PATTERNS, TYPES, AND DISTRIBUTIONS OF MACROPLASTIC DEBRIS BASED ON OCEANOGRAPHIC CONDITIONS AND COMMUNITY PERSPECTIVES: CASE STUDIES IN MUARA GEMBONG DOWNSTREAM OF CITARUM

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[VIRTUAL] INTERNATIONAL CONFERENCE ON MARINE SCIENCE & AQUACULTURE

Background



- 8 million tons of plastic debris that end up on the high seas every year and 80% of the total marine debris is found on the ocean surface and seabed (IUCN, 2018).
- Indonesia being one of countries in the Southeast Asian that has to improve the strategical solution of plastic waste through launching the initiation of the National Action Plan on Marine Debris (World Bank, 2018)
- Plastic waste distribused from land into ocean. Muara Gembong as the one of polluted estuary that has impact into human activities and aquatic ecosystems.






Muara Gembong Fishermen has struggling with plastic waste trapped in fishing nets


Marine Debris condition near estuary

Research Purposes

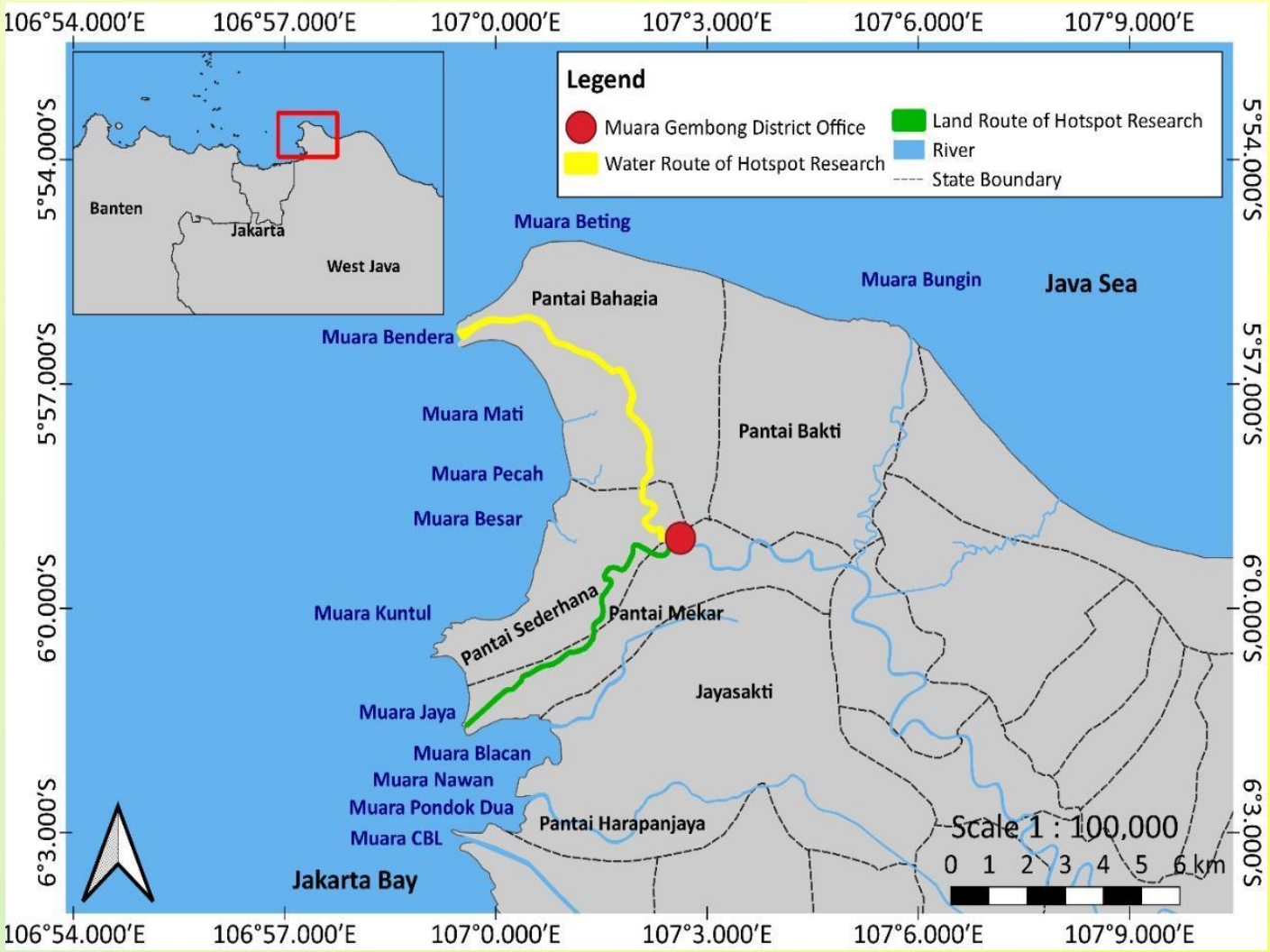
1. Knowing the distribution point and type of macroplastic debris in Muara Gembong
2. Knowing the oceanographic factors in Muara Gembong
3. Knowing the comparison of local people's perception and oceanographic factors about distribution of macroplastic debris in Muara Gembong

Research Methodology

Time and Place

April and August-September 2021

Muara Gembong ,Bekasi Subdistrict, west Java Province



Oceanography Data

PARAMETERS	
Wind	WR Plot 8.0.2
Current	Qgis 3.16
Tides	Microsoft Excel 2016

MONSOON SEASONS	
West Monsoon Season /WMS	December, January, February
Transitional Season 1 / TS1	March, April, May
East Monsoon Season /EMS	June, July, August
Transitional Season 2 / TS2	September, October, November

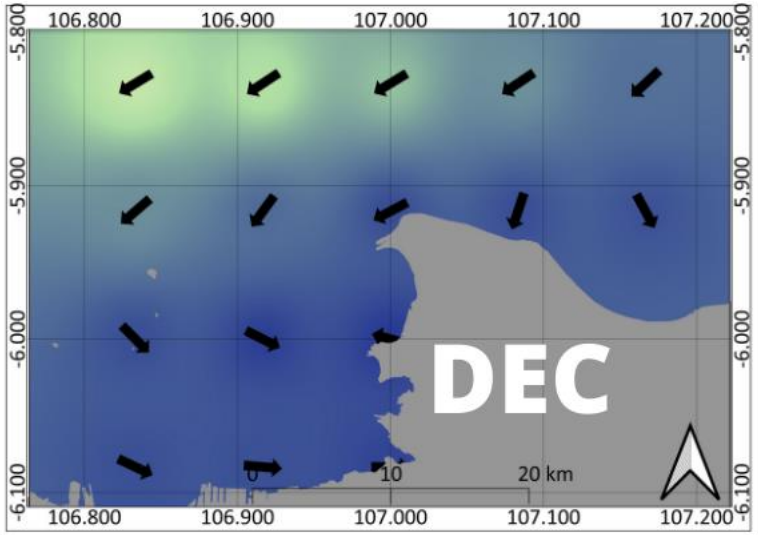
Debris Data

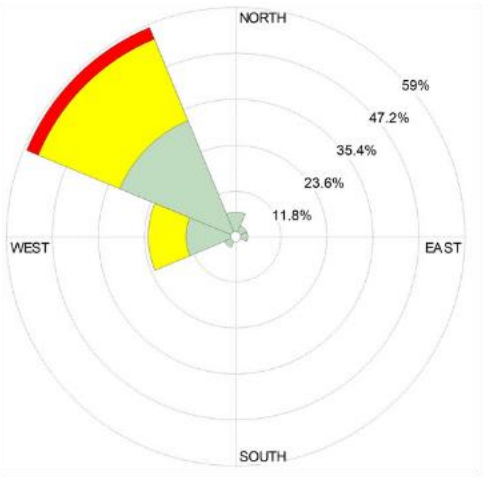
METHOD	
Focus Group Discussion	19 **Attendances**
Hotspot Sampling	**Muara Bendera and Muara Jaya**
Interview	**100 respondents**

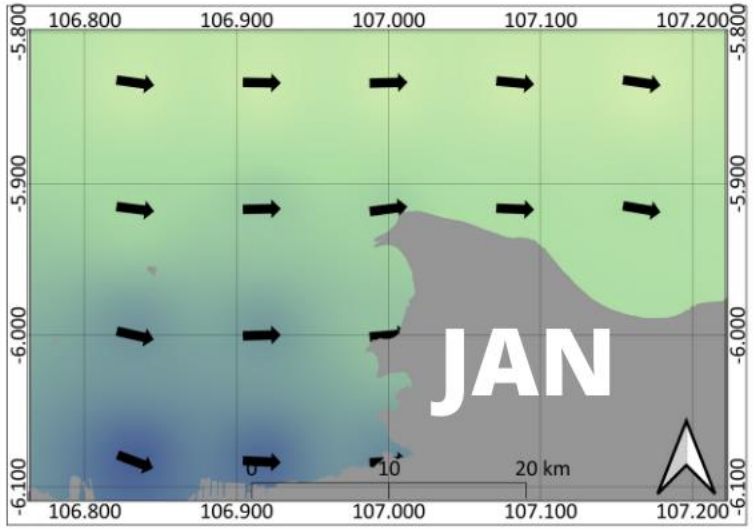


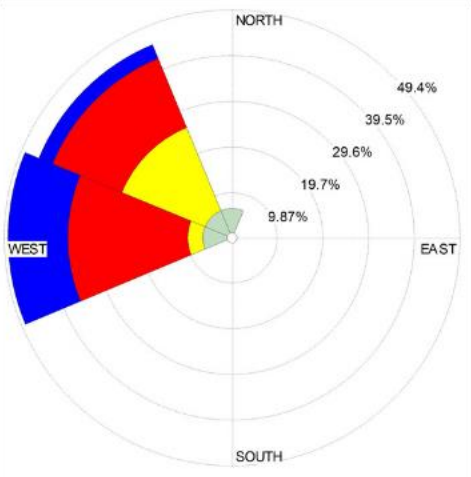
RESULT OF OCEANOGRAPHY

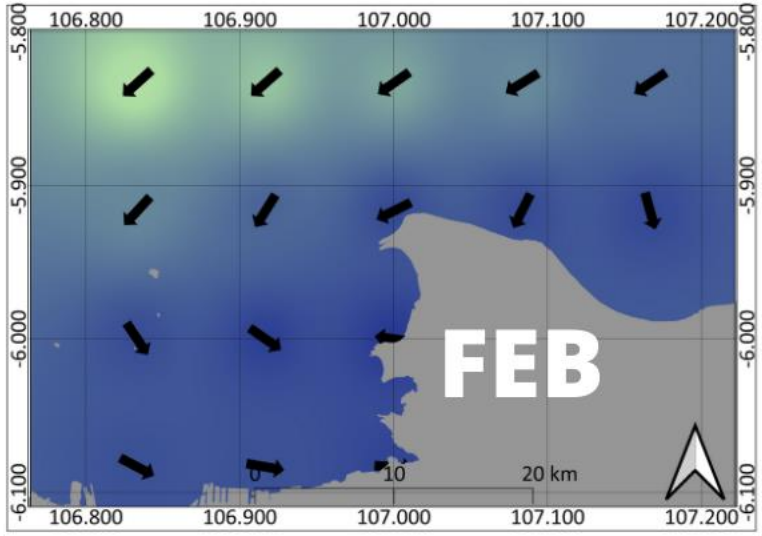
West Monsoon Season /WMS

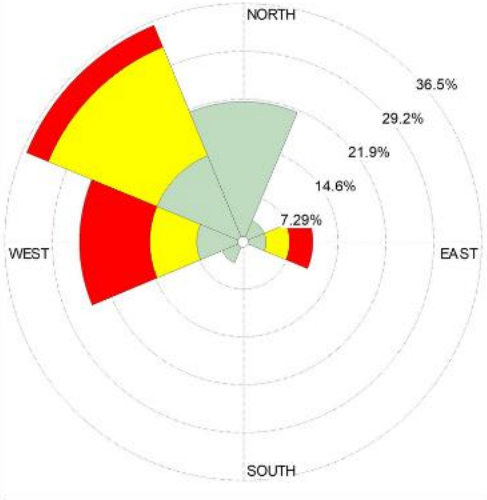












Current Direction

Current Velocity (m/s)

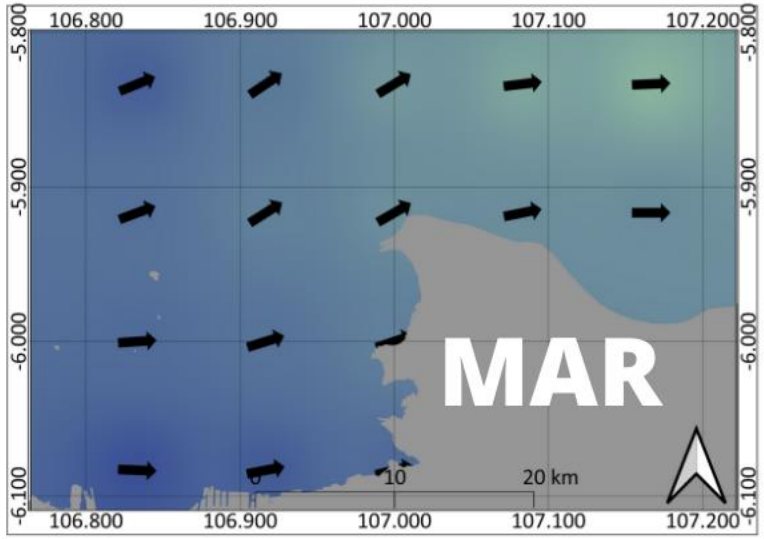
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0.1212725	0.3581575	

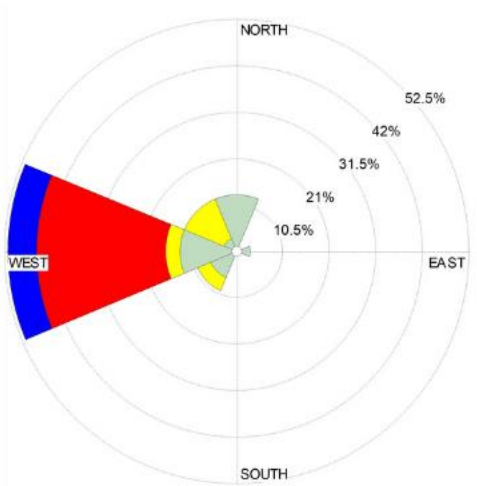
Wind Speed (m/s)

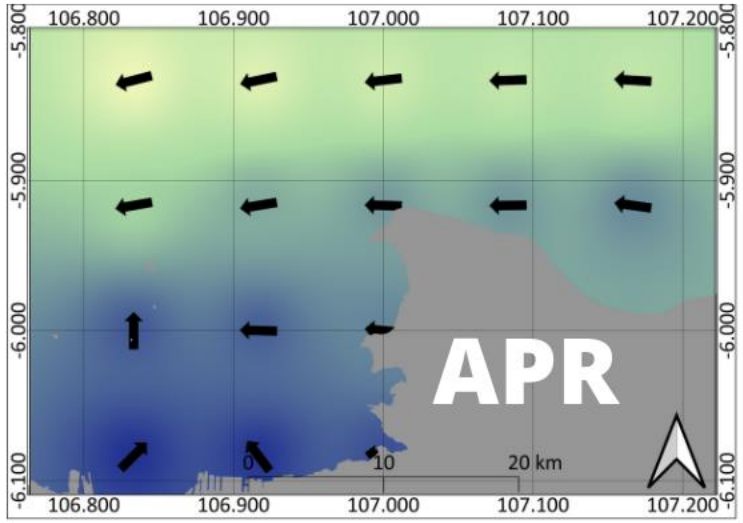
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8.80 - 11.10	3.60 - 5.70	0.50 - 2.10

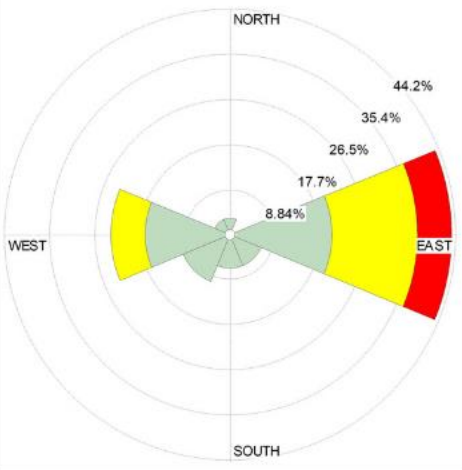
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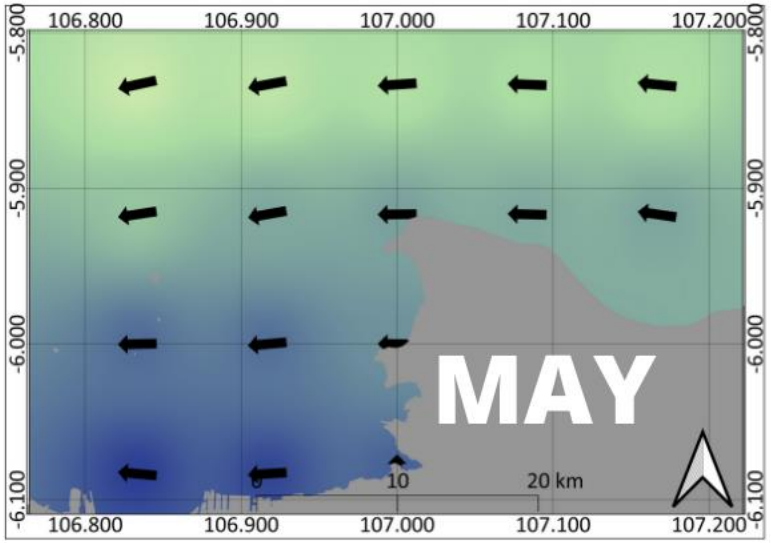
Transitional Season 1 / TS1

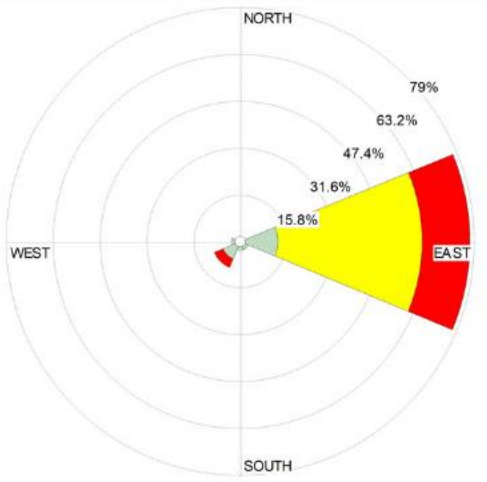












Current Direction

Current Velocity (m/s)

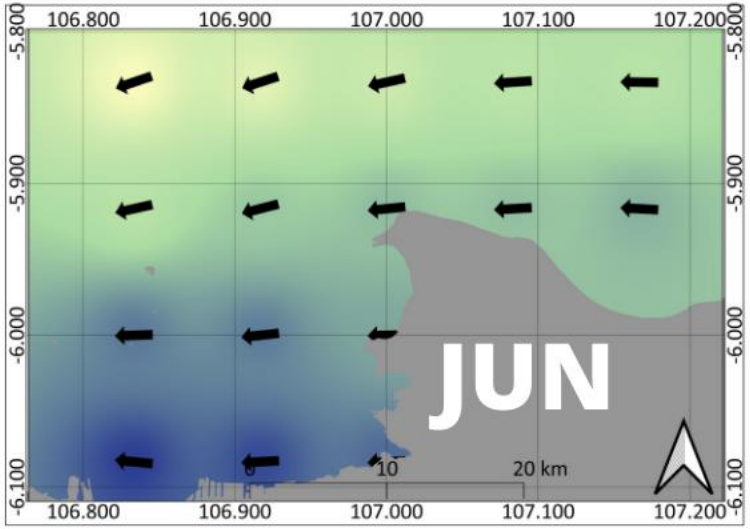
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0.1212725	0.3581575	

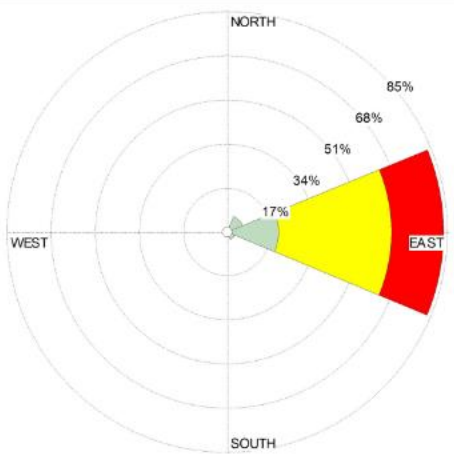
Wind Speed (m/s)

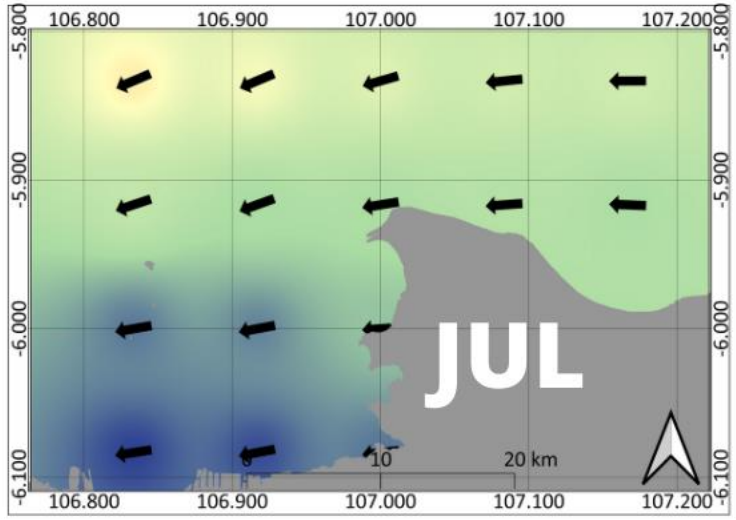
>= 11.10	5.70 - 8.80	2.10 - 3.60
8.80 - 11.10	3.60 - 5.70	0.50 - 2.10

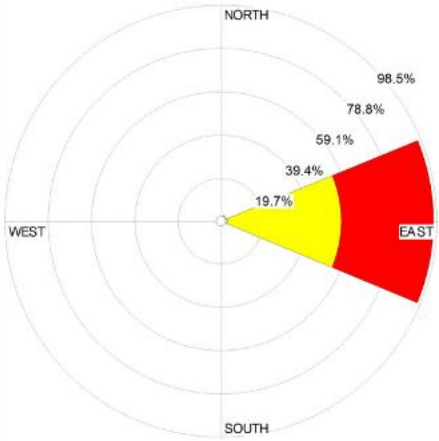
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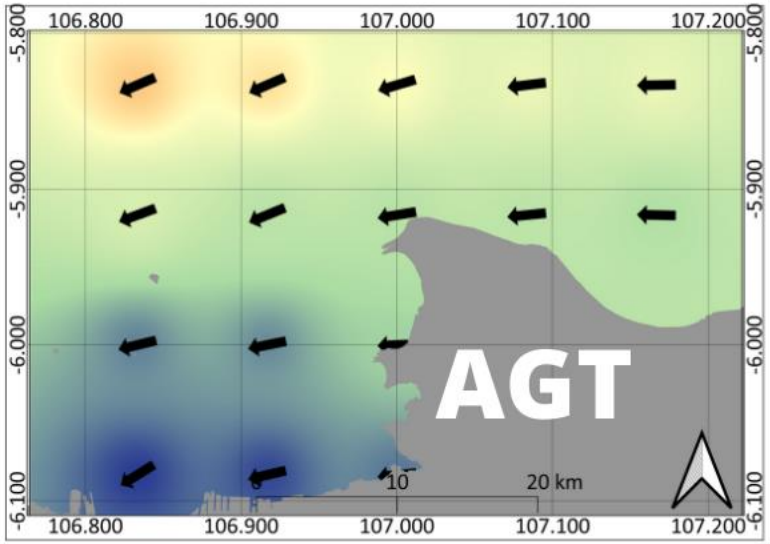
East Monsoon Season /EMS

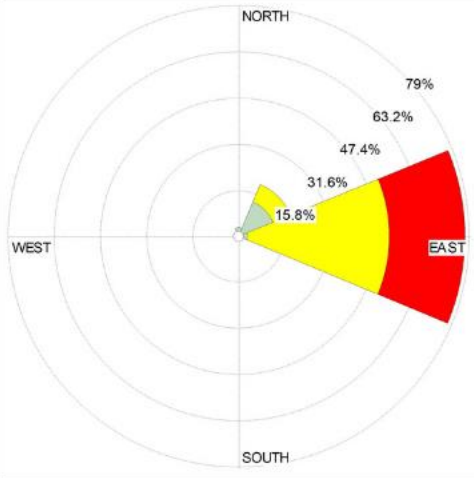












Current Direction

Current Velocity (m/s)

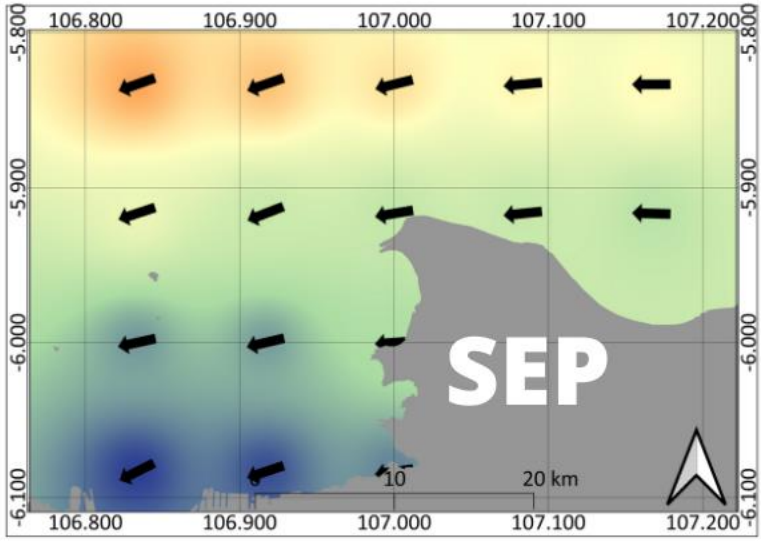
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0.1212725	0.3581575	

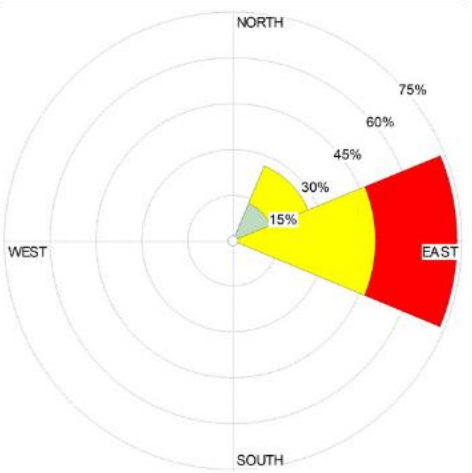
Wind Speed (m/s)

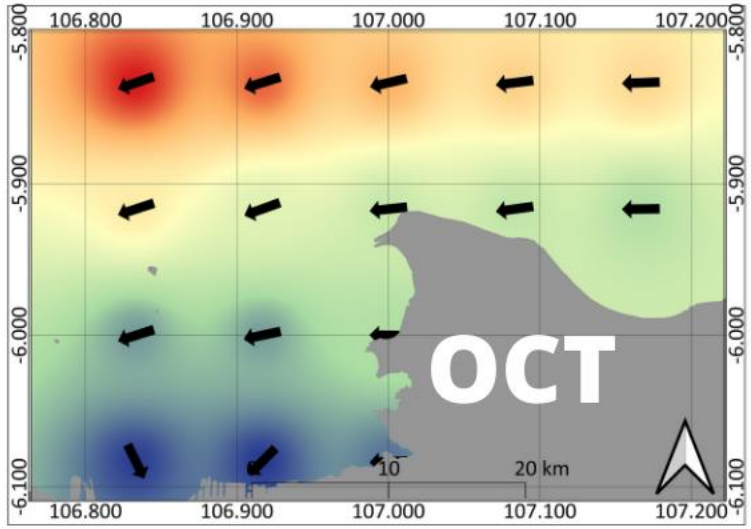
>= 11.10	5.70 - 8.80	2.10 - 3.60
8.80 - 11.10	3.60 - 5.70	0.50 - 2.10

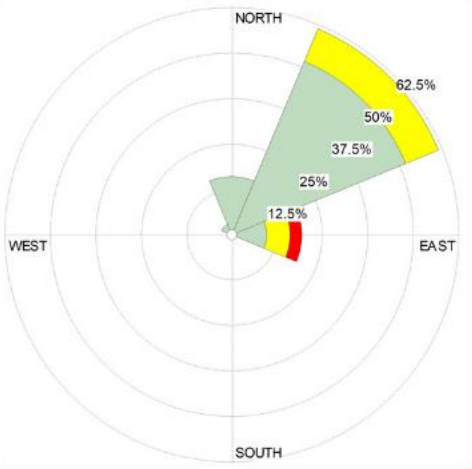
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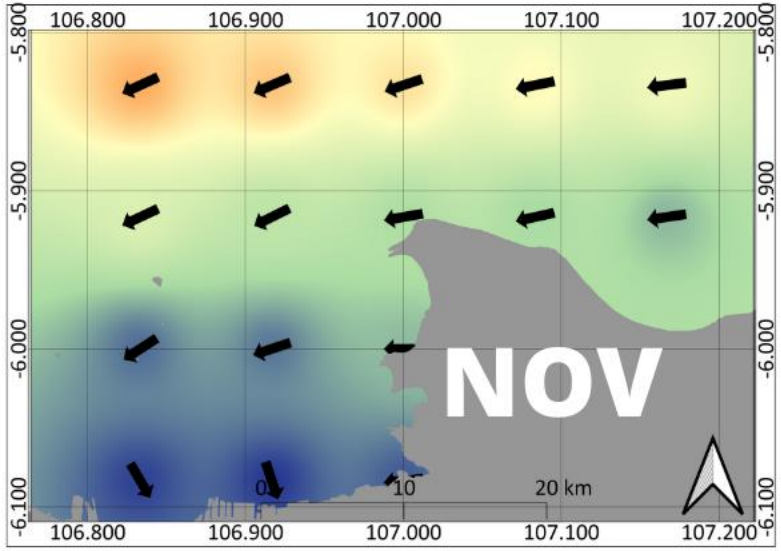
Transitional Season 2 / TS2

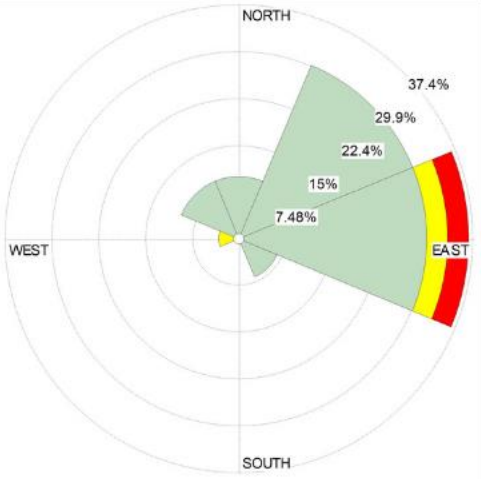












Current Direction

Current Velocity (m/s)

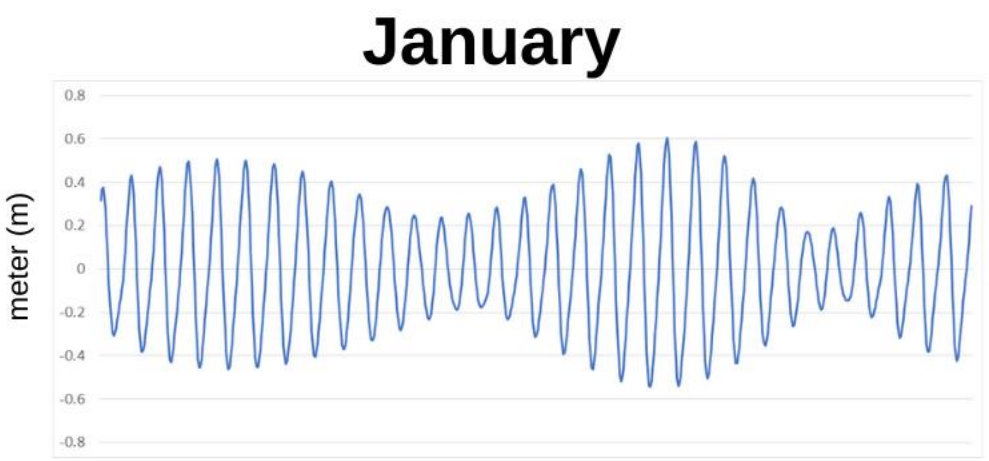
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0.1212725	0.3581575	

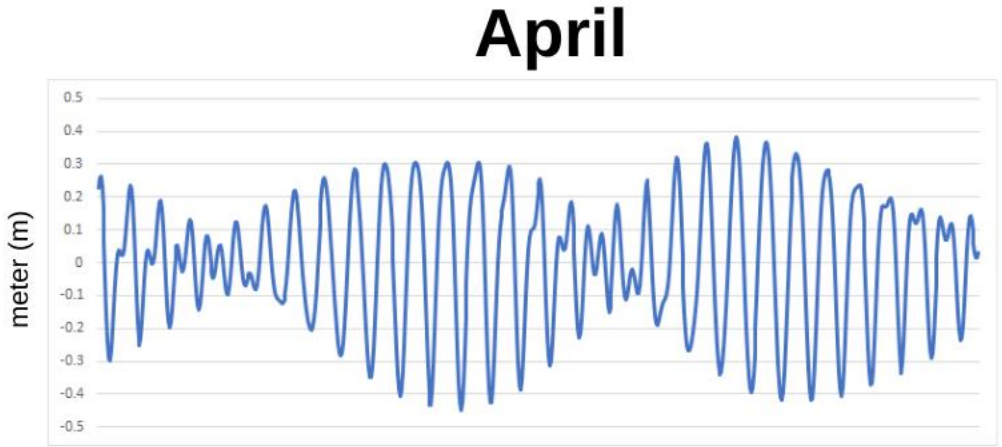
Wind Speed (m/s)

>= 11.10	5.70 - 8.80	2.10 - 3.60
8.80 - 11.10	3.60 - 5.70	0.50 - 2.10

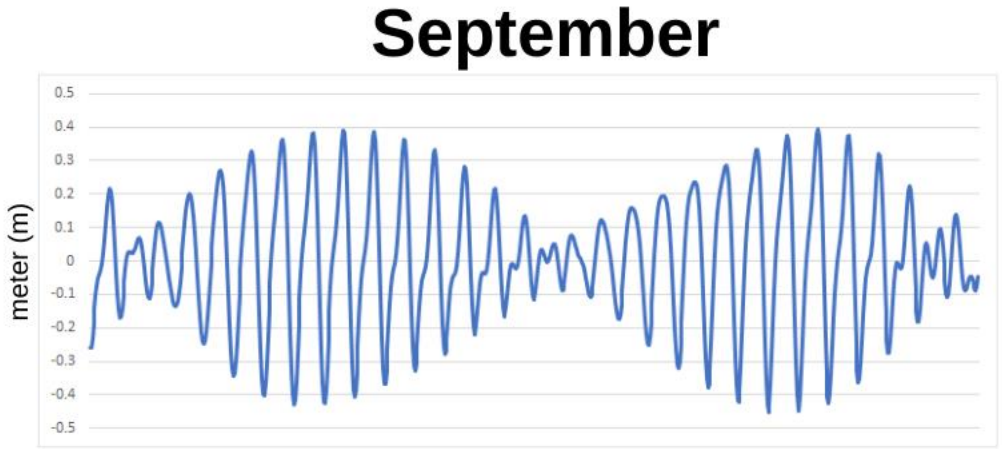
Calms: 6.67%

Tidal Visualization









- The tidal types dominate in the Muara Gembong are Mixed Tide and Diurnal Tide

RESULT OF DEBRIS DATA

Macrodebris Hotspot Map

Muara Gembong 2021

- Water Route
- Land Route
- Local Perspective





Muara Beting

Muara Bendera

Muara Mati

Muara Pecah

Muara Besar

Muara Kuntul

Muara Jaya

Muara Blacan

Muara Nawan

Muara Pondok Dua

Muara CBL

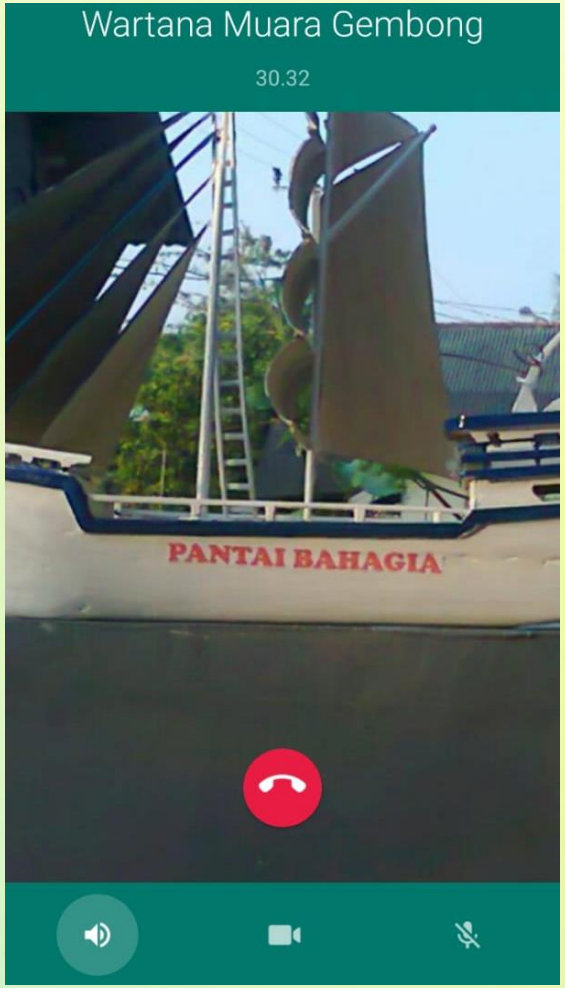




N

5 mi

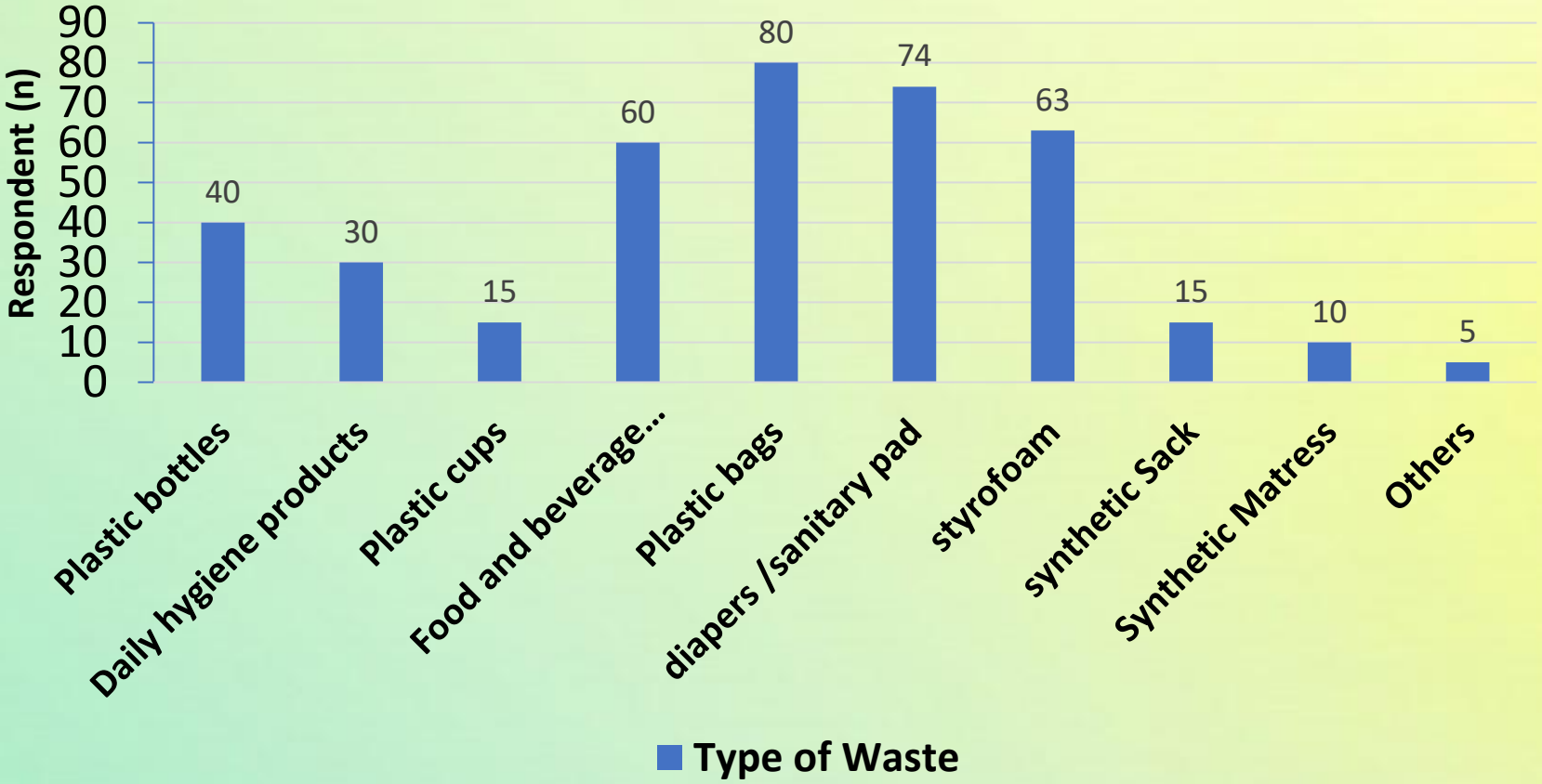
Online Interview Result of 100 Local Resident







What type of problematic macroplastic waste in Muara Gembong?*

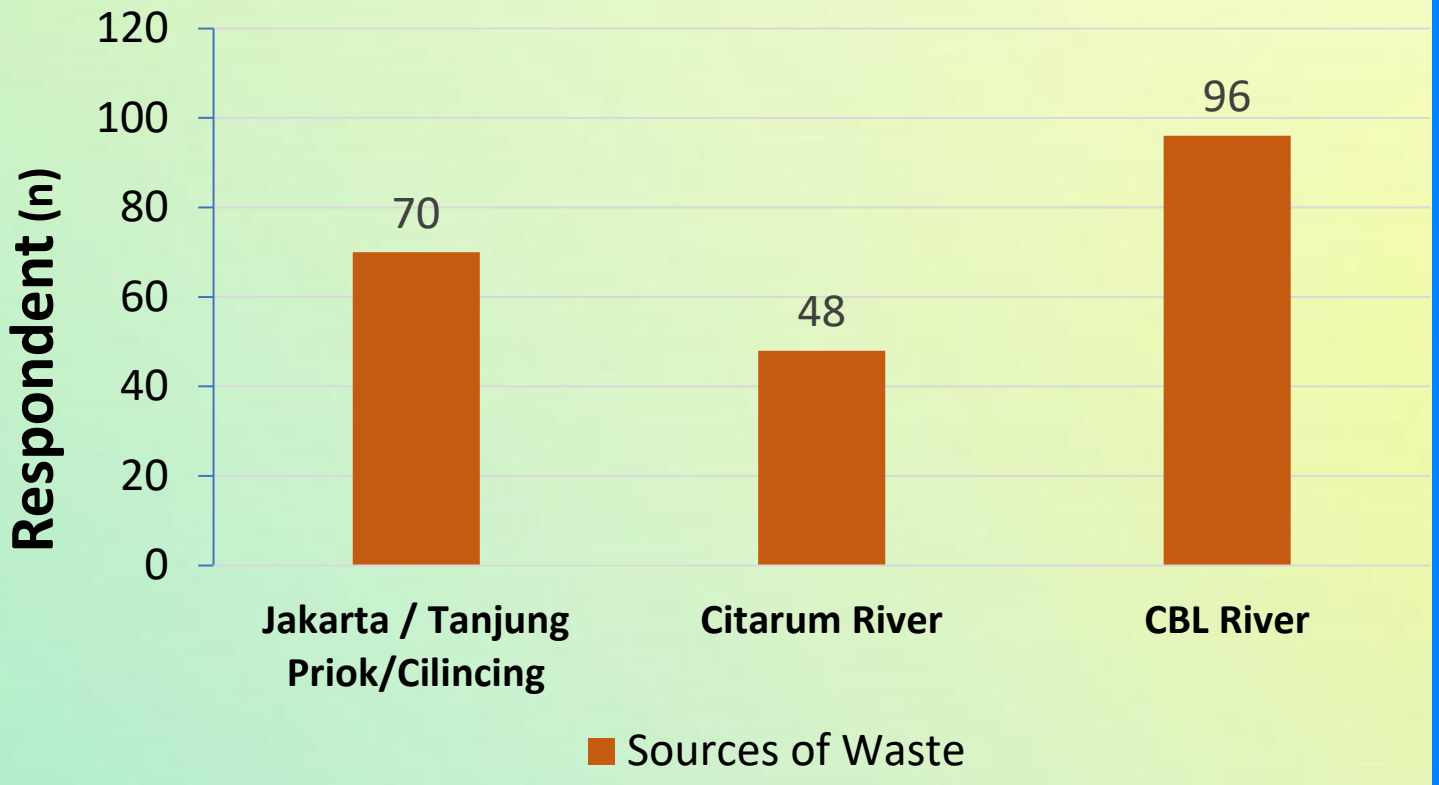


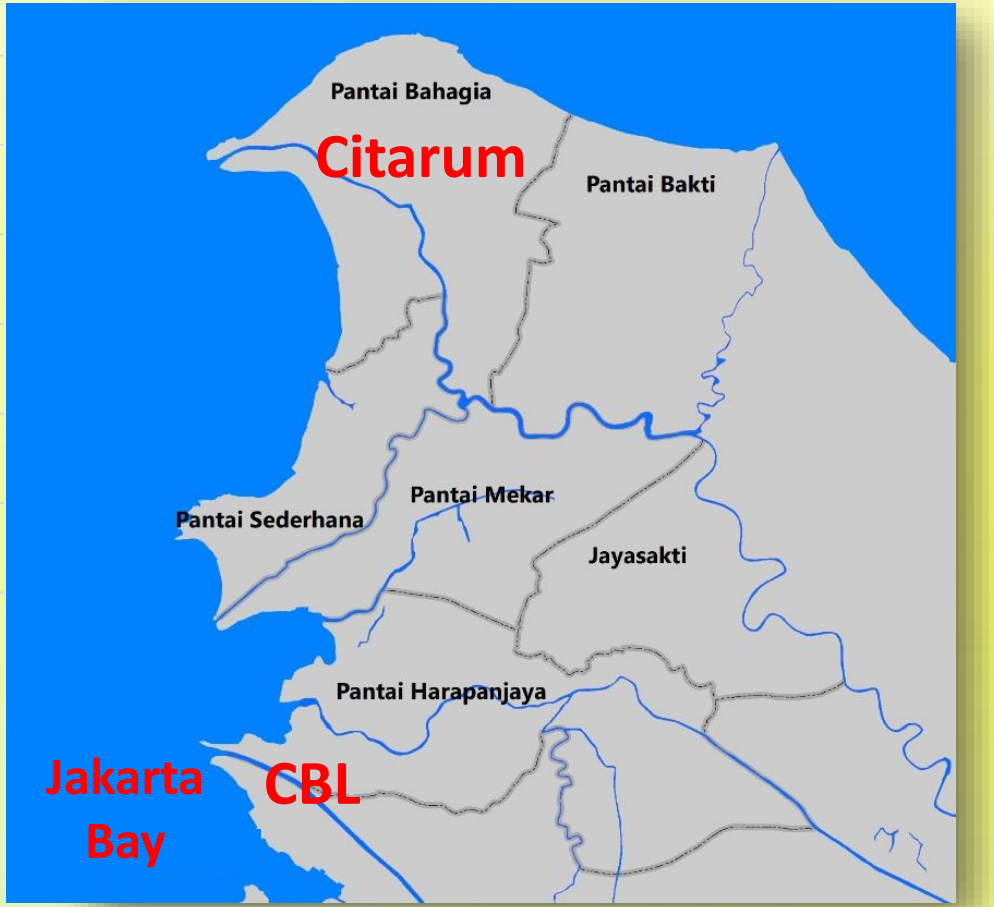


Plastic Bags, Diapers, and Styrofoam are the 3 highest ranks for macroplastic waste in Muara Gembong area.

*multiple responses (each respondent could answer more than 1)

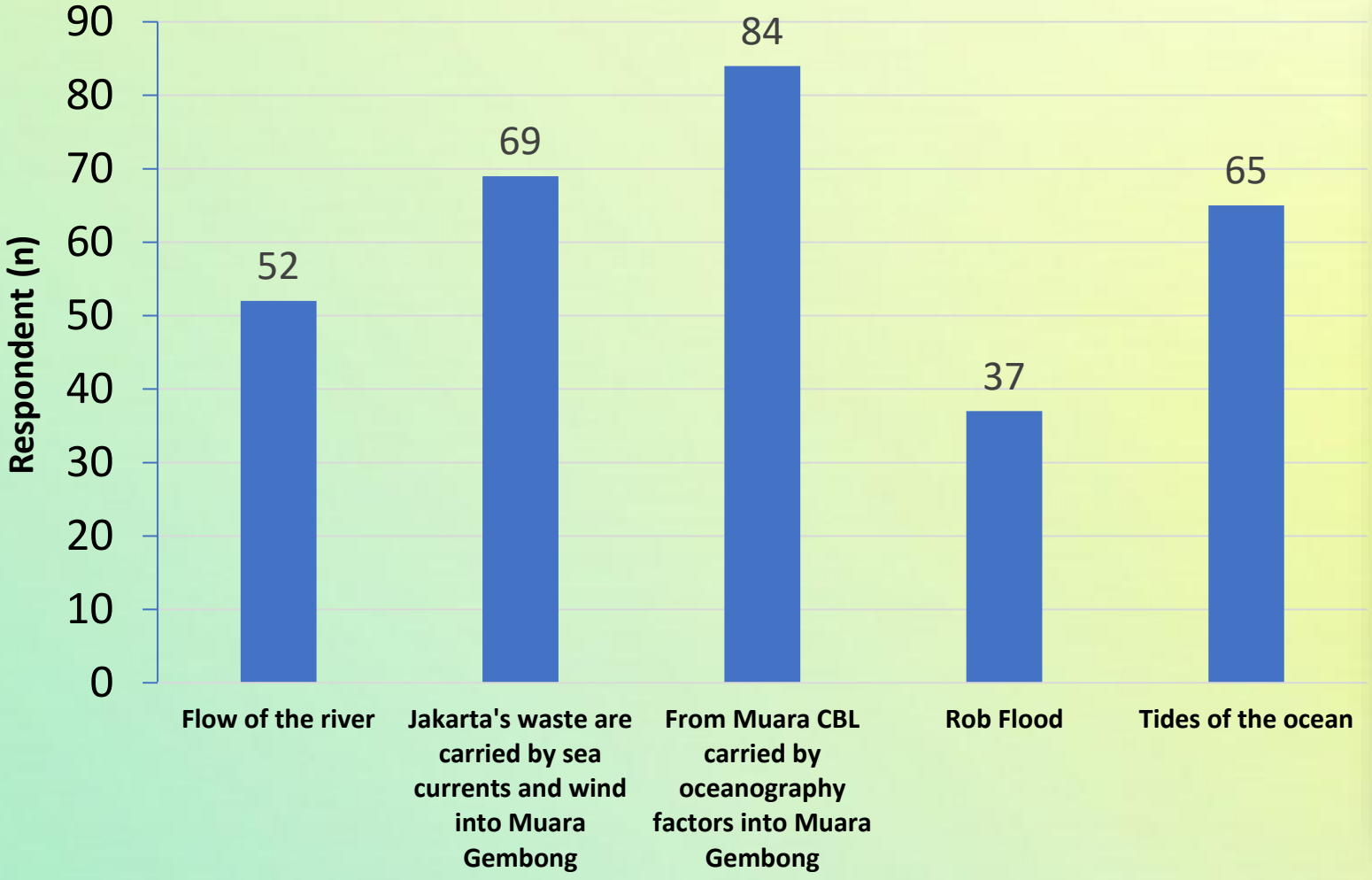
Where do plastic waste in Muara Gembong come from?*

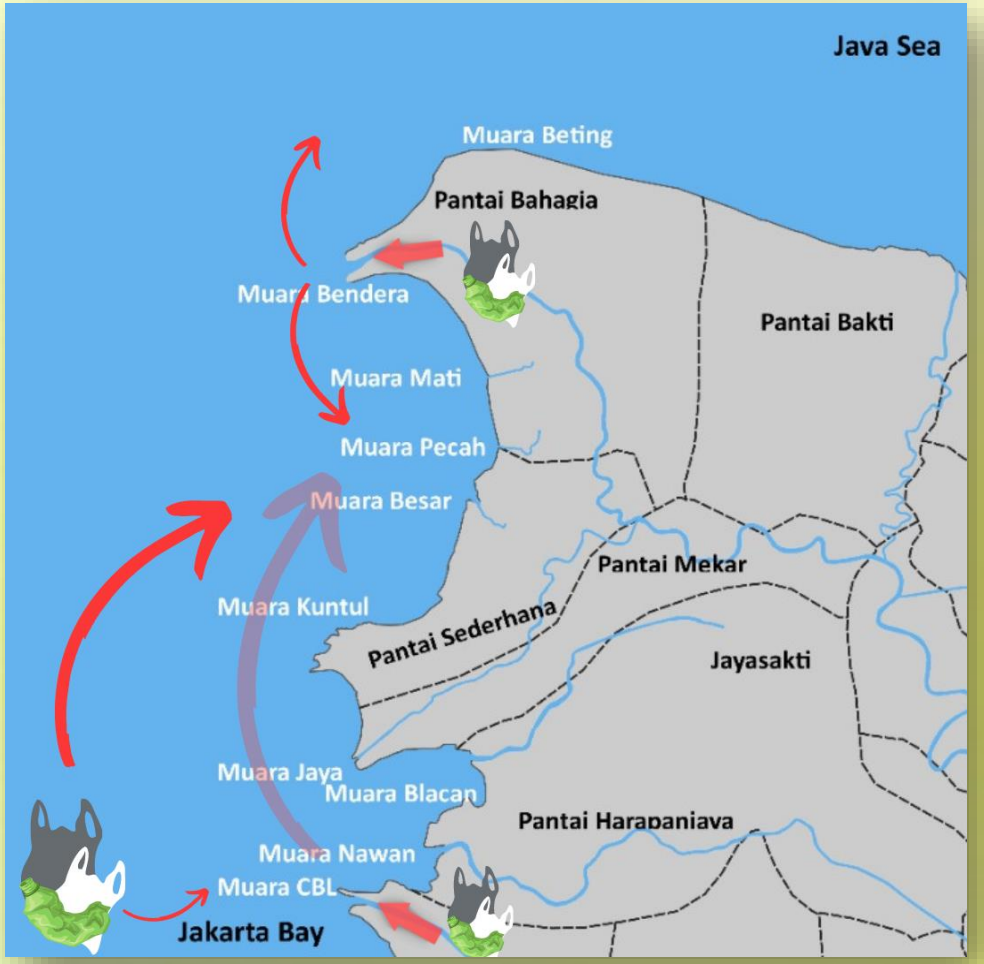




*multiple responses (each respondent could answer more than 1)

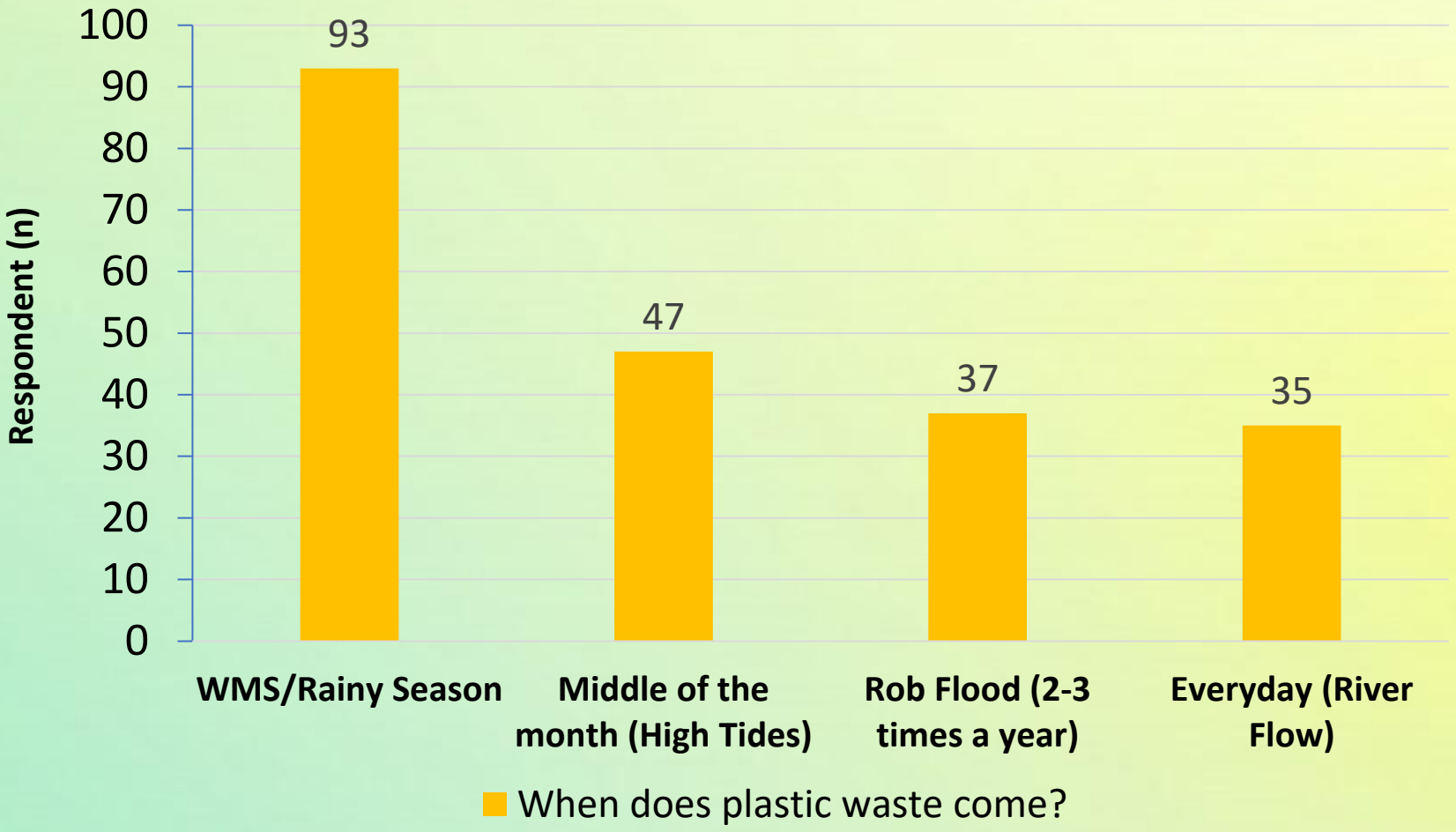
How do plastic waste reach the Muara Gembong area?*





*multiple responses (each respondent could answer more than 1)

What Period does the plastic waste come into Muara Gembong?*



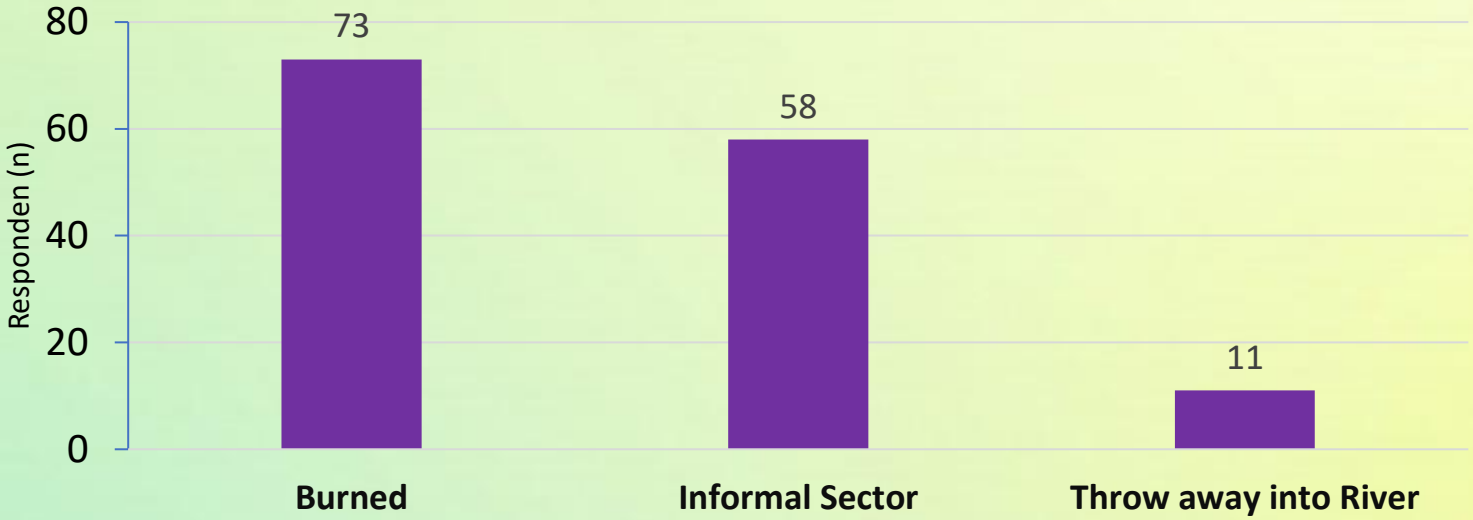


During the rainy season, water from the upstream and ocean causing the distribution of waste more expand

*multiple responses (each respondent could answer more than 1)

Household Waste Management in Muara Gembong*

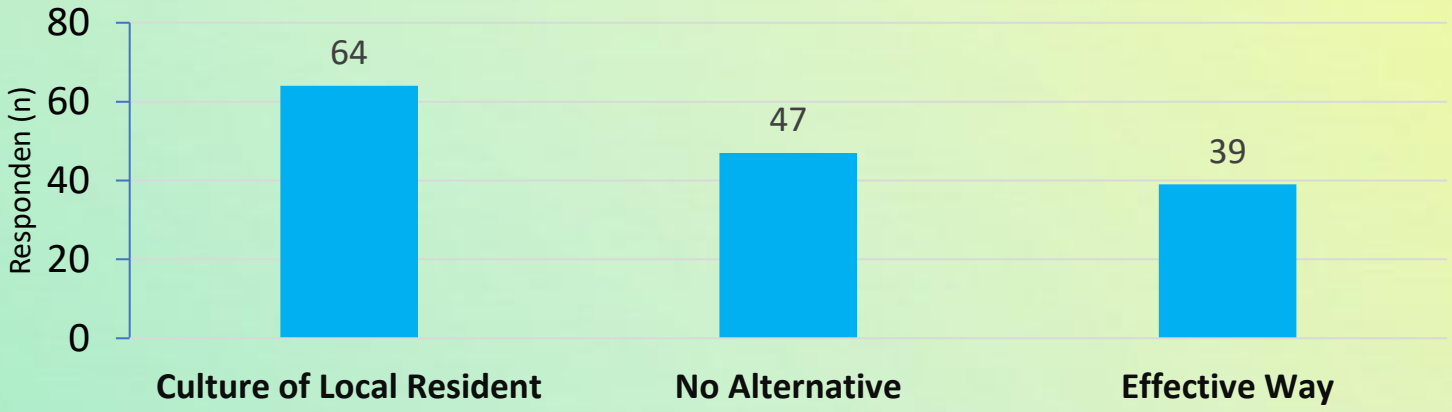
Waste Management :







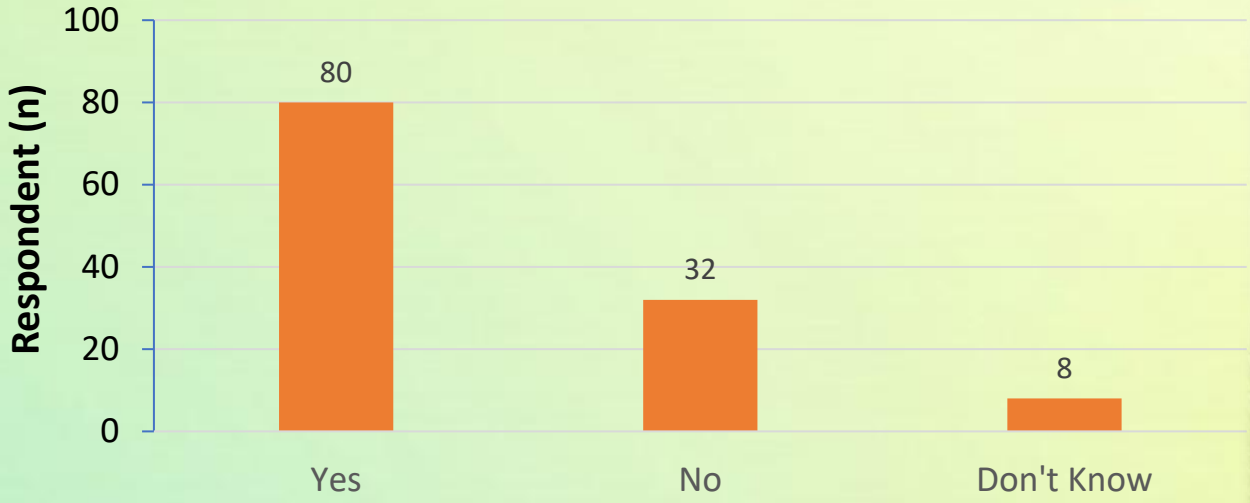
Reasons :



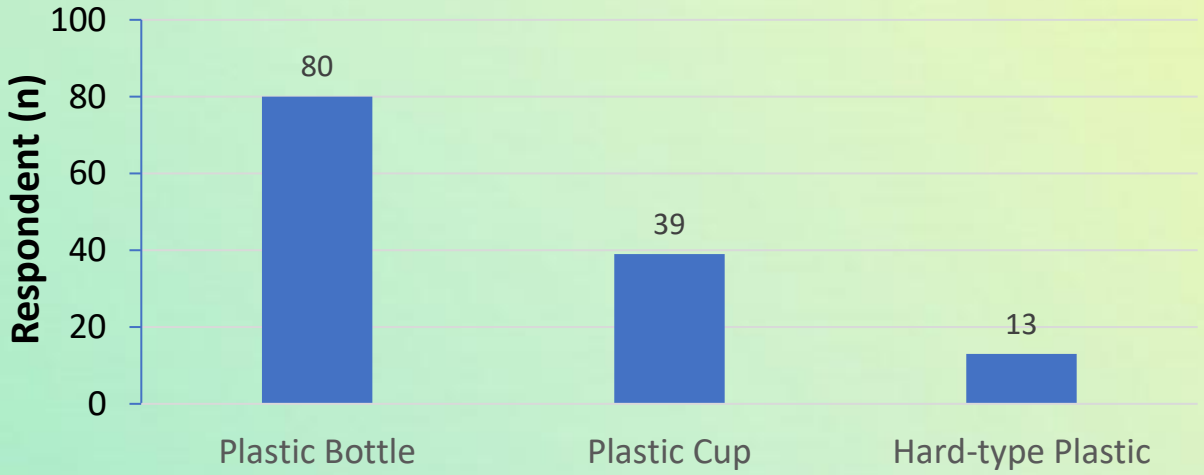
*multiple responses (each respondent could answer more than 1)

The Role of Scavengers*

Existence



Plastic Types *



*multiple responses (each respondent could answer more than 1)





Scavanger in Muara Gembong, especially in estuary , they just collecting the valued plastic

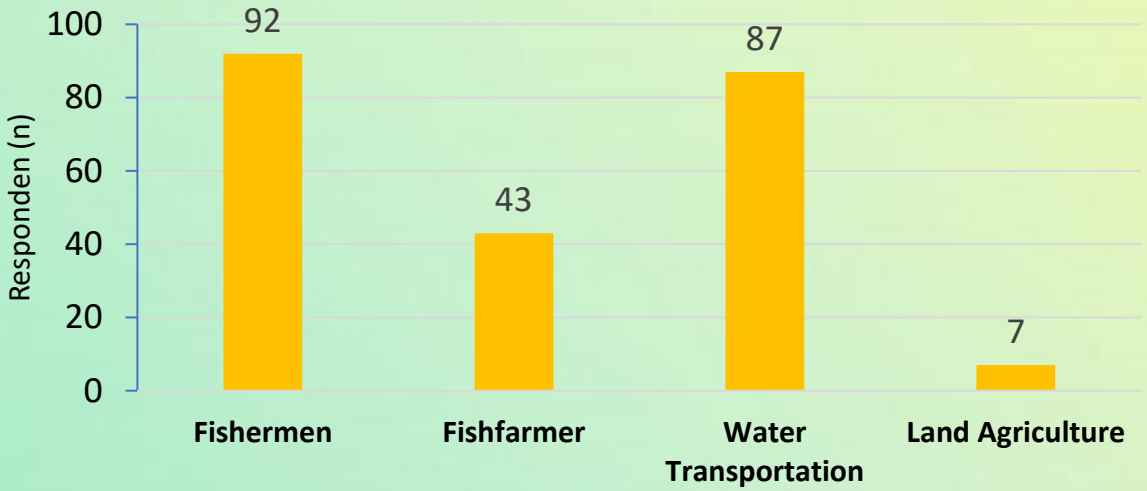


Social and Economic Impact of Plastic Waste in Muara Gembong *

Impact :



Activities :





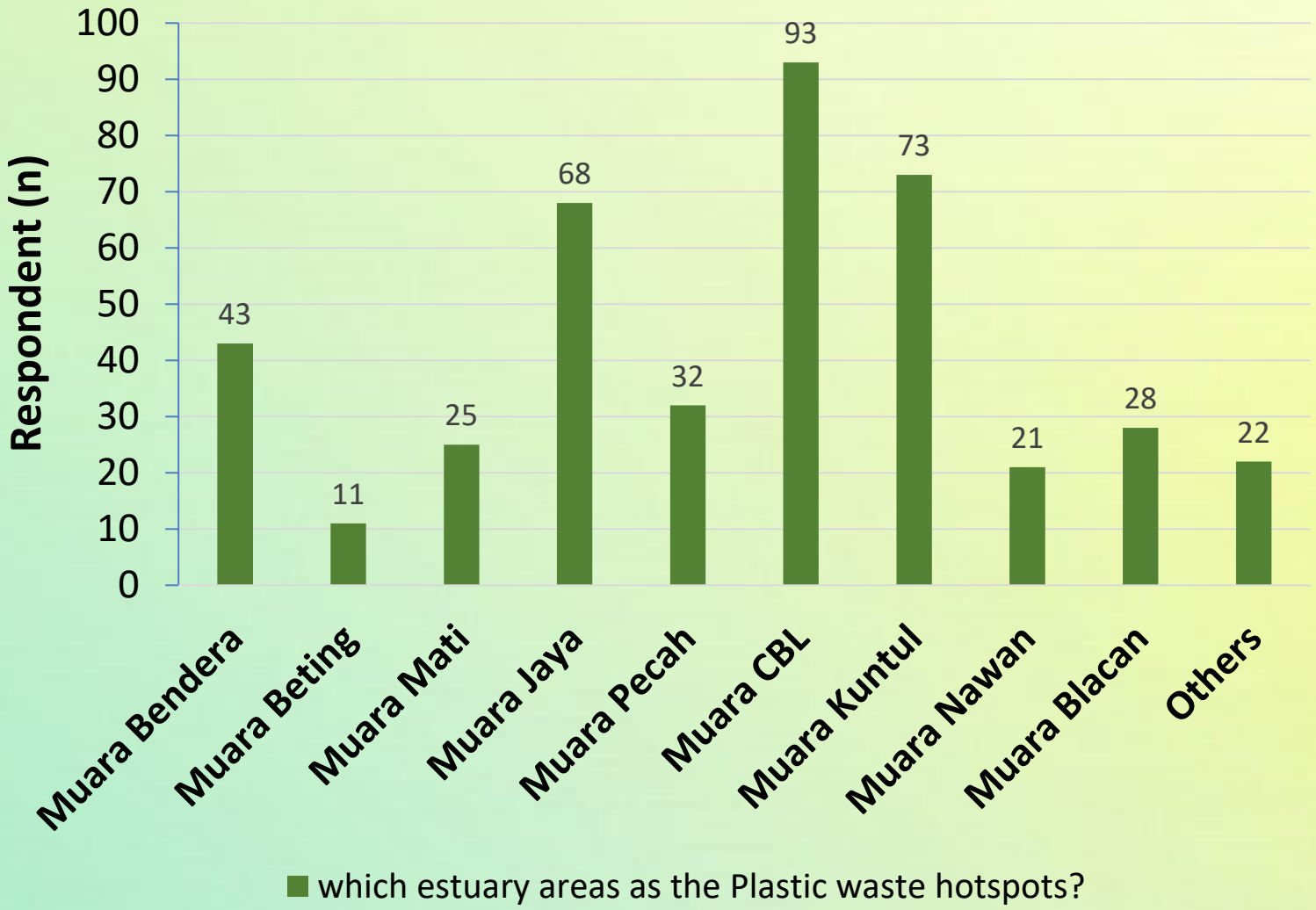
- Most of Local People affected by decrease of their incomes
- Fisherman and water transportation affected by the plastic waste tapped on boat machine
- We couldn't tolerate if local seeing plastic debris as the normal situation and habit





*multiple responses (each respondent could answer more than 1)

Which estuary areas as Hotspots of Polluted by Plastic Waste?*

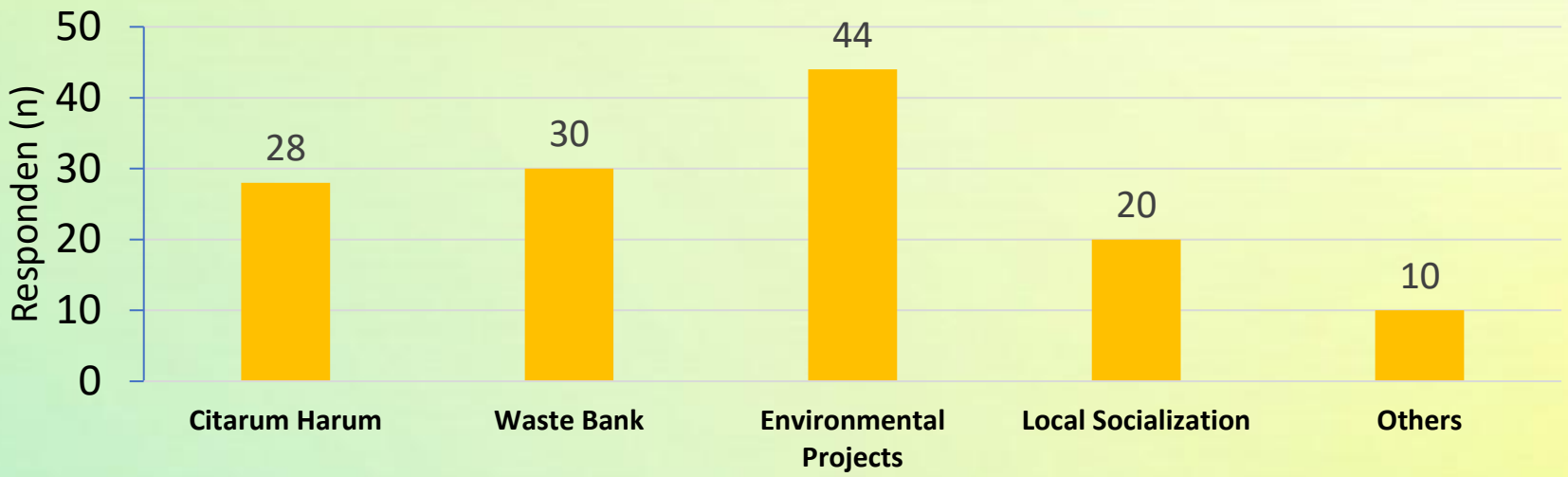




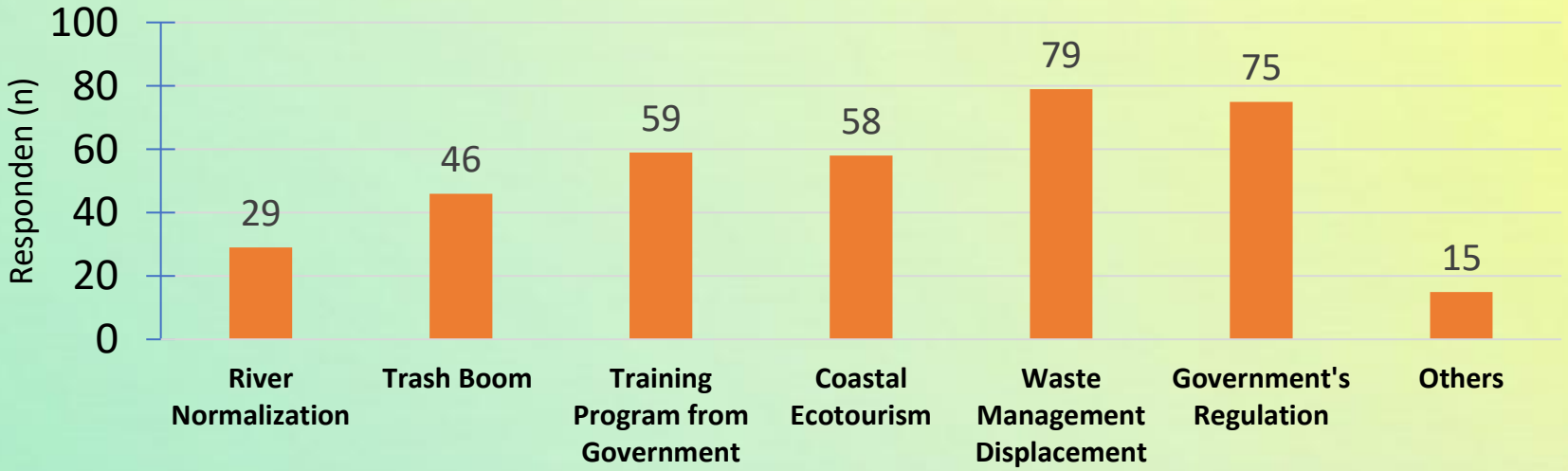
*multiple responses (each respondent could answer more than 1)

Solutions Regarding Plastic Waste in Muara Gembong*

Have been implemented :



Local's opinions for future solution :

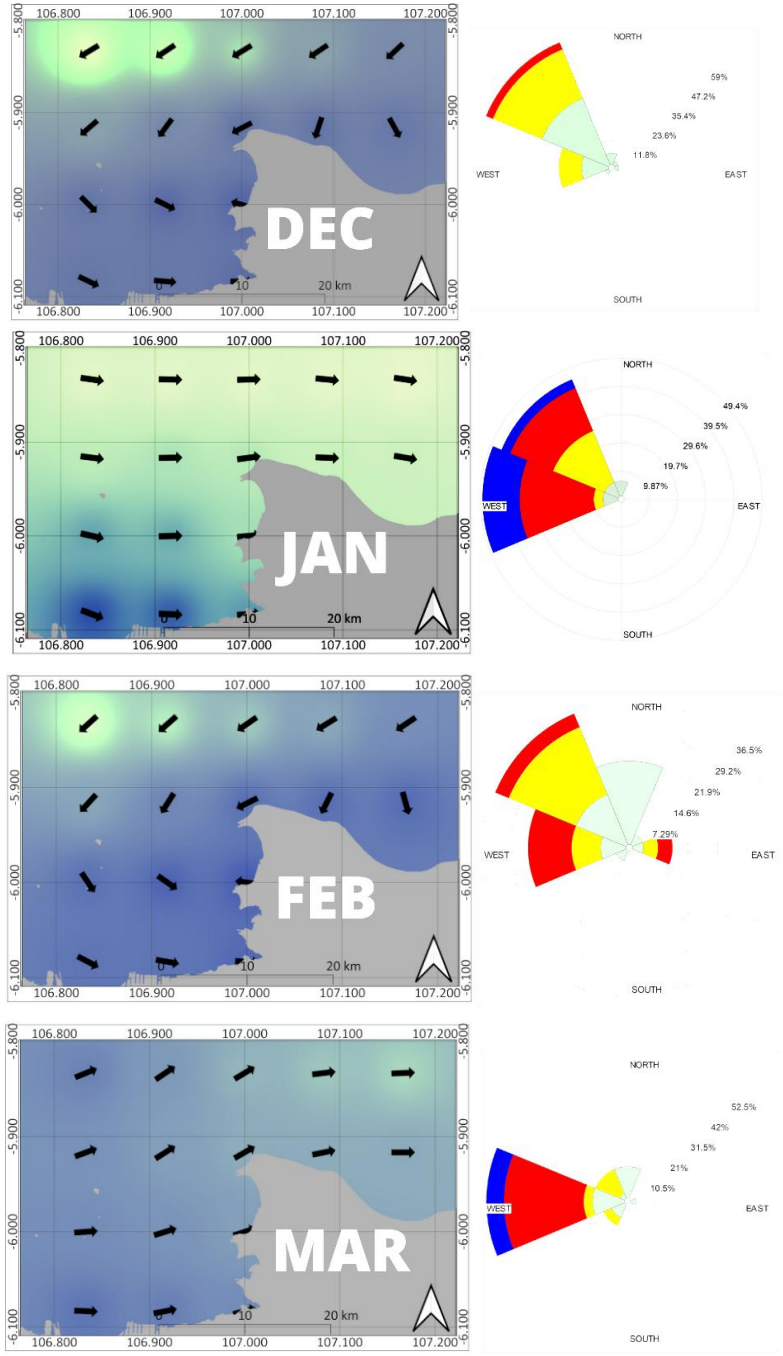




- The solutions implemented by stakeholder are have not been maximized positive impact on the local population
- Several solutions that has not implemented yet. These solutions are considered important for the future decision of stakeholders in the local even national stakeholder



*multiple responses (each respondent could answer more than 1)



Distribution of Plastic Debris in WMS and Early of TS1

Java Sea
Muara Beting
Pantai Bahagia
Muara Bendera
Pantai Bakti
Muara Mati
Muara Pecah
Muara Besar
Pantai Mekar
Muara Kuntul
Pantai Sederhana
Jayasakti
Muara Jaya
Muara Blacan
Pantai Harapaniava
Muara Nawan
Muara CBL
Jakarta Bay

Conclusion

I. Marine debris that's being problem along the coastal of Muara Gembong has dominated by debris that coming from the upstream of Citarum and CBL rivers (Cikarang Bekasi Laut) also Jakarta Bay influenced by oceanographic factors such as tides, currents and winds that dominate in WMS and early of TS1 period.

II. Muara Gembong area is dominated by debris type such as : Diapers, plastic bags and sterofoam as the highest rank of problematic debris type. Debris flow in the water coloumn also impact the daily activities of local activities such as : fishing activities, marine transportation and fishfarmer.

III. Based on the results of oceanographic visualization and Interview of Local, There is an exact correlation between oceanographic and local's perspective interview. Debris will coming between December until March period and reasonable about debris transportation from Jakarta Bay area.



Thank You





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