for a more sustainable, efficient, and economically viable waste management system for Puerto Princesa City.