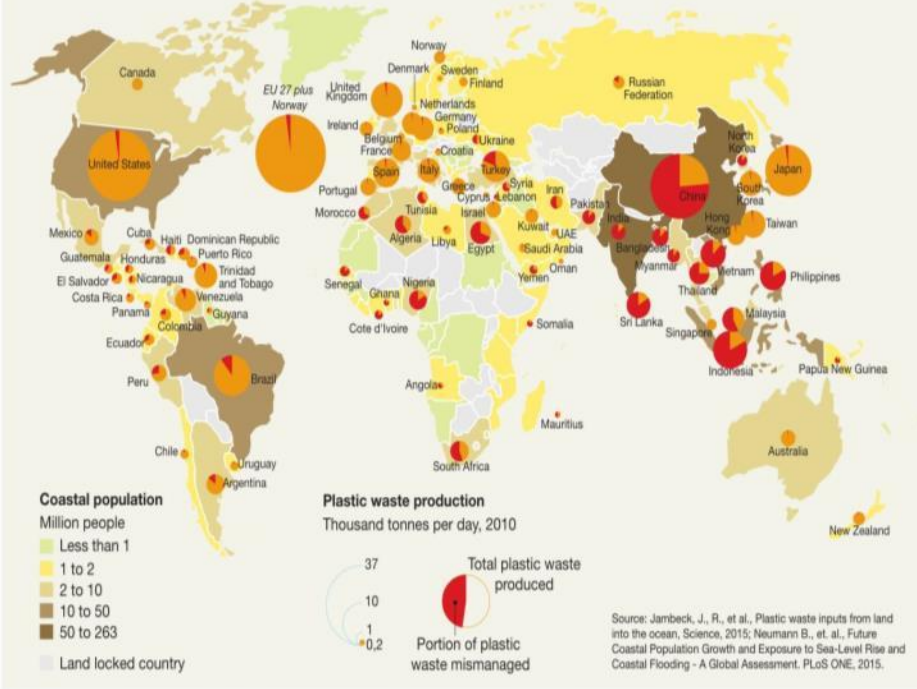


Microplastic characterization in Tunasan River in Metro Manila

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World Water Week
Stockholm, Sweden
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Plastic waste produced and mismanaged



Rivers are highways of plastic litter transport to lakes and oceans

Flows of plastic waste



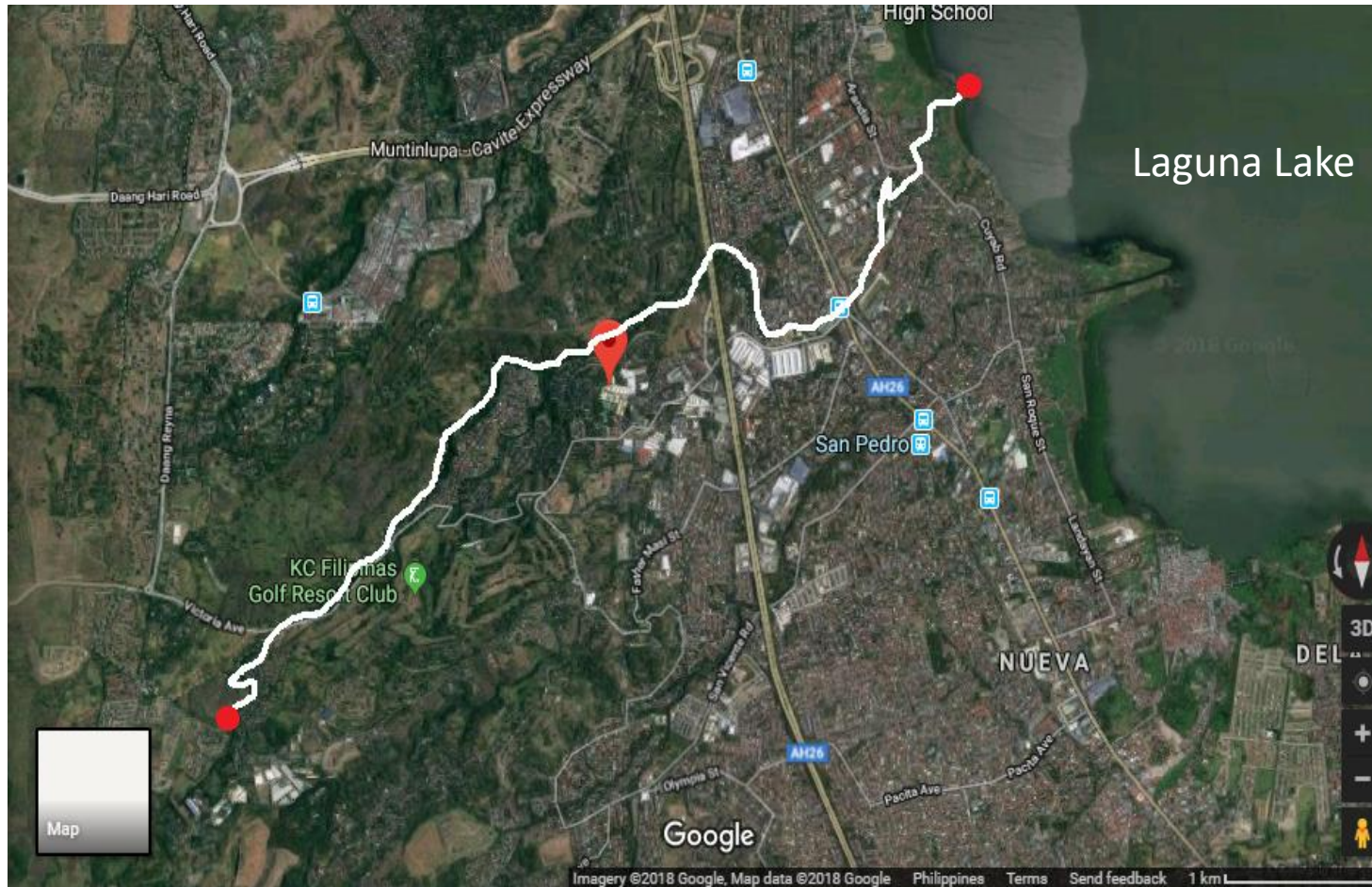
Source: Expert interviews; field visits; Roland Geyer et al., "Plastic waste inputs from land into the ocean," Science, February 13, 2015, sciencemag.org; National Solid Waste Management Commission (Philippines); World Bank Group; McKinsey analysis

The Philippines is the 3rd largest source of plastic leaking into oceans

Jambeck, et. al. (2015)

TUNASAN RIVER

- One of the 21 major tributaries to Laguna Lake
- **9 km**
- **3 *barangays*** (Tunasan, Cuyab, San Antonio)
- Traverses through **factories**, commercial establishments, an **industrial complex**, and **residential areas**
- several **informal settlements**

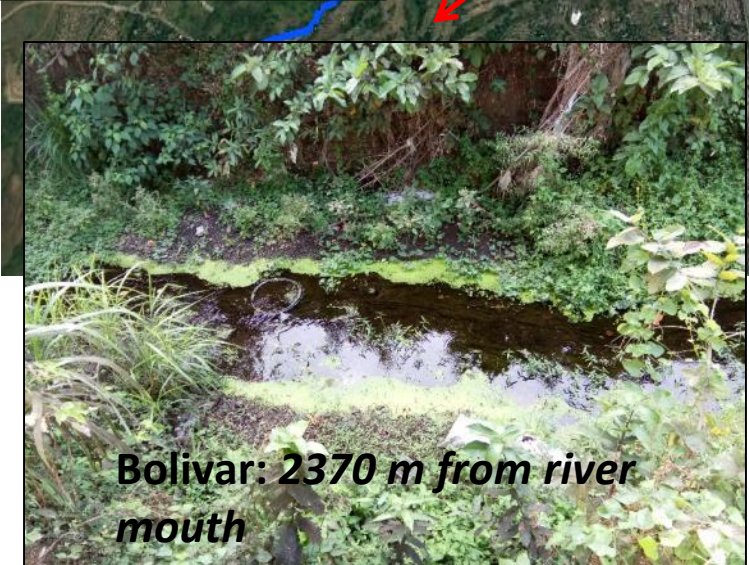




**Pinagbuklod: 3000 m
from river mouth**



Cuyab: 260 m from river mouth



**Bolivar: 2370 m from river
mouth**



Regala: 1520m from river mouth

SOLID WASTE CHARACTERIZATION



COLLECTED A
REPRESENTATIVE
SACK FOR EACH
STATION



ESTIMATED
VOLUME OF
WASTE



SEGREGATED WASTE
AND WEIGHED EACH
TYPE OF MATERIAL

COLLECTION OF MICROPLASTIC SAMPLES

COLLECTED WATER
FROM 3 POINTS
ACROSS THE STATION



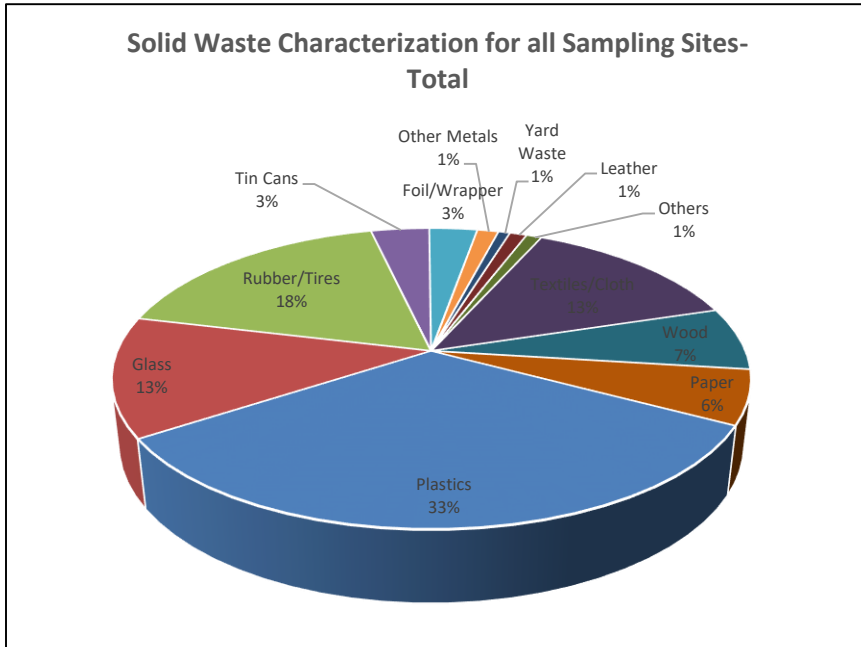
ALLOWED 20L OF
WATER TO PASS
THROUGH SERIES
OF SIEVES



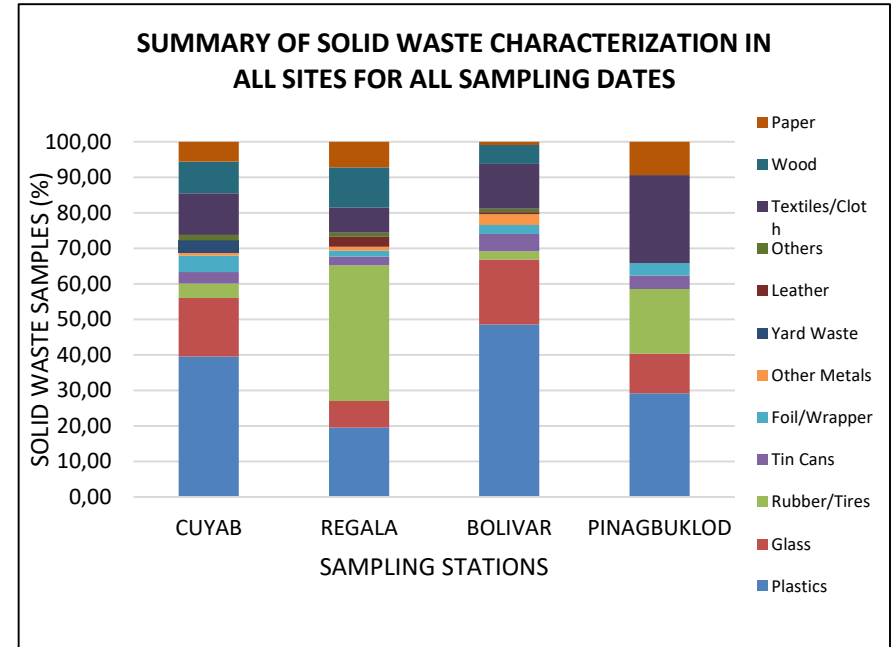
COLLECTED TRAPPED
MATERIAL IN EACH
SIEVE AND STORED IN
SEPARATE JARS



SOLID WASTE



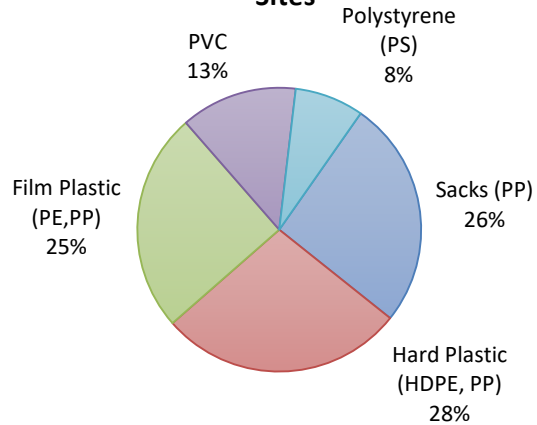
PLASTIC (33%), RUBBER (18%), GLASS (13%), AND TEXTILES (13%) CONSTITUTE MAJORITY OF SOLID WASTES



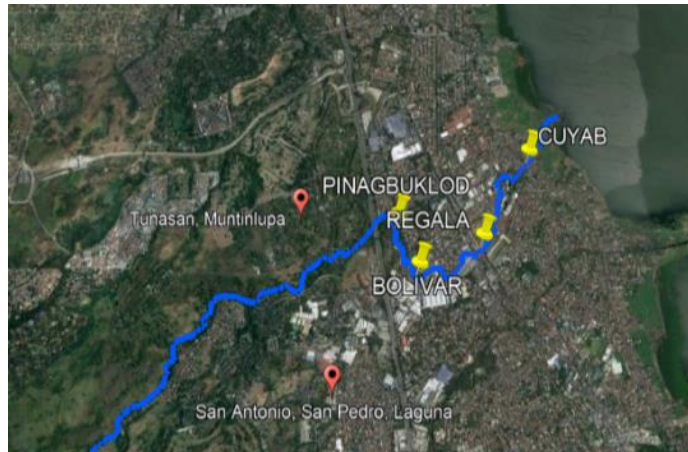
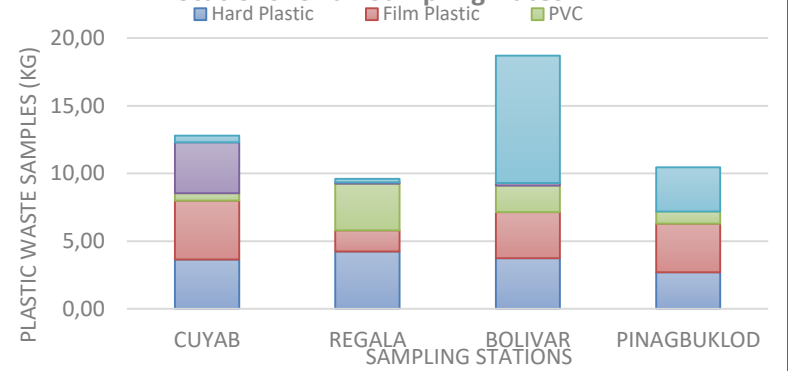
GENERALLY, PLASTICS, GLASS AND RUBBER WERE FOUND AT ALL STATIONS

MACRO PLASTIC WASTES

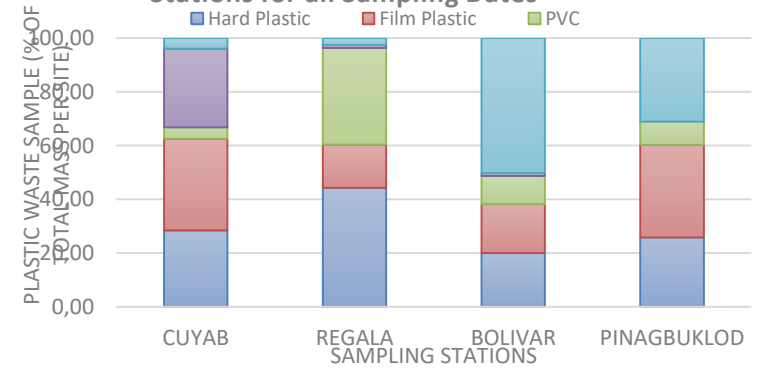
Plastic Waste Characterization for all Sampling Sites



Summary of Plastic Wastes in all Sampling Stations for all Sampling Dates



Summary of Plastic Waste in all Sampling Stations for all Sampling Dates



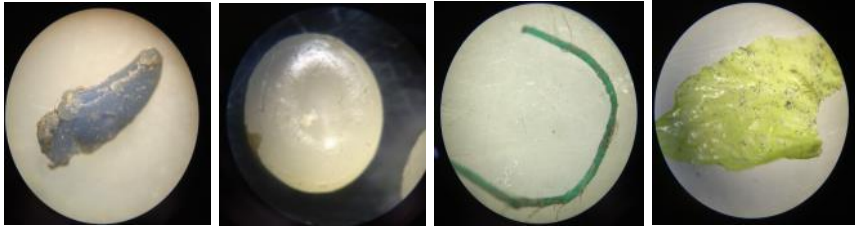
MICROPLASTICS SIZE RANGE

	0.300 - 0.800 mm	0.800 - <4.76 mm
fragment	49.22	50.78
pellet	0.00	100.00
foam	37.50	62.50
filament	45.10	54.90
film	28.79	71.21
TOTAL	47.93	52.07

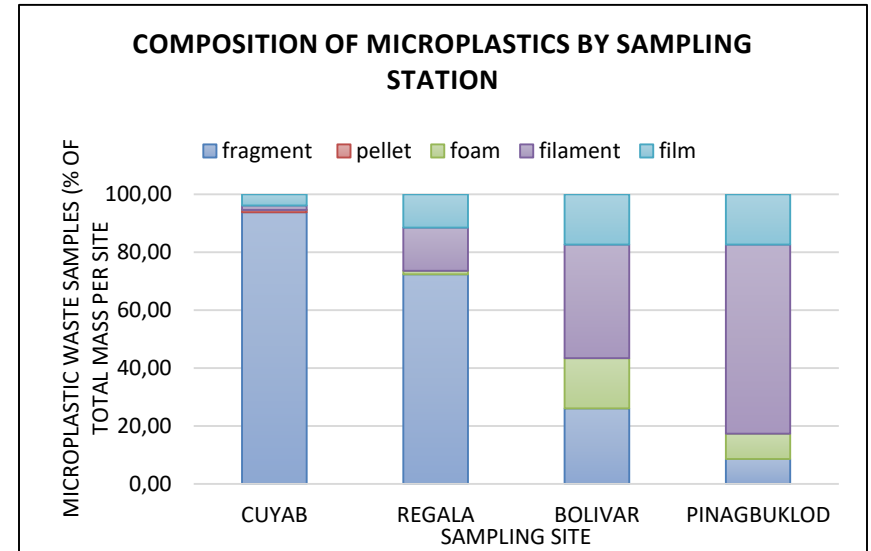
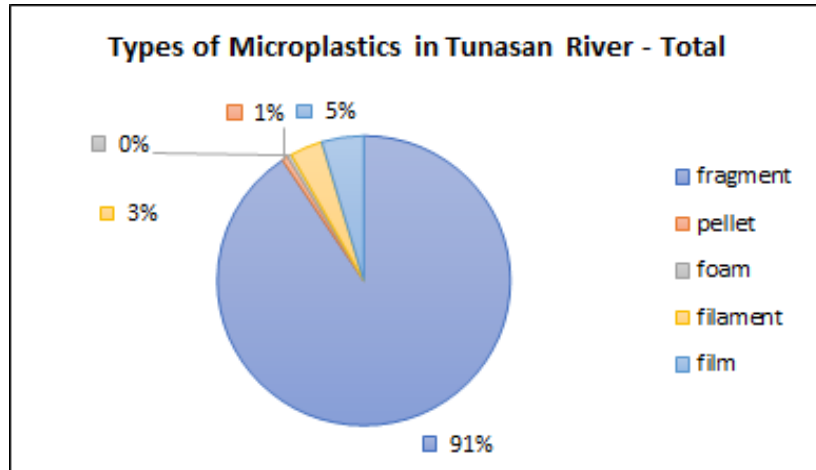
MICROPLASTICS QUANTITY AND CONCENTRATION

Sampling station	Particle count	Concentration (particles/L)
Cuyab	7-1351	0.12-22.52
Regala	7-57	0.12-0.95
Bolivar	6-10	0.10-0.17
Pinagbuklod	8-9	0.10-0.15

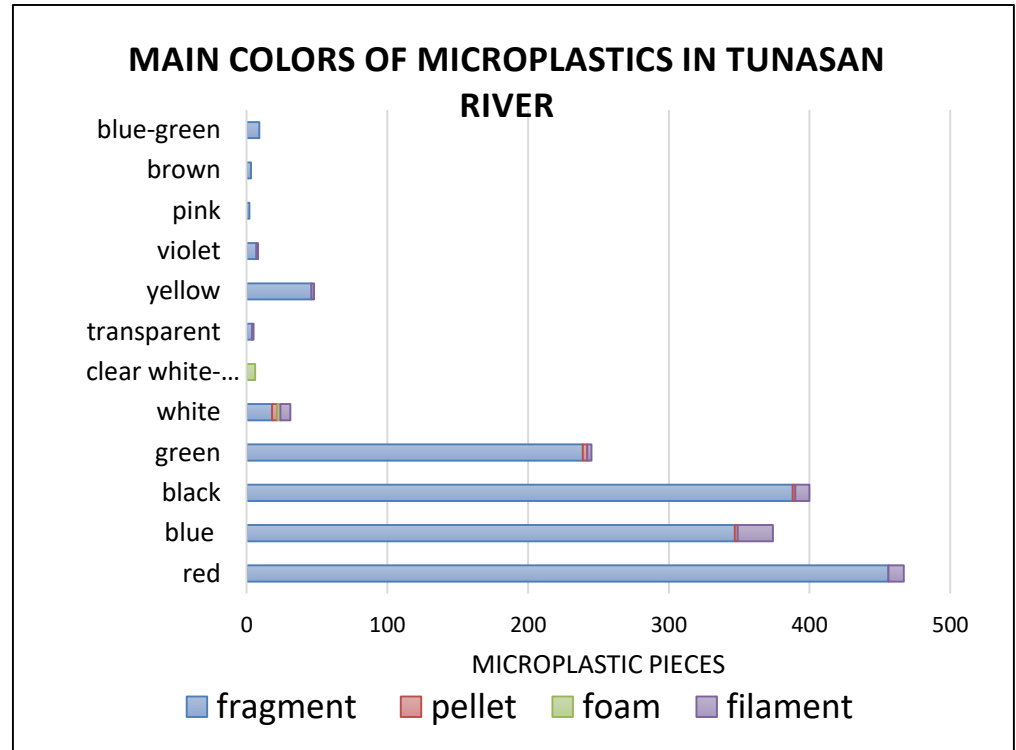
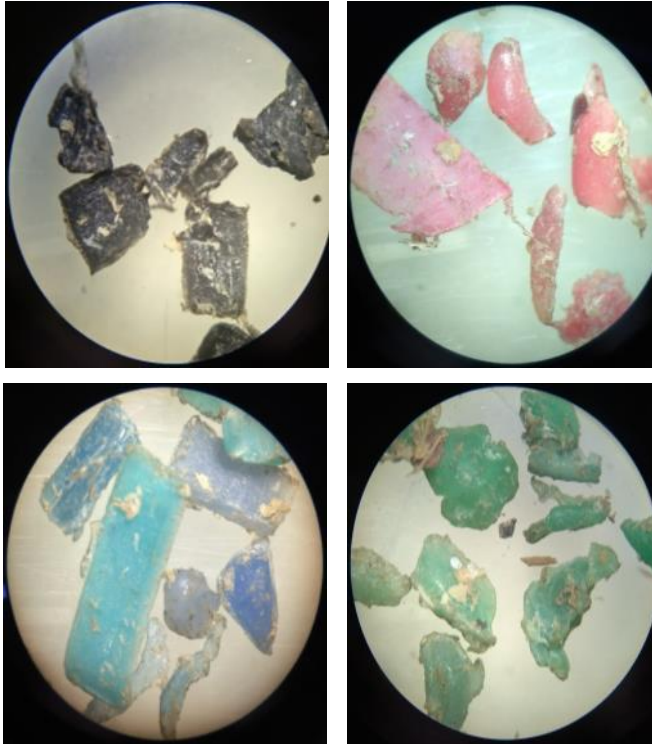
PARTICLE TYPE and MORPHOLOGY



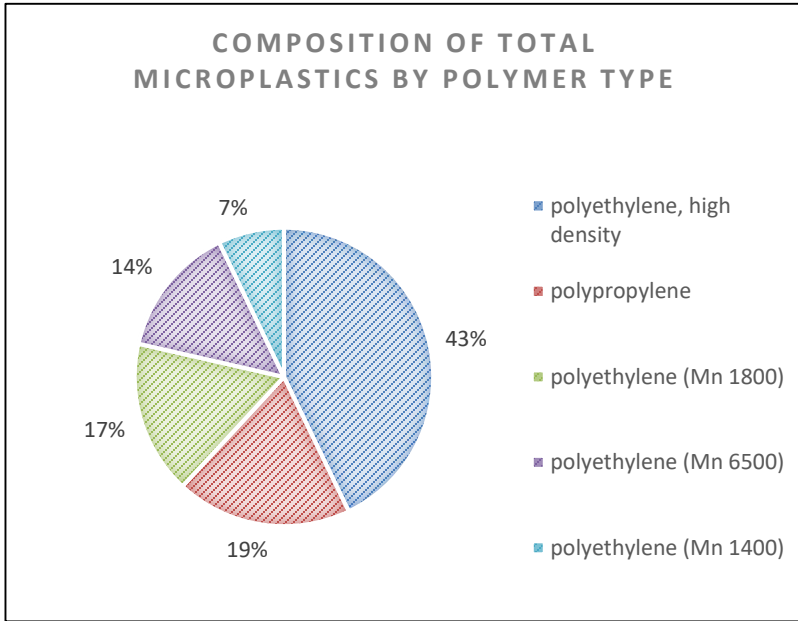
Types of Microplastics (L-R): fragment, pellet, fiber, film (30x magnification)



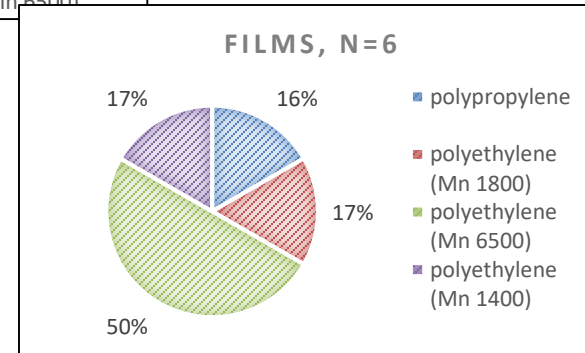
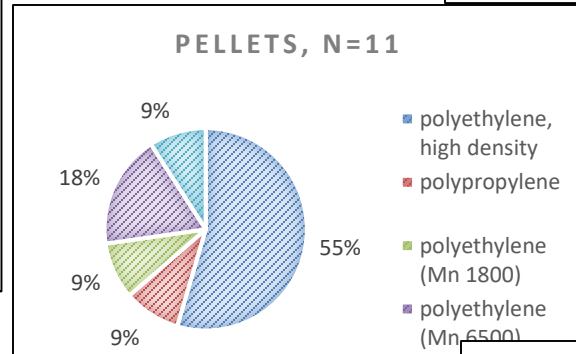
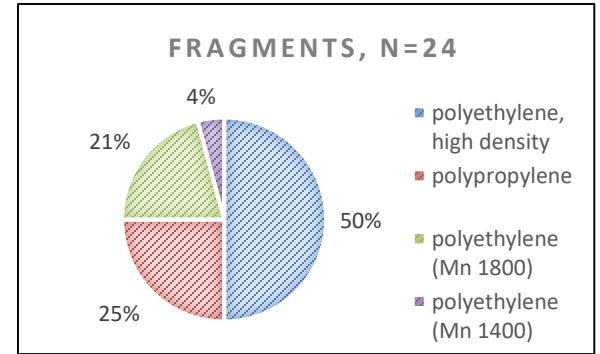
COLOR OF MICROPLASTICS



FTIR IDENTIFICATION OF POLYMER TYPE



Polyethylene (81%)
Polypropylene (19%)



CONCLUSIONS AND POLICY RECOMMENDATIONS

1. Abundance of plastic litter on the river shows that the **ban on plastic bags** of Muntinlupa and San Pedro **is not strictly implemented**.
2. Frequent collection of garbage particularly in areas near the river should be done.
3. Conduct **awareness campaign on solid waste pollution**, its risks, and role of inhabitants on solid waste (and plastic) pollution.
4. Technology to **recycle single-use plastics should be studied and supported**, particularly polyethylene and polypropylene. Social entrepreneurship is encouraged particularly for waste collection.
5. Close open dumpsites and penalize waste haulers who illegally dump its collected wastes.

Maraming salamat!

