CLOSING THE LOOP

Janet Salem, Economic Affairs Officer (Circular Economy)

Sustainable Urban Development Section, Environment and Development Division

Economic and Social Commission for Asia and the Pacific

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Cities in ASEAN use innovation and smart technology to monitor, assess, and sustainably manage plastic waste

Cities develop policy and investment strategies to apply circular economy approaches on managing plastic

What does Closing the Loop want to achieve?

https://www.unescap.org/projects/closing-the-loop

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HOW WILL WE ACHIEVE THAT?

PLASTIC POLLUTION CALCULATOR

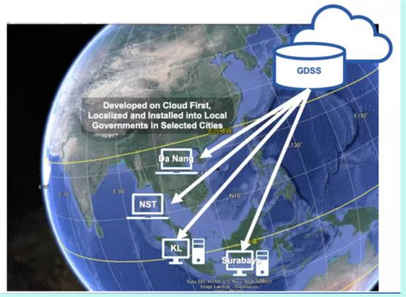



BASELINE ASSESSMENT

Waste policy and institutional environments.

Capacity assessment (waste management and digital readiness)

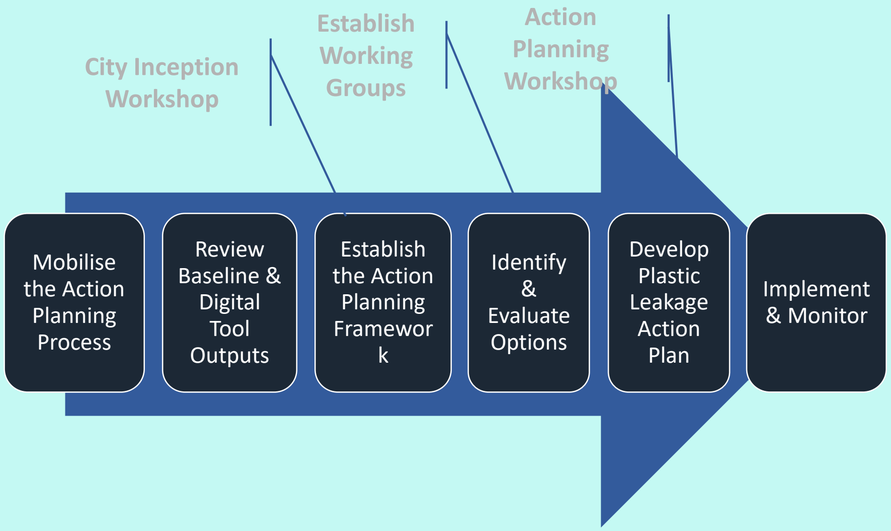
Develop a plastic material waste flow



DIGITAL MAPPING TOOL

Design digital tool using satellite data, remote sensing, drones, crowdsourced data, machine learning

Map marine plastic hotspots in 4 cities



CITY ACTION PLANS

Identify policy intervention areas based on the waste hierarchy

Develop local action plans and investment strategies

eLearning course for cities

WHO ARE THE PARTNERS?

DA NANG

Danang, DONRE

Development of city action plan

ESCAP

Project design and management

IGES

Baseline study and technical support for action plan

IUCN

Technical support

JAPAN SPACE SYSTEMS

Development of digital tool

IDENTIFICATION OF PLASTIC POLLUTION HOTSPOTS

SOME DEFINITIONS

- A hotspot is a location that has a relatively high concentration of the measure in question (e.g. relatively high amounts of plastic emissions into the environment, plastic on land, or plastic entering waterways etc.)
- However, there are different ways of assessing this relativity, with the user dictating which one is important for their needs.
- In order to validate that the sampling location is indeed a hotspot, sampling must also be performed in areas predicted to have relatively low emissions, termed here ‘not-spots’.

- ***Emissions density (emissions/km2)***
- ***Emissions per person (emissions/capita)***
- ***Emissions per boundary/area***

(emissions/district; emissions/river basin etc.)

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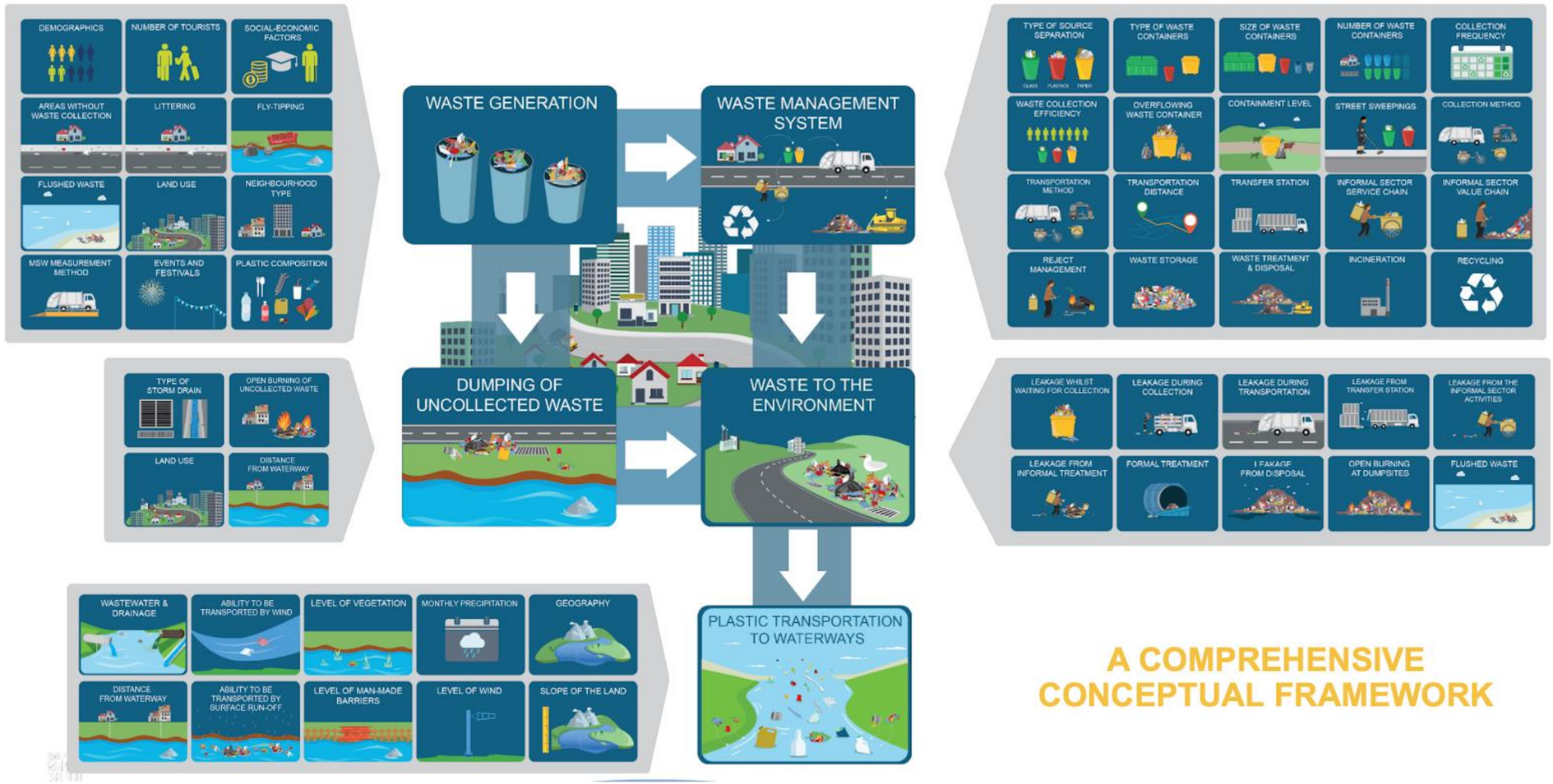
HOW WE ARE MEASURING PLASTIC LEAKAGE

PLASTIC POLLUTION CALCULATOR



A COMPREHENSIVE CONCEPTUAL FRAMEWORK

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CONSIDERATIONS IN MONITORING PLASTIC WASTE

DIGITAL TOOL

- Emission to ocean?
- Top 10-20 items?
- Hotspots in time/space?

- Wide (>500 m) or narrow (<100 m)?
- Safe bridges available?
- River mouth or upstream?

- How many observers?
- High-tech or low-tech equipment?
- Measurement frequency?

- Normalize to standard units
- Consistent with questions

- Clear visualization
- Consider the stakeholders
- Are questions answered?

QUESTION	Domain	DA NANG Domain Characteristics	List of Possible Resources and Approaches	DA NANG: Available Resources	Data Collected	Output Results	FINAL CHECK
Where does plastic litter enter the river system?	Land and River	▪ Plastic Calculator appropriate ▪ Built up urban environment alongside river ▪ Confluence of 3 rivers and municipalities	1. Local people for visual counting from riverbank and bridges 2. Net sampling 3. Trash booms 4. Mounted Cameras 5. Drones 6. Commercial satellite data	→ Local people for visual counting from riverbank and bridges → Net sampling → Mounted Cameras	Terrestrial: ▪ Items /m² ▪ Mass /m² ▪ Items /m² /day ▪ Mass /m² /day ▪ Composition Riverbank: ▪ Items /m² ▪ Mass /m² ▪ Items /m² /day ▪ Mass /m² /day ▪ Composition River waters: ▪ Items/ hr ▪ Mass /hr ▪ Composition	Pointers to potential hotspots of plastic leakage. Amount of plastic around hotspot areas Composition of waste Val/Cal data for Plastic Calculator	Do the data and results match the question? Y/N

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CONSIDERATIONS IN MONITORING PLASTIC WASTE

DIGITAL TOOL

First get the basics right using simple methods. This provides reliable order of magnitude data. If resources are available, additional high-tech methods can be included.

The method checklist

Terrestrial

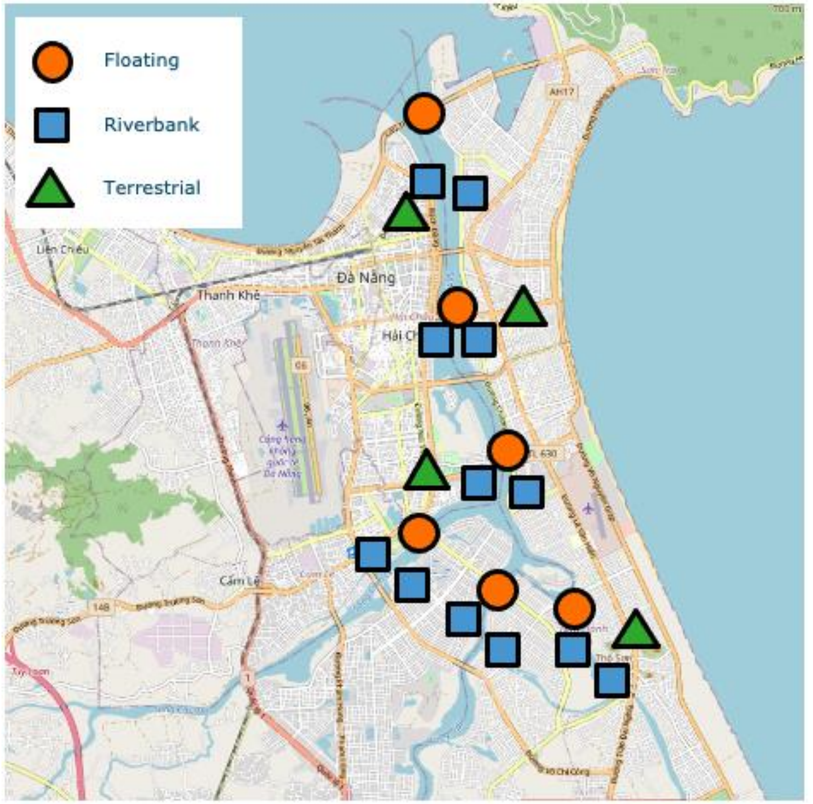
- Visual counting
- Mounted cameras
- Moving cameras

Floating

- Visual counting
- Net sampling
- Drones
- Cameras
- Satellite imagery

Riverbank

- Visual counting
- Drones



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Floating plastic: Visual counting

1. Divide each bridge into 5 segments, evenly spaced.

2. At each segment, face downstream direction and count all floating plastics that are visible in a ~15 m wide section for 5 minutes.

3. After the measurement, continue to the next location. When all segments are measured, you completed a "sweep"

4. Do a sweep every hour

Practical considerations

1. If you're not sure something is plastic, don't count it.

2. You can adjust the time, based on high/low plastic transport. Make sure you write this down.

3. In tidal areas, we recommend sampling sessions of >4 hours.

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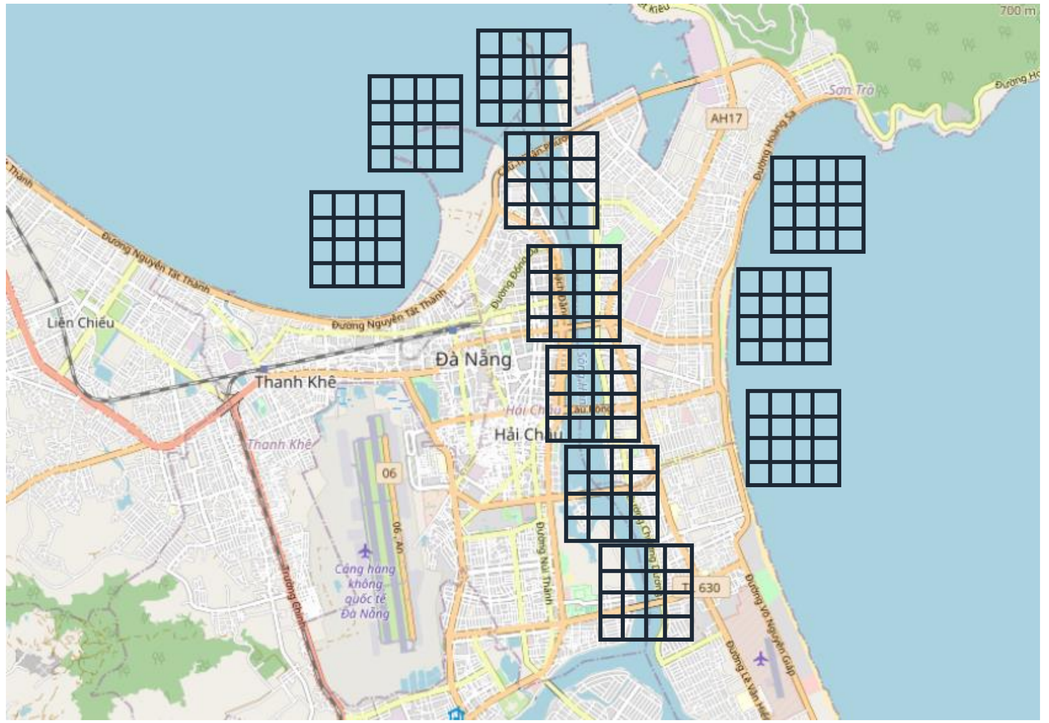
Floating plastic: Satellite remote sensing

1. Select areas of interest. Han river is 300-500 m wide, so good candidate for meaningful imagery.

2. Can be complemented with imagery in coastal areas.

3. Start with images that have overlap with field data, that makes it easier (and more meaningful) to interpret.

4. After building a training dataset, you can give the automatic detection a try



Practical considerations

1. No data on cloudy days, which can decrease data availability substantially.

2. More difficult to apply to upstream river reaches, as they may be to narrow.

3. Without food field data, difficult to interpret satellite imagery.

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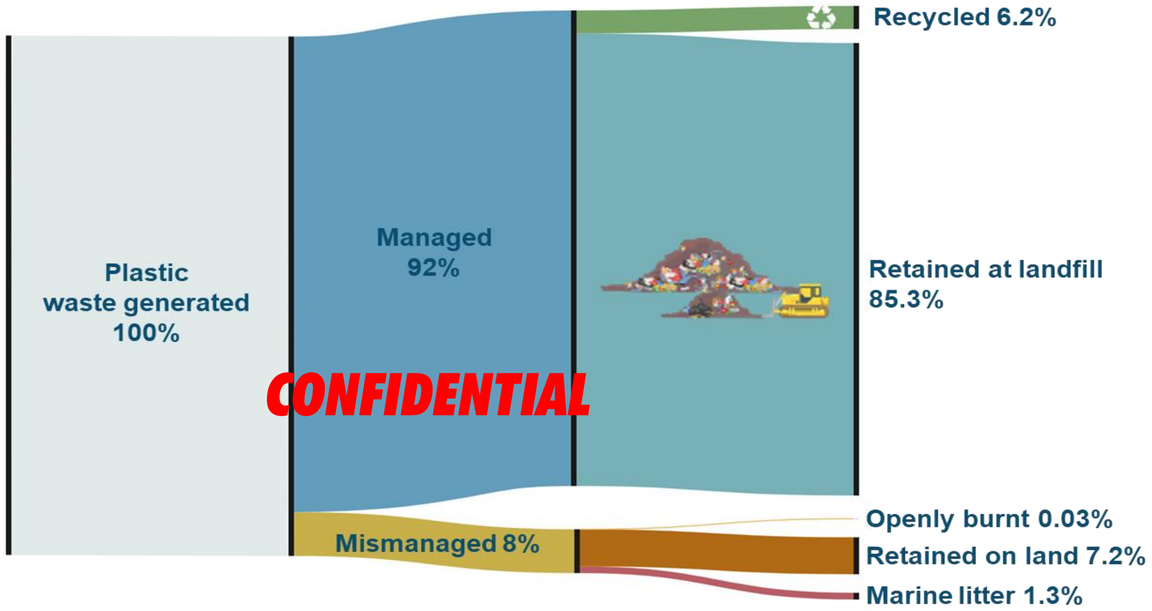

Figure 20: Plastic waste fates in Da Nang

EARLY RESULTS

1.3%

of plastic waste becomes marine litter

(1,037 tonnes)

7.2%

of plastic waste becomes land pollution

(5,725 tonnes)

0.03%

Of plastic waste is open burned

(21 tonnes of plastic | 59 tonnes CO_2-eq)

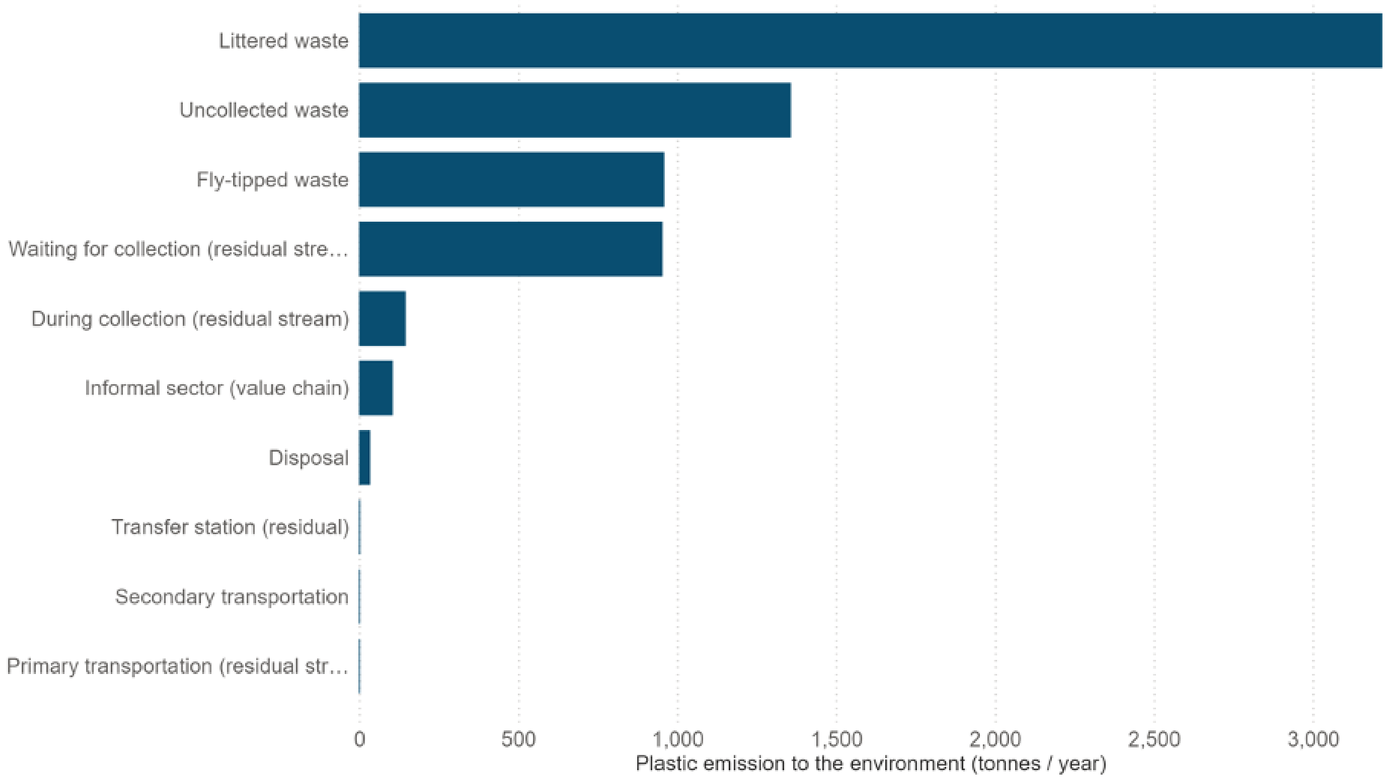

Figure 11: Key source of plastic pollution

EARLY RESULTS

CONFIDENTIAL

3,218 tonnes

of plastic waste results from littering

(approx. 2 plastic bags per person per day)

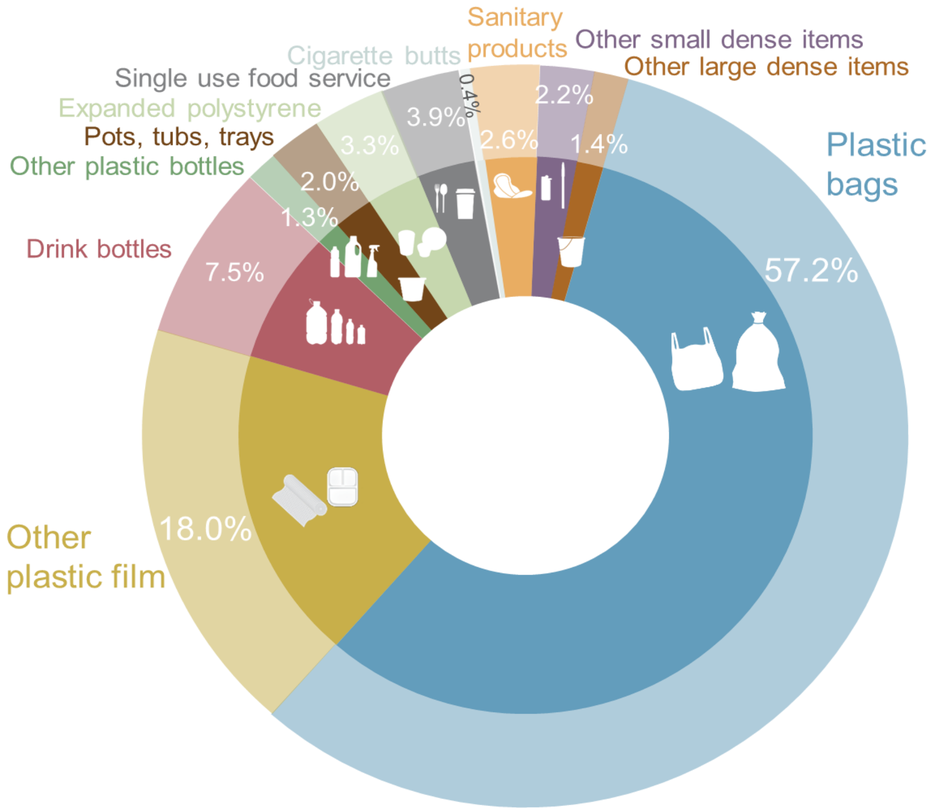

Figure 13: Item composition of plastic emissions to the environment

EARLY RESULTS

CONFIDENTIAL

Plastic bags

Dominate emissionsß

ACTION PLANNING FOR LEAKAGE PREVENTION

Some examples of how to use data for action planning

- **Reduce use of single use plastic bags**
  - Why? Largest type of marine litter; national goal to reduce by 85%
  - How? Bans, tax/levy, support alternatives, voluntary agreement in retail sector, Extended Producer Responsibility.
- **Target littering**
  - Why? Largest point of pollution.
  - How? More public bins, frequent evacuation, signs about fines, enforce penalties, raise awareness, increase street sweeping).
- **Increase waste collection coverage**
  - Why? Open dumping by residents lacking waste collection causes 20% of emissions.
  - How? Increase collection by formal (public or private) and informal (NGOs, Community based organisations, MSMEs), Waste collection service charge.
- **Reduce illegal dumping**
  - Why? Illegal dumping, especially flytipping, is the third largest emission point to the environment.
  - How? Signboards alerting polluters, regular clean up of known sites, surveillance, free/affordable waste collection for bulky items, cooperation with land owners.
- **Improve waste storage**
  - Why? Leakage while waiting for collection accounted for 14% of emissions.
  - How? Provide separate collection container to households, improve the quality of existing waste containers (right size, easy loading to truck, tapered shape, protection from animals/rain/wind, durable, maintained).

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THANK YOU

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