

Plastic Wastes Survey in River Mouths Discharging to Manila Bay

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Introduction

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The Philippines as of 2010, contributed a total of **1.88 million metric tons (MMT)/year of plastic waste** to oceans, making the country being the **third largest contributor of plastics** in the ocean globally (Jambeck et al., 2015).



Introduction

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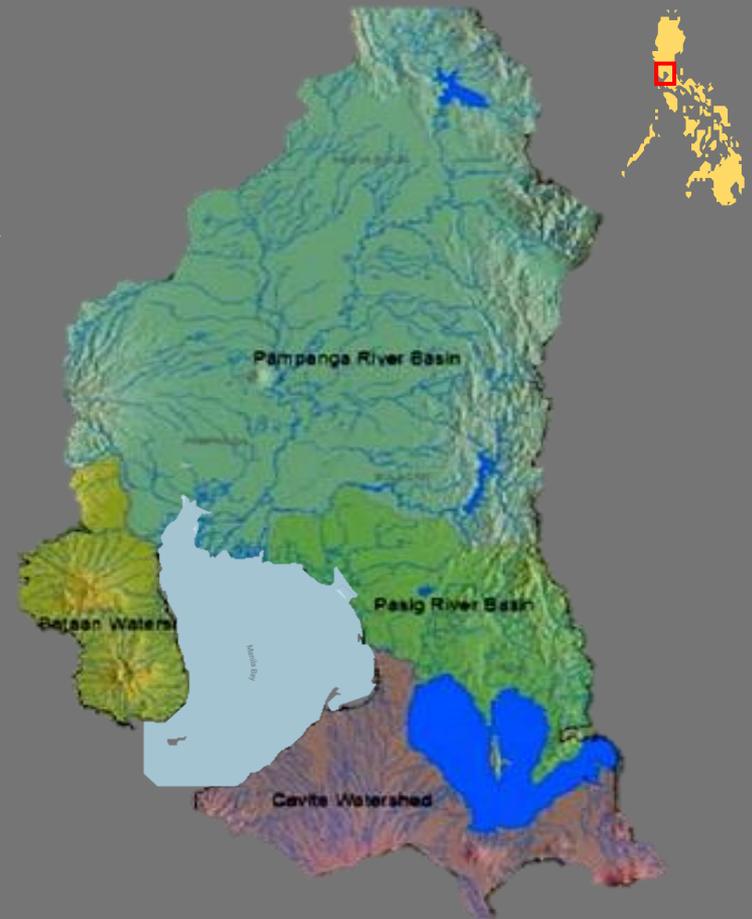
Manila Bay, with a watershed area of 17,000 km³, is an economically important area in the country. It is primarily used for international and local port and harbor, fishing ground, aquaculture, and other maritime activities.



Introduction

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It receives discharges from **17 major river systems plus many canals** flowing through the through densely populated and industrialized urban stretches of **Metro Manila, Bulacan, Pampanga and Cavite.**

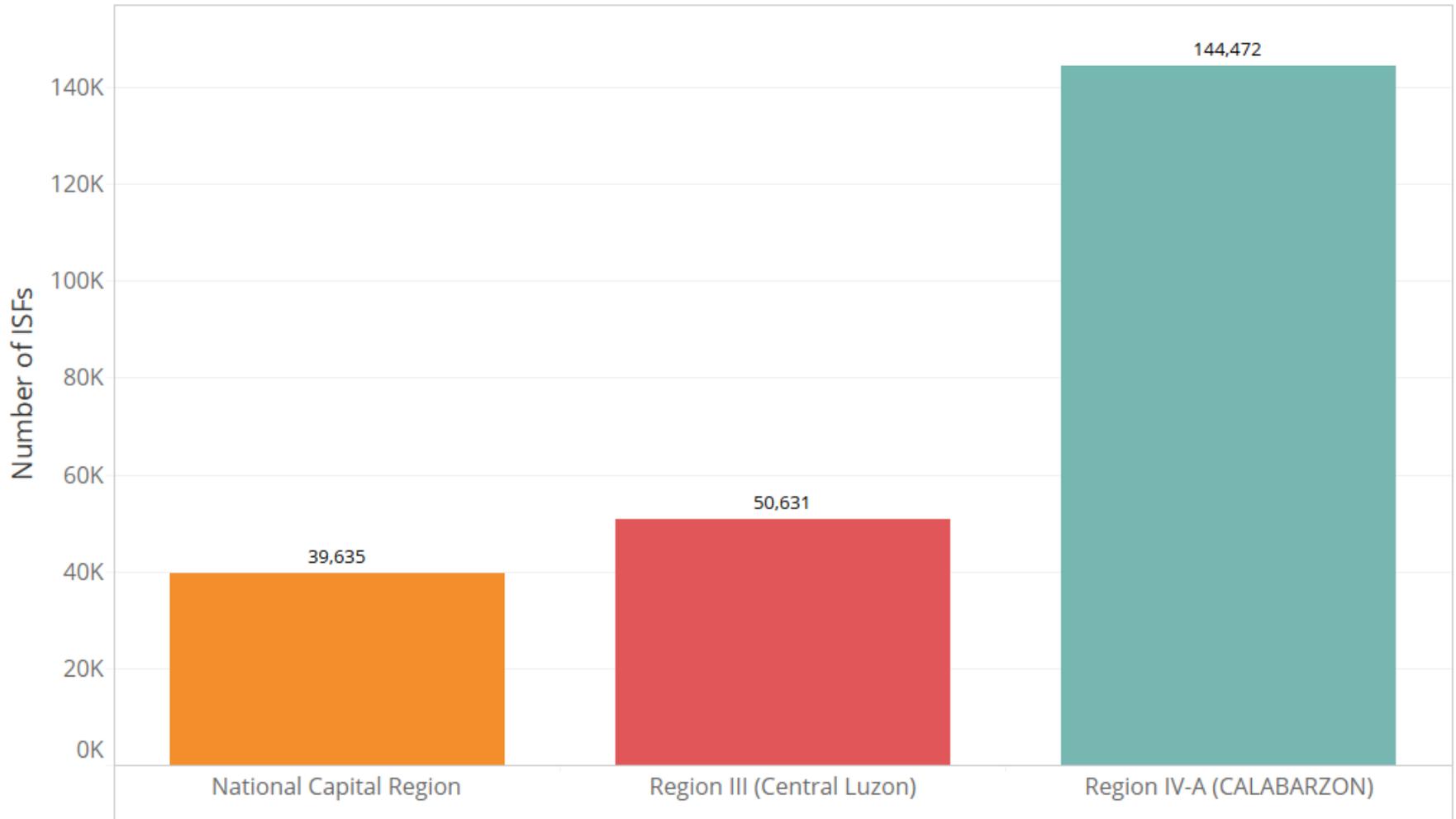


(Soilscape 2nd Quarter Issue, 2012)

Introduction

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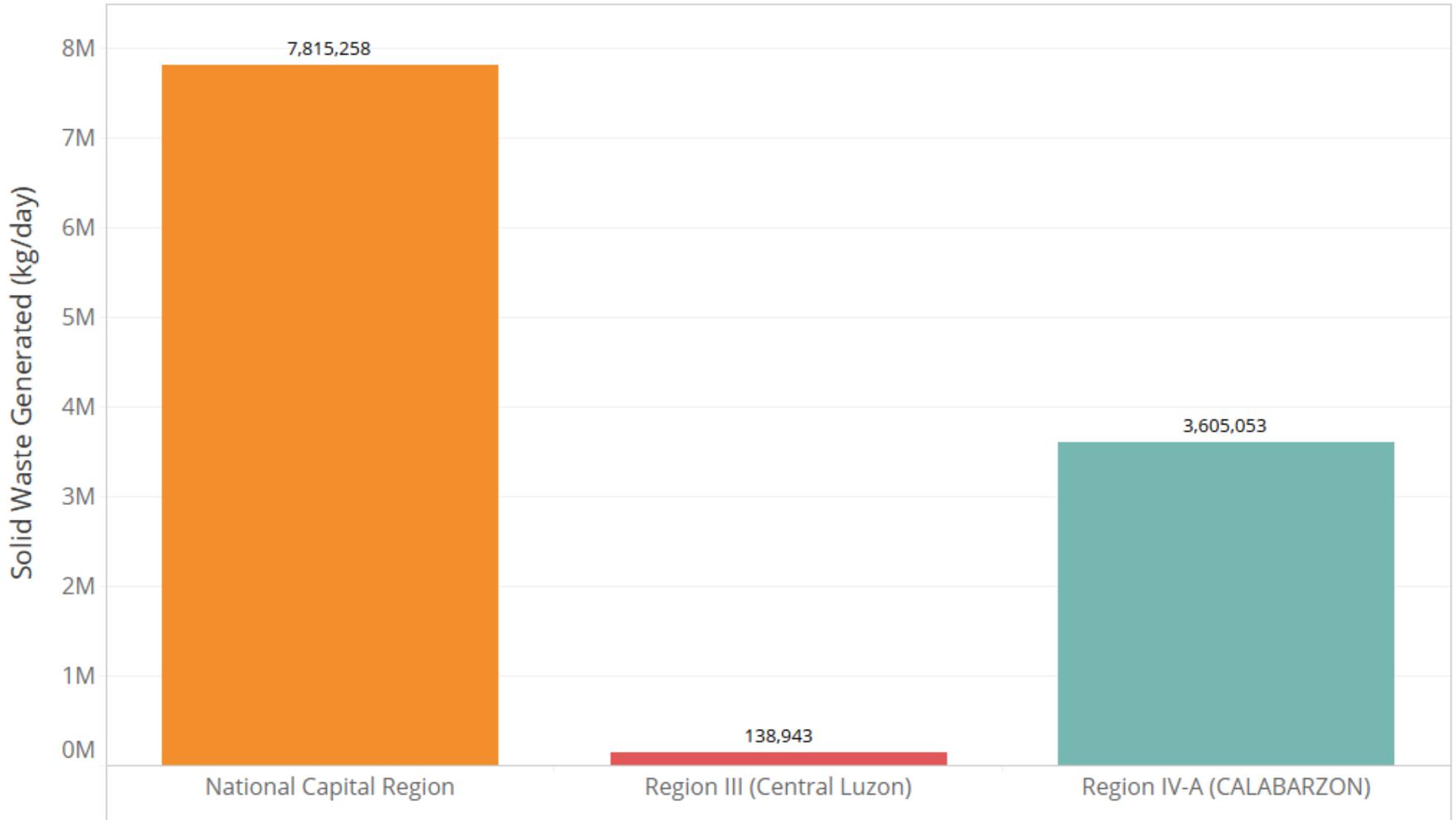
Number of Informal Settler Families (ISFs) within Manila Bay Watershed



Introduction

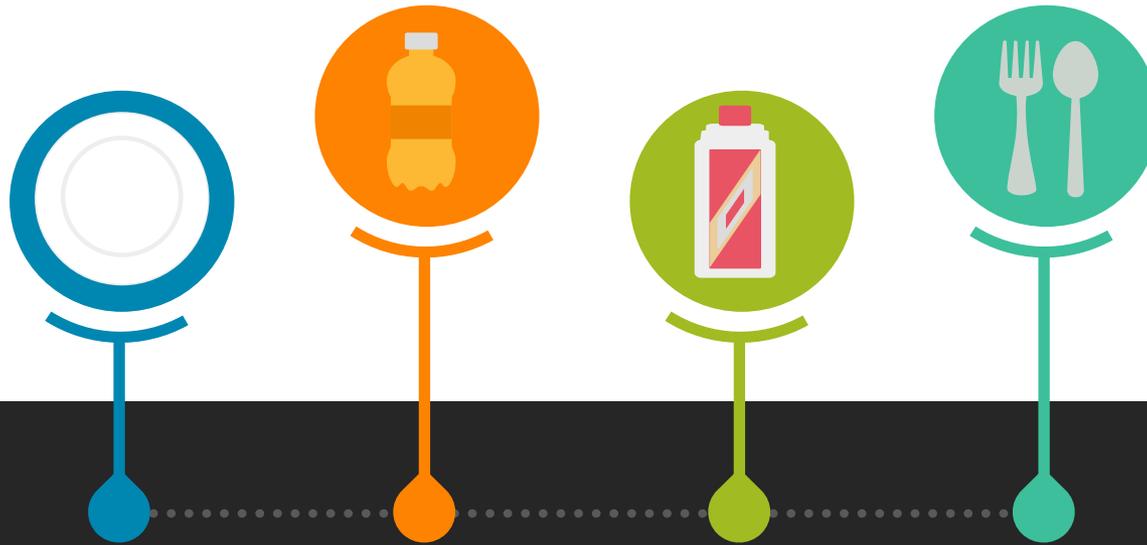
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Solid Waste Generated within Manila Bay Watershed



Objective

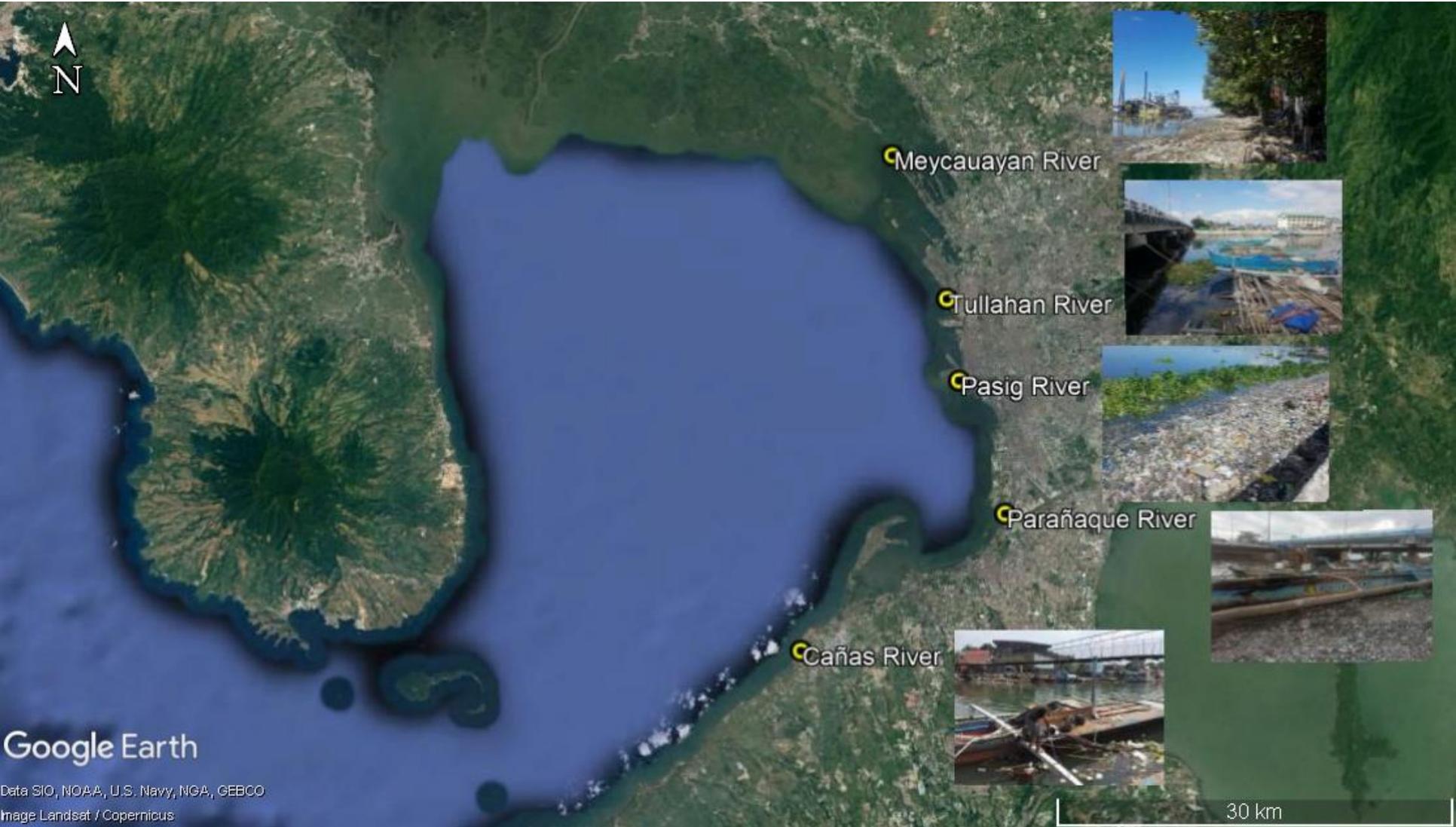
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To characterize the plastic waste sampled for five identified river mouths of Manila Bay

Study Area

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Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Image Landsat / Copernicus

Study Area

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CAÑAS River
Cavite (Region IV-A)

Study Area

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MEYCAUAYAN River Bulacan (Region III)

Study Area

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PARAÑAQUE River Metro Manila (National Capital Region)

Study Area

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PASIG River
Metro Manila (National Capital Region)

Study Area

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TULLAHAN River Metro Manila (National Capital Region)

Methodology

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1 Collection

Existing wastes were randomly collected in the sampling area and were put inside a storage box with definite volume.

2

Sample Weighing

The whole waste sample was weighed and the result was recorded in data entry form.



3 Waste Characterization

Contents of the box containing wastes were poured out and segregated into these types: Paper, Glass, Metal, Plastic, Organics, Special, Hazardous and Other Inorganic.



Waste samples collected in Parañaque River



Plastic samples collected in Tullahan River



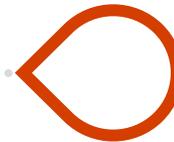
4 Plastic Characterization

Contents from each category were divided into sub-categories. For example, the contents of the Plastic were sorted into these types: Hard Plastic, Film Plastic, Polystyrene, PET, PVC and HDPE. Each content from the sub-categories was weighed and recorded.

Data Processing

Recorded data were processed, analyzed and illustrated using MS Excel- based linked templates which are designed to systematize data and automatically generate estimates and summaries.

5



RESULTS

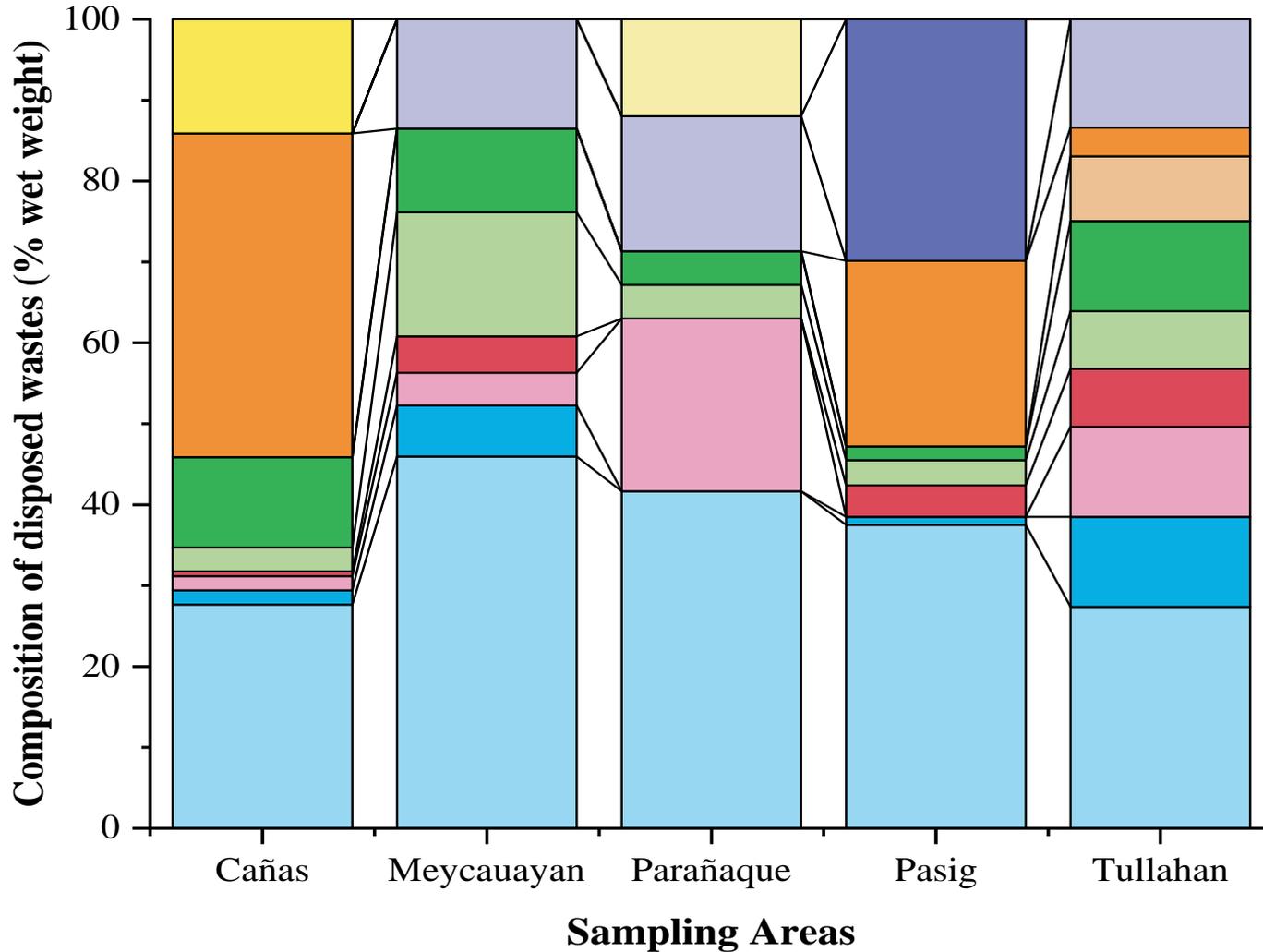
Results

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Sampling Area	Weight of Disposed Wastes Collected (kg)	Volume (m ³)	Bulk Density (kg/m ³)	Area Covered (m ²)	Average Depth of Water (Sampled Area) (m)
Cañas River	17.00	0.12	141.67	21.18	2.0
Meycauayan River	11.10	0.09	123.33	15.08	0.5
Parañaque River	7.50	0.05	150.00	15.86	0.2
Pasig River	29.64	0.12	246.96	17.43	0.2
Tullahan River	28.05	0.15	187.00	12.31	2.0

Results: Composition of Waste

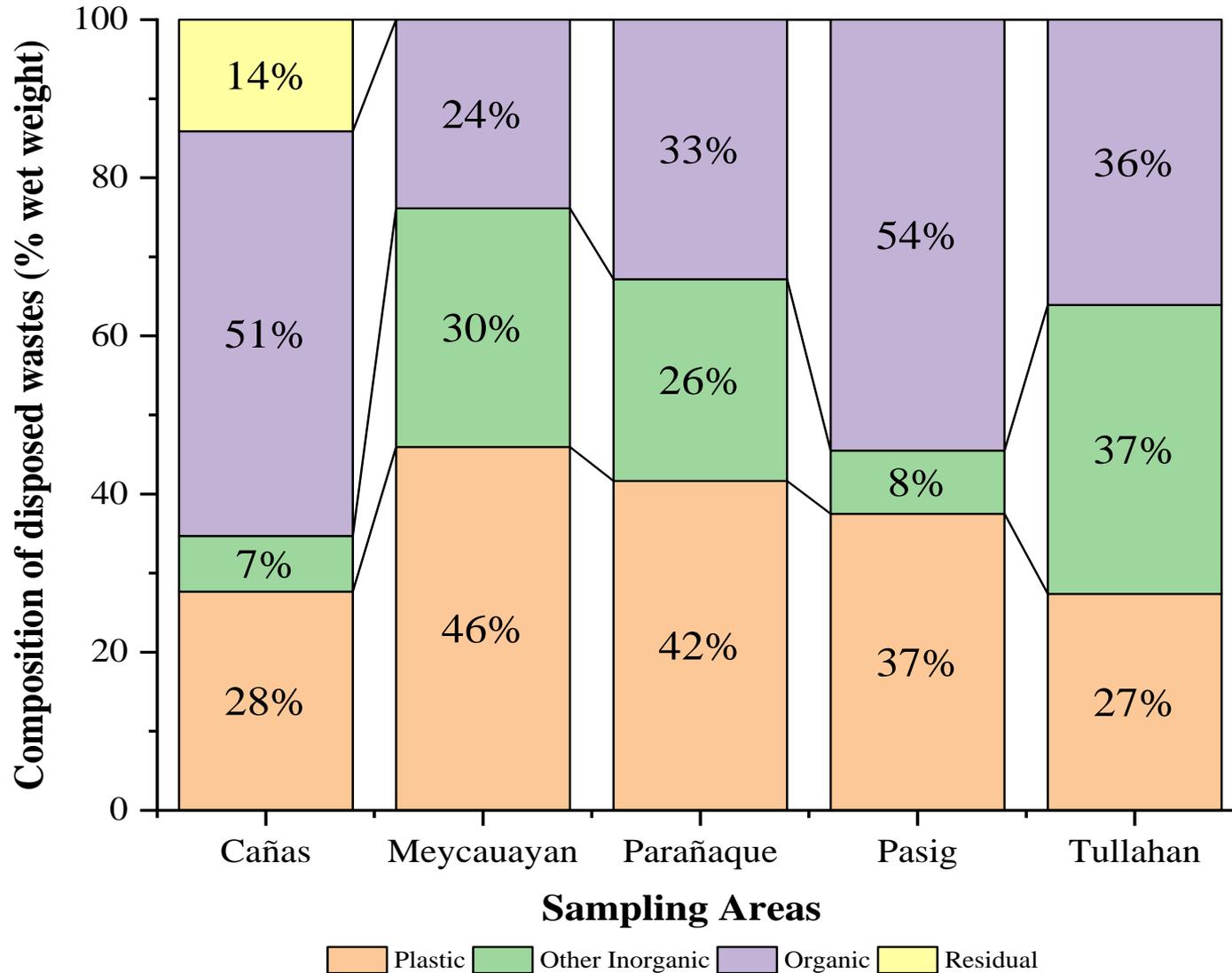
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■ Plastic
 ■ Metal
 ■ Paper
 ■ Glass
 ■ Rubber
 ■ Yard Waste
 ■ Leather
 ■ Food Waste
 ■ Wood
 ■ Textiles
 ■ Animal Remains
 ■ Diaper

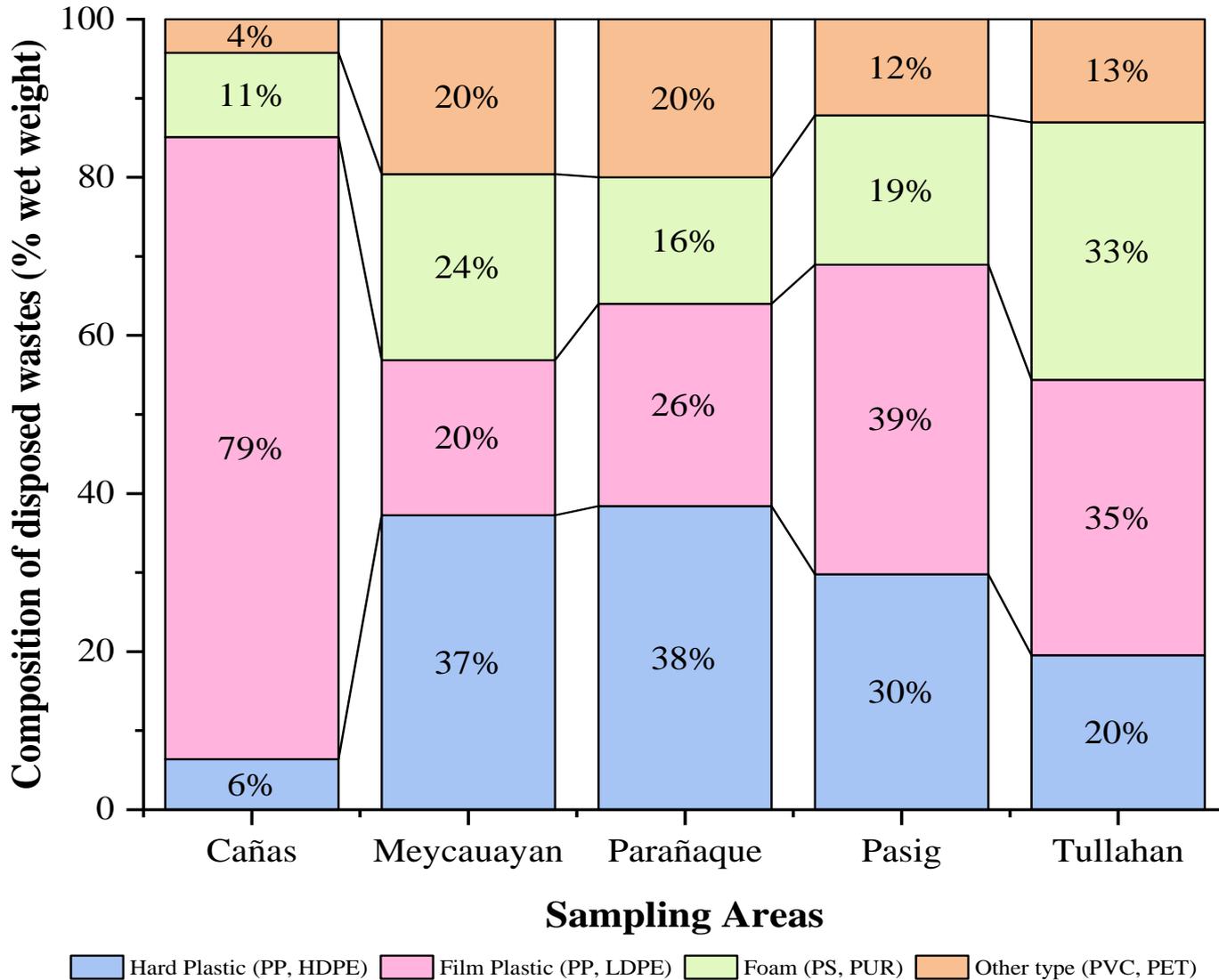
Results: Composition of Waste (General)

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Results: Composition of Plastic Waste

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Results

Plastic Wastes Survey in River Mouths Discharging to Manila Bay

Study Area	Plastic Type			
	Hard Plastics (PP, HDPE)	Film Plastics (LDPE, PP)	Foam (PS, PU)	Other Types (PVC, PET, etc.)
Meycauayan River	Most abundant plastic type. Items such as bottles of detergents and toiletries were collected.	Numerous plastic straw ropes were collected as fishermen use these straws to tie up their boats to the docking area.	Foams gathered were mostly comprised of PS (specifically Styrofoam) – disposable items such as cups and food containers used for takeout.	Only few PVC and PET waste as compared with other types were collected. Most PVC products are being used as construction materials. PET bottles were commonly recycled and sold to junkshop.
Parañaque River				
Cañas River	Usually household products such as shampoo bottles, broken clippers and hangers (used for clothes) and cup noodle containers.	Most abundant plastic type. The river mouths are surrounded by residential areas, hence most of the waste collected are different sachets of household products and plastic bags.		
Pasig River				
Tullahan River				

Solid Waste Management Infrastructure

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Collection Efficiency

National Capital Region – 95%
Region III (Central Luzon) – 56%
Region IV-A (CALABARZON) – 61%

Material Recovery Facilities (MRF)*

National Capital Region – 974
Region III (Central Luzon) – 574
Region IV-A (CALABARZON) – 491

33% of required number
on a national scale

Available Landfills*

National Capital Region – 1
Region III (Central Luzon) – 4
Region IV-A (CALABARZON) – 10

11 % of required capacity
on a national scale



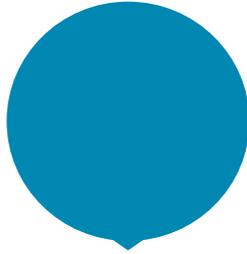
*Within Manila Bay Watershed (NSWMC, 2019)

Conclusion

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Substantial amount of plastic wastes (especially single-use plastics) in each of the river mouths signifies poor waste management infrastructure available (low collection efficiency, lack of MRFs and lack of landfills).

All of the rivers in this study run through densely populated, urbanized and industrialized areas, and there is a high probability that the amount of wastes accumulated (particularly microplastics) will increase in the future.



THANK YOU!