QUANTIFYING DEBRIS SOURCES AND IMPACT IN MANGROVE ECOSYSTEMS UNDER HUMAN PRESSURE

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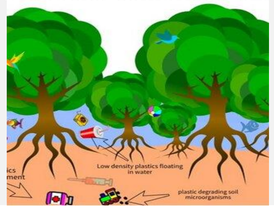
ABSTRACT

- Mangroves in Thoothukudi are complex and unique ecosystems. **Habitat destruction**, industrialization, sewage disposal, low freshwater inflow, and illegal dumping of wastes including plastics, pressurize the mangrove ecosystem
- A total of **2,296 surface debris** items, with a weight of 167 kg, were collected from twenty belt transects
- **Plastic materials**, including carry bags and food wrappers, comprised **62.4%** of the debris



INTRODUCTION

- Mangroves are coastal vegetation that occurs worldwide in the **tropics and subtropics**, which act as the buffer zone between land and sea.
- Mangroves are well recognized for their **ecological services and vital support to human livelihoods.**
- India has **3.3%** of the global mangrove cover with a total area of 4921 km^2 with 46 species (Ragavan et al., 2016).
- They are **coastal vegetation** located between the city's settlement and the shoreline, acts as reserves for various ecologically and economically important organisms (Forest Survey of India, 2017).
- However, these **forests face intense pressure from anthropogenic activities**, with debris pollution posing significant threats to mangrove ecosystems.

METHODOLOGY

- The litters collected using the **belt-transect (20 × 2 m plots)** and **quadrat methods**.

- In each site, **20 m transect lines** placed perpendicular to the shore area, and the starting point of the transect is the **first mangrove tree** (from the seaward side).

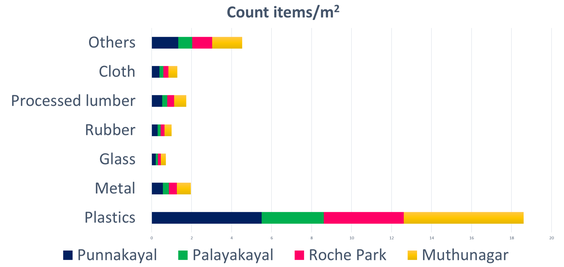
- The transect placement was in the near shore area to target accumulated debris from the sea.
- The macro litter was assessed as per **NOAA marine debris shoreline survey field guide** (Opfer et al. 2012) to determine the abundance and distribution

RESULTS

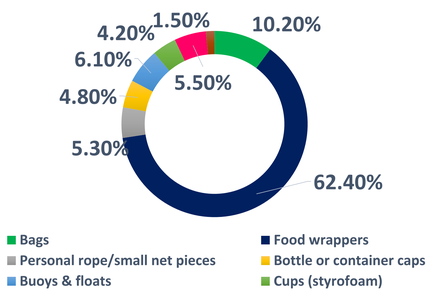
- The collected items were classified in to seven categories as **Plastic, Metal, Glass, Rubber, Processed lumber, Cloth, Others**
- A total of **2,296 surface debris items**, weighing **167 kg,** were collected
- **Plastics** contribute to the majority of the debris items, **5.51 ± 2.33 items/m^2** and **396.25 ± 144.71g/ m^2**

RESULTS

- A total of **1224 (51kg) trapped debris items** were collected from **35 mangrove trees** in the Punnakayal mangrove region.



- The mean surface debris was estimated at **7.8 ± 2.4 items/m^2** with a weight of **810 ± 297 g/m^2**, while trapped debris averaged **35 ± 10** items per tree and weighed **2,614 ± 658 g/tree.**
- Plastic materials, including carry bags and food wrappers, comprised **62.4%** of the debris, with shoreline/recreational activities contributing **38.9%** and other sources 32.7%.



WIDER IMPACT OF THE WORK

- The significant role of **human activities** in contributing to debris accumulation in mangrove ecosystems vital for coastal protection and biodiversity.
- Urgent need for **waste management policies** to safeguard these critical habitats.
- By identifying the key sources of debris, the work provides **actionable insights for reducing pollution** and mitigating environmental degradation.

CONCLUSION

- The findings indicate that mangrove ecosystems **naturally filter and trap coastal debris.**
- However, trapped debris poses risks to mangroves by **obstructing sunlight needed for photosynthesis.**
- Implementing **cleaning programs within mangrove areas** can help reduce ecological disturbances.
- Regular **removal of trapped debris** can also support coastal pollution management.
- This data will be valuable for **policymakers and resource managers** aiming to control and manage debris pollution in mangrove regions effectively.

REFERENCES

- Alongi, D., 2009. The Energetics of Mangrove Forests. Springer, Netherlands. Bulmer, R.H., Schwendenmann, L., Lundquist, C.J., 2016. Allometric models for estimating aboveground biomass, carbon and nitrogen stocks in temperate Avicennia marina forests. Wetlands 36 (5), 841–848.https://doi.org/10.1007/s13157-016- 0793-0.

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