

Advances in quantifying plastic marine litter to support waste management decision making in local authorities of the Global South



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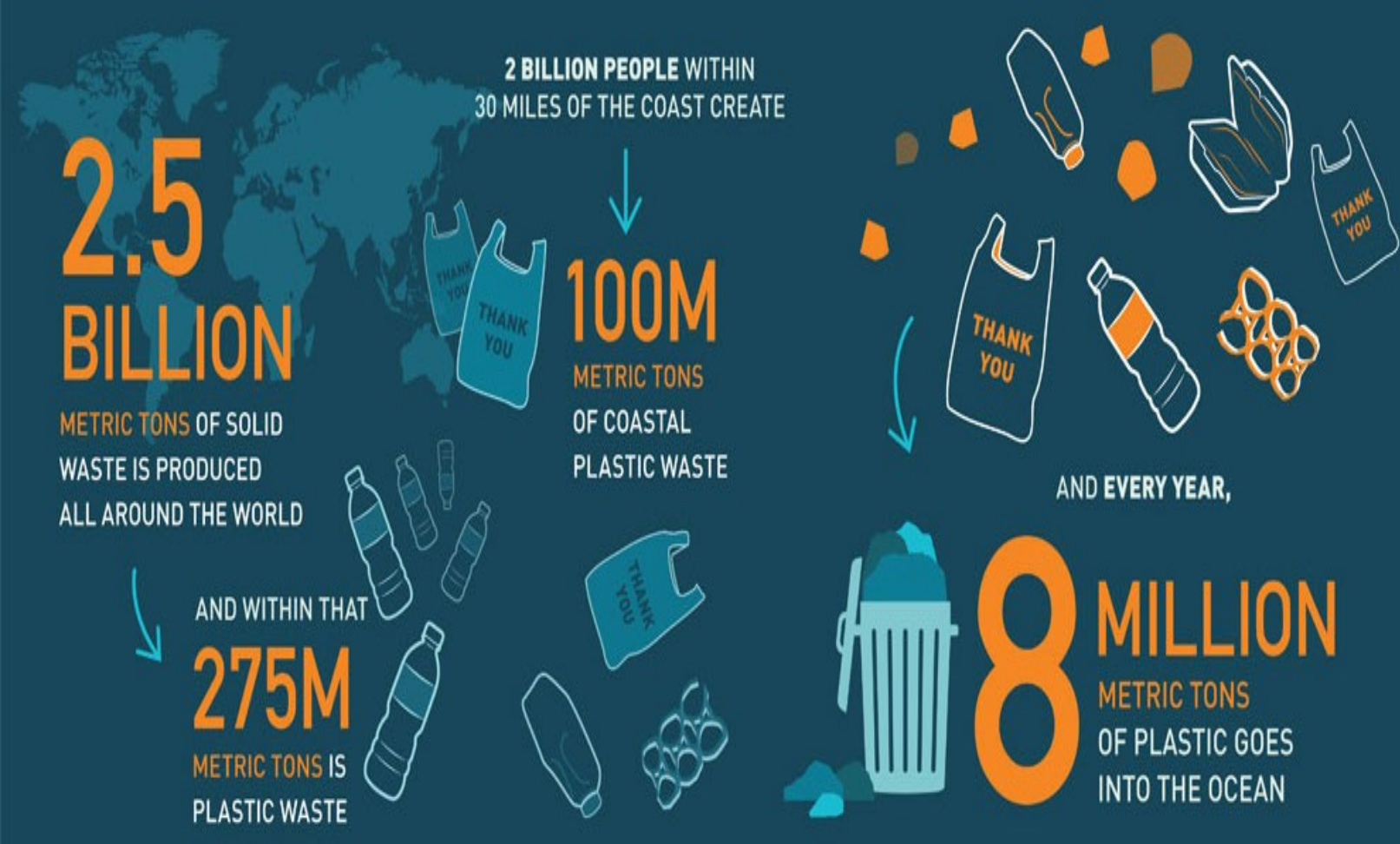
7TH INTERNATIONAL CONFERENCE ON SUSTAINABLE SOLID WASTE MANAGEMENT
26-29 June 2019, Heraklion, Crete Island, Greece



A GLOBAL CHALLENGE



Microplastics found in craft beers made with Lake Superior water
University of Minnesota study



- About 300 M tonnes of plastic waste is generated annually
- 9% is recycled -12% incinerated and the rest disposed in dumpsites/landfill sites
- 8-10 M tonnes of plastics escape into the ocean every year
- 5 trillion items of microplastics getting into the sea every minute.



60 - 90% of marine litter is plastic (UNEP-GRID 2016)

80% of marine litter from on land-based sources

The problem... in numbers

THE TOP 10 CORPORATE PLASTIC POLLUTERS IN GLOBAL BRAND AUDITS



Source: <https://www.breakfreefromplastic.org/2018/10/11/branded-pollution/>
#breakfreefromplastic

1

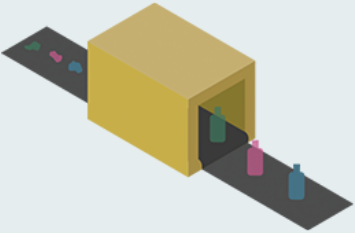


2 billion people without access to solid waste collection

INSUFFICIENT INFRASTRUCTURE

What is wrong?

2



MARKETS FOR SECONDARY MATERIALS

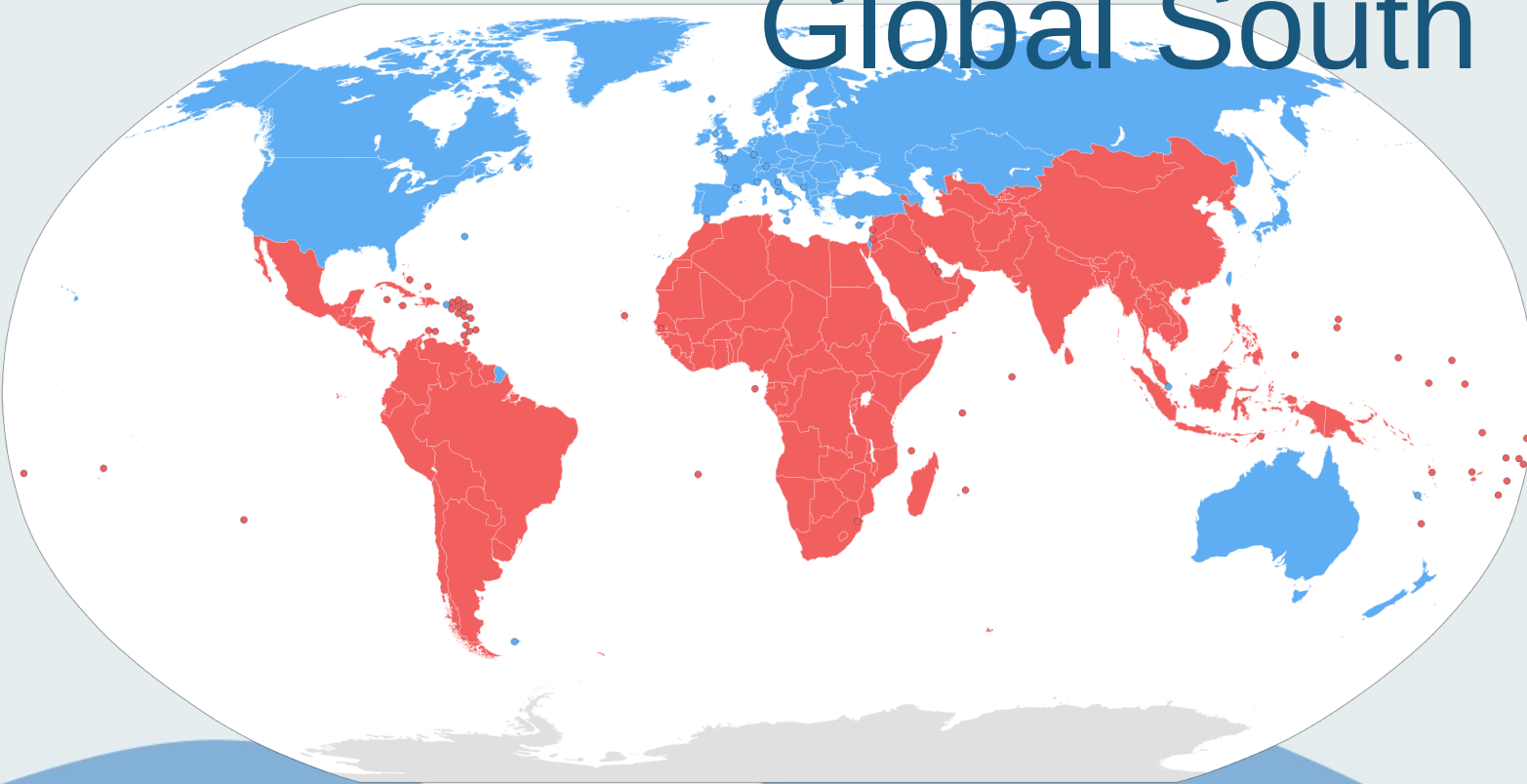
3

KNOWLEDGE GAPS



GLOBAL SYSTEMIC FAILURES

Most of the plastic escapes from the Global South



- Low collection coverage
- Irregular collection services
- Illegal open dumping
- Open burning
- Informal activities
- Contaminated plastic scrap from countries of the Global North
- Low- tech recycling units
- Fewer trained people
- Lack of political stability & environmental law enforcement
- Disarticulated economies

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TASK FORCE

An estimated 3.2m tonnes of **plastic** polluted **Indonesian** waters in 2010

What do we need ?

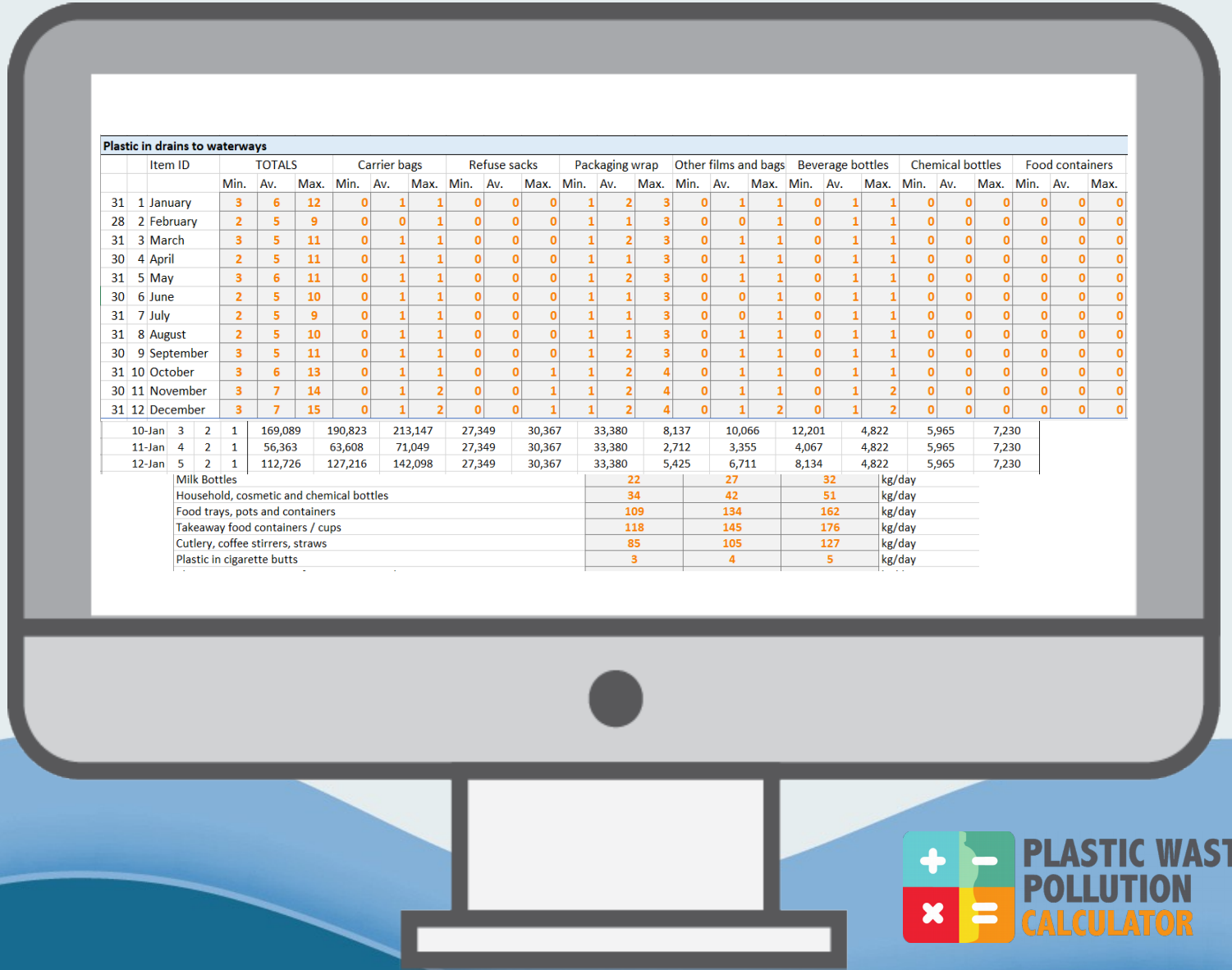
- Master plans on municipal, regional and national level to prevent and tackle marine litter
- Scientific proven tools



Methodology

The tool has been developed using Microsoft Excel taking into account:

- Sources
- Factors that affect the location and quantity of potential plastic leakage
- Transfer coefficients to model transfer of plastic from source to final receptors
- Global scientific experience



The screenshot shows a detailed Excel spreadsheet with the following structure:

- Table 1: Plastic in drains to waterways (Monthly Data)**

Item ID	TOTALS			Carrier bags			Refuse sacks			Packaging wrap			Other films and bags			Beverage bottles			Chemical bottles			Food containers		
	Min.	Av.	Max.	Min.	Av.	Max.	Min.	Av.	Max.	Min.	Av.	Max.	Min.	Av.	Max.	Min.	Av.	Max.	Min.	Av.	Max.	Min.	Av.	Max.
31 1	3	6	12	0	1	1	0	0	0	1	2	3	0	1	1	0	1	1	0	0	0	0	0	0
28 2	2	5	9	0	0	1	0	0	0	1	1	3	0	0	1	0	1	1	0	0	0	0	0	0
31 3	3	5	11	0	1	1	0	0	0	1	2	3	0	1	1	0	1	1	0	0	0	0	0	0
30 4	2	5	11	0	1	1	0	0	0	1	1	3	0	1	1	0	1	1	0	0	0	0	0	0
31 5	3	6	11	0	1	1	0	0	0	1	2	3	0	1	1	0	1	1	0	0	0	0	0	0
30 6	2	5	10	0	1	1	0	0	0	1	1	3	0	0	1	0	1	1	0	0	0	0	0	0
31 7	2	5	9	0	1	1	0	0	0	1	1	3	0	0	1	0	1	1	0	0	0	0	0	0
31 8	2	5	10	0	1	1	0	0	0	1	1	3	0	1	1	0	1	1	0	0	0	0	0	0
30 9	3	5	11	0	1	1	0	0	0	1	2	3	0	1	1	0	1	1	0	0	0	0	0	0
31 10	3	6	13	0	1	1	0	0	1	1	2	4	0	1	1	0	1	1	0	0	0	0	0	0
30 11	3	7	14	0	1	2	0	0	1	1	2	4	0	1	1	0	1	2	0	0	0	0	0	0
31 12	3	7	15	0	1	2	0	0	1	1	2	4	0	1	2	0	1	2	0	0	0	0	0	0
- Table 2: Summary of Plastic Waste (kg/day)**

Category	Value	Unit																								
10-Jan	3	2	1	169,089	190,823	213,147	27,349	30,367	33,380	8,137	10,066	12,201	4,822	5,965	7,230											
11-Jan	4	2	1	56,363	63,608	71,049	27,349	30,367	33,380	2,712	3,355	4,067	4,822	5,965	7,230											
12-Jan	5	2	1	112,726	127,216	142,098	27,349	30,367	33,380	5,425	6,711	8,134	4,822	5,965	7,230											
Milk Bottles	22												32													kg/day
Household, cosmetic and chemical bottles	34												42													kg/day
Food trays, pots and containers	109												134													kg/day
Takeaway food containers / cups	118												145													kg/day
Cutlery, coffee stirrers, straws	85												105													kg/day
Plastic in cigarette butts	3												4													kg/day

Combined with CVORR

The tool has the capability to expand to quantification of loss of “value” present in waste plastics via combination with the Complex Value Optimization and Resource Recovery (CVORR) approach (Iacovidou et al., 2017)

This approach assesses how value is created and destroyed in resource recovery from waste systems. It achieves this by taking into account environmental, economic, social and technical positive and negative impacts within the socio-political context of the specific regions.



Data-Required

GEOGRAPHY



DEMOGRAPHICS



LAND USE



WASTEWATER & DRAINAGE



NEIGHBOURHOOD TYPE



COMMERCIAL



INSTITUTIONAL



RECREATIONAL



DERELICT



WASTE GENERATION



PLASTIC COMPOSITION



COLLECTION SYSTEM

INFORMAL SECTOR

WASTE TREATMENT & DISPOSAL



COLLECTION AND TRANSPORTATION METHOD



SIZE OF WASTE CONTAINERS



TYPE OF WASTE CONTAINERS



NUMBER OF WASTE CONTAINERS



STREET SWEEPINGS



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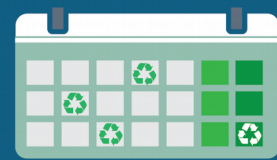
WASTE COLLECTION EFFICIENCY



TYPE OF SOURCE SEPARATION



COLLECTION FREQUENCY



WASTE
ON
OR

It estimates...

FLY-TIPPING



LITTERING



WASTE TO THE ENVIRONMENT



DUMPING OF UNCOLLECTED WASTE



OPEN BURNING OF UNCOLLECTED WASTE



LEAKAGE WHILST WAITING FOR COLLECTION



LEAKAGE DURING COLLECTION & TRANSPORTATION



LEAKAGE FROM THE INFORMAL SECTOR ACTIVITIES



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+ **-** **PLASTIC WASTE POLLUTION CALCULATOR**
x **=**

SLOPE OF THE LAND



DISTANCE FROM WATERWAY



PLASTIC TRANSPORTATION TO WATERWAYS



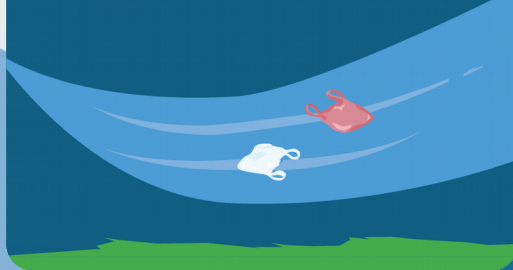
ABILITY TO BE TRANSPORTED BY SURFACE RUN-OFF



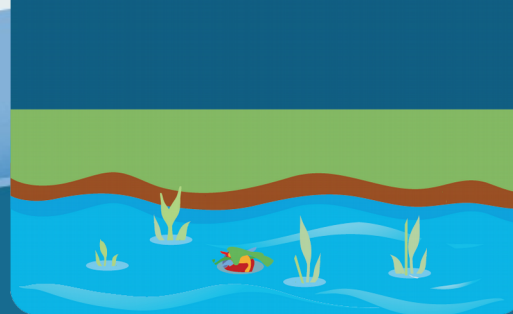
MONTHLY PRECIPITATION



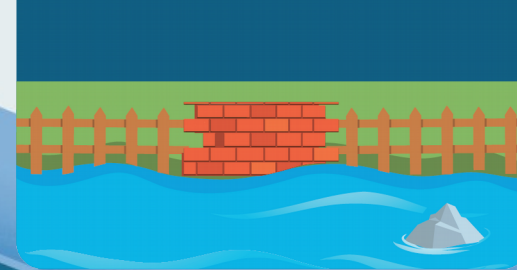
ABILITY TO BE TRANSPORTED BY WIND



LEVEL OF VEGETATION



LEVEL OF MAN-MADE BARRIERS



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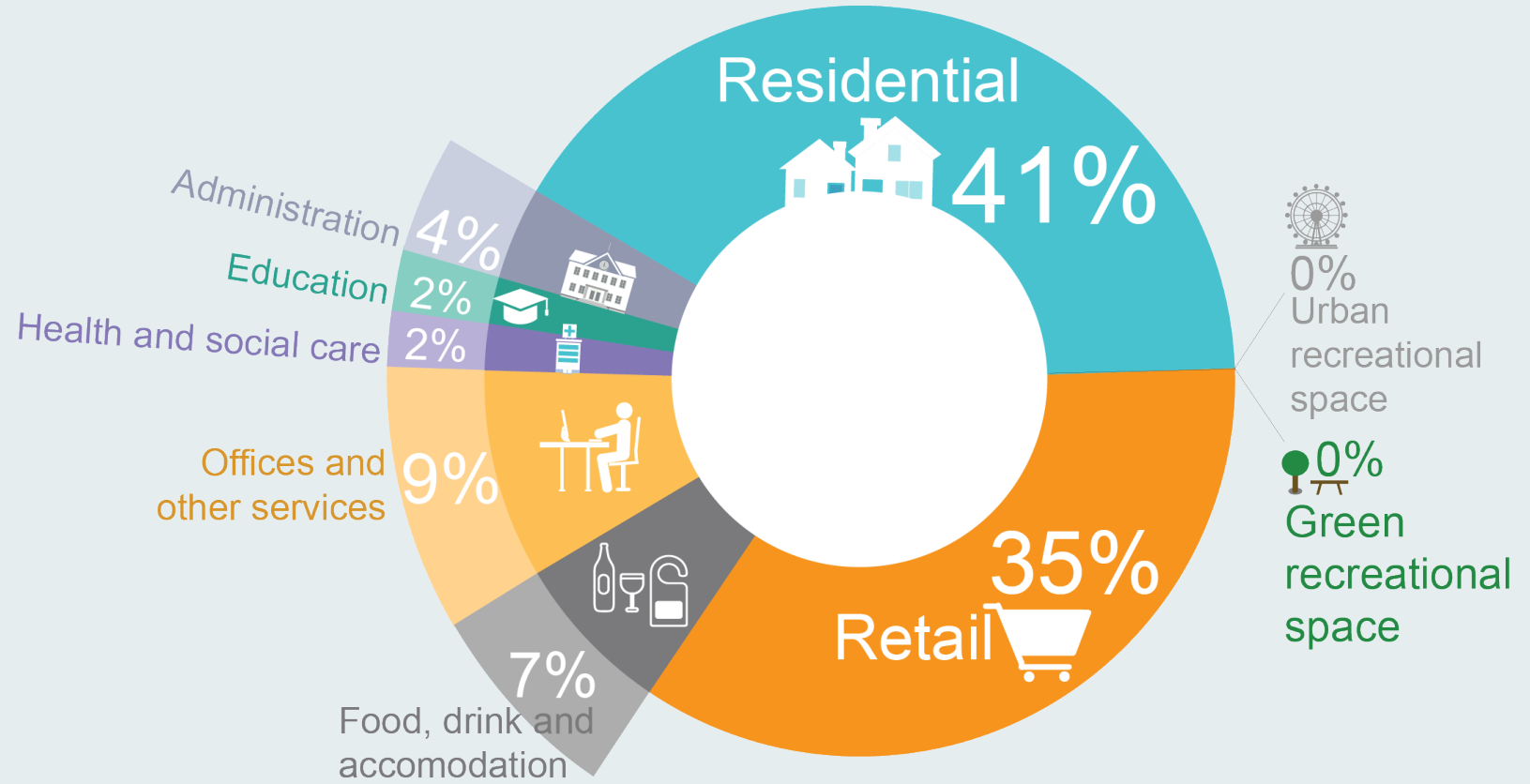
+ **-** **PLASTIC WASTE POLLUTION CALCULATOR**
× **=**

Results you get...

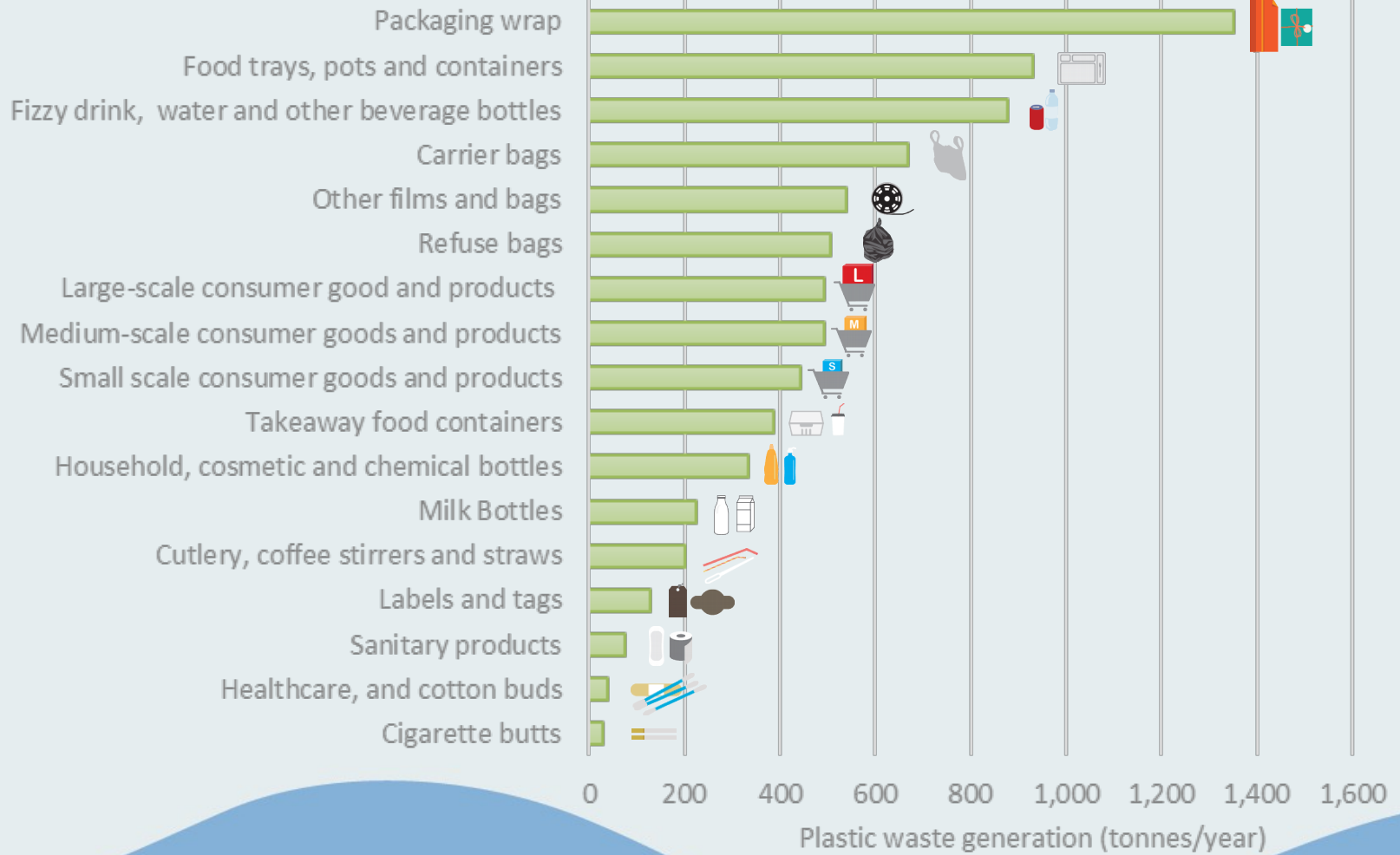
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The logo for the ISWA Marine Task Force is located in the bottom left corner. It features the text "ISWA" on the top line, "MARINE" on the second line, and "TASK FORCE" on the third line, all in a white, sans-serif font. To the right of the text is a white circular icon containing a stylized wave pattern.

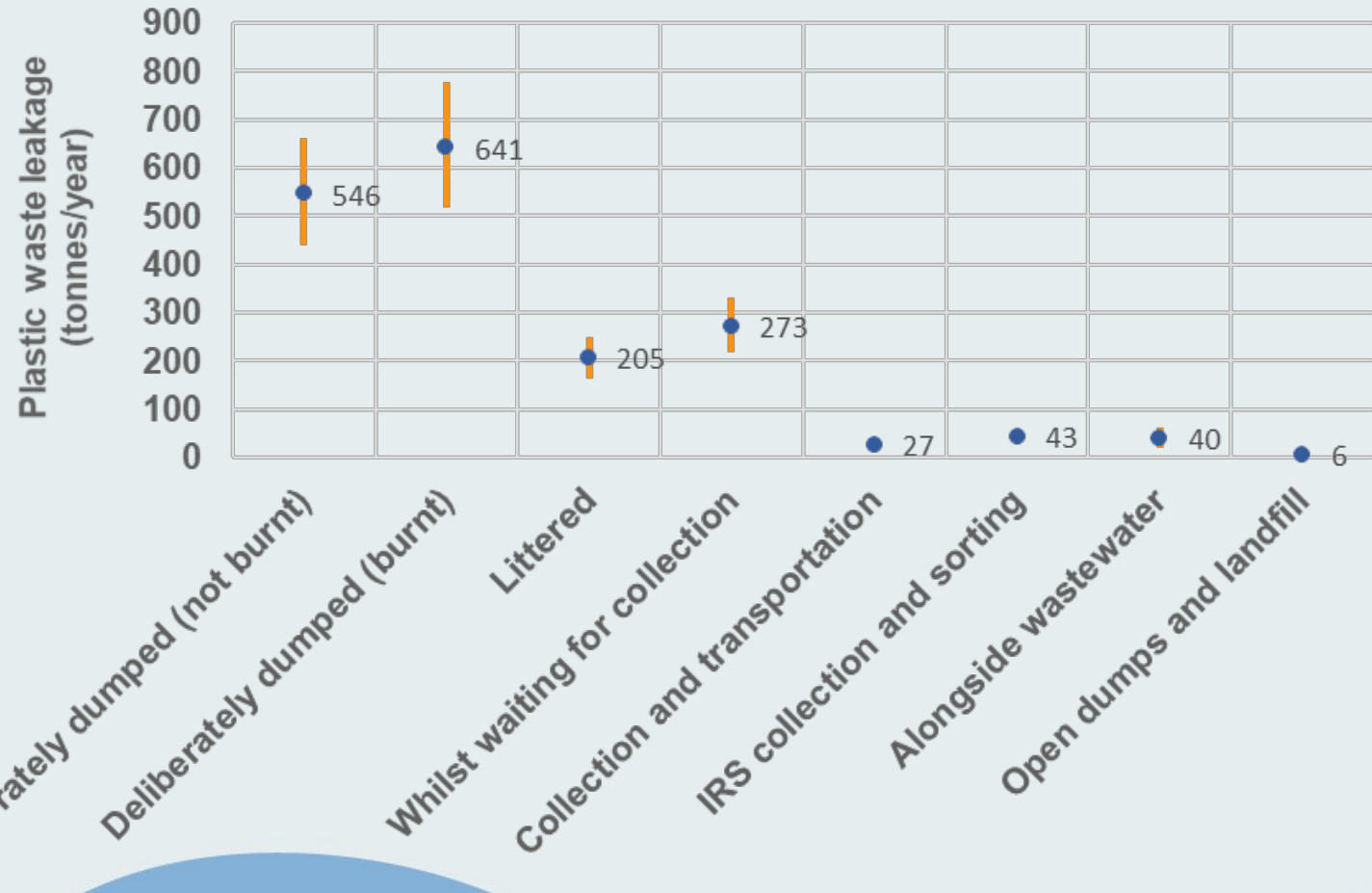
WASTE GENERATION

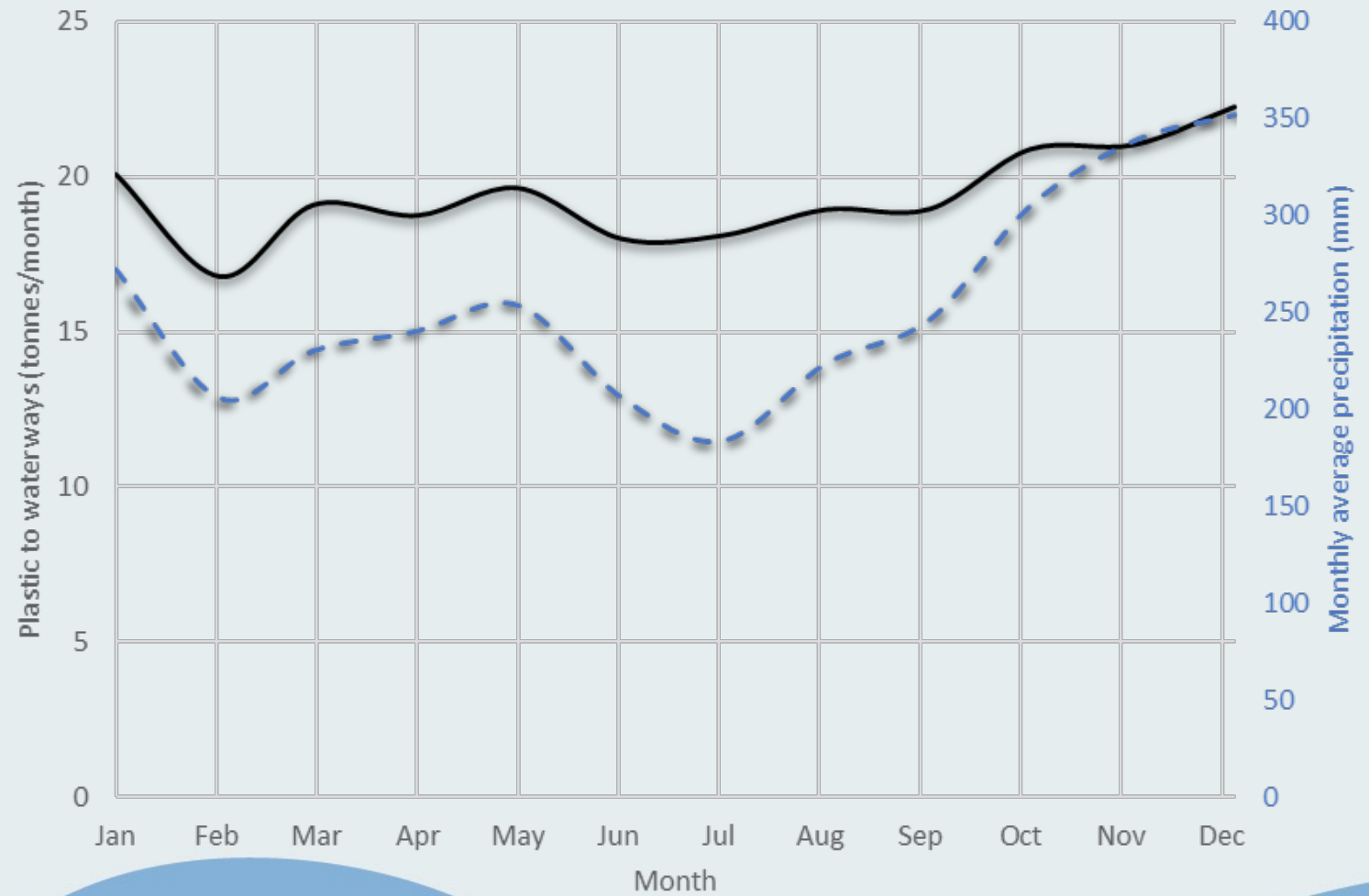


PLASTIC COMPOSITION



WASTE TO THE ENVIRONMENT





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**PLASTIC WASTE
POLLUTION
CALCULATOR**



Customised solutions...

POLICY/ ENGINEERING

Take no action

Provide all households with waste collection services

Increase collection frequency

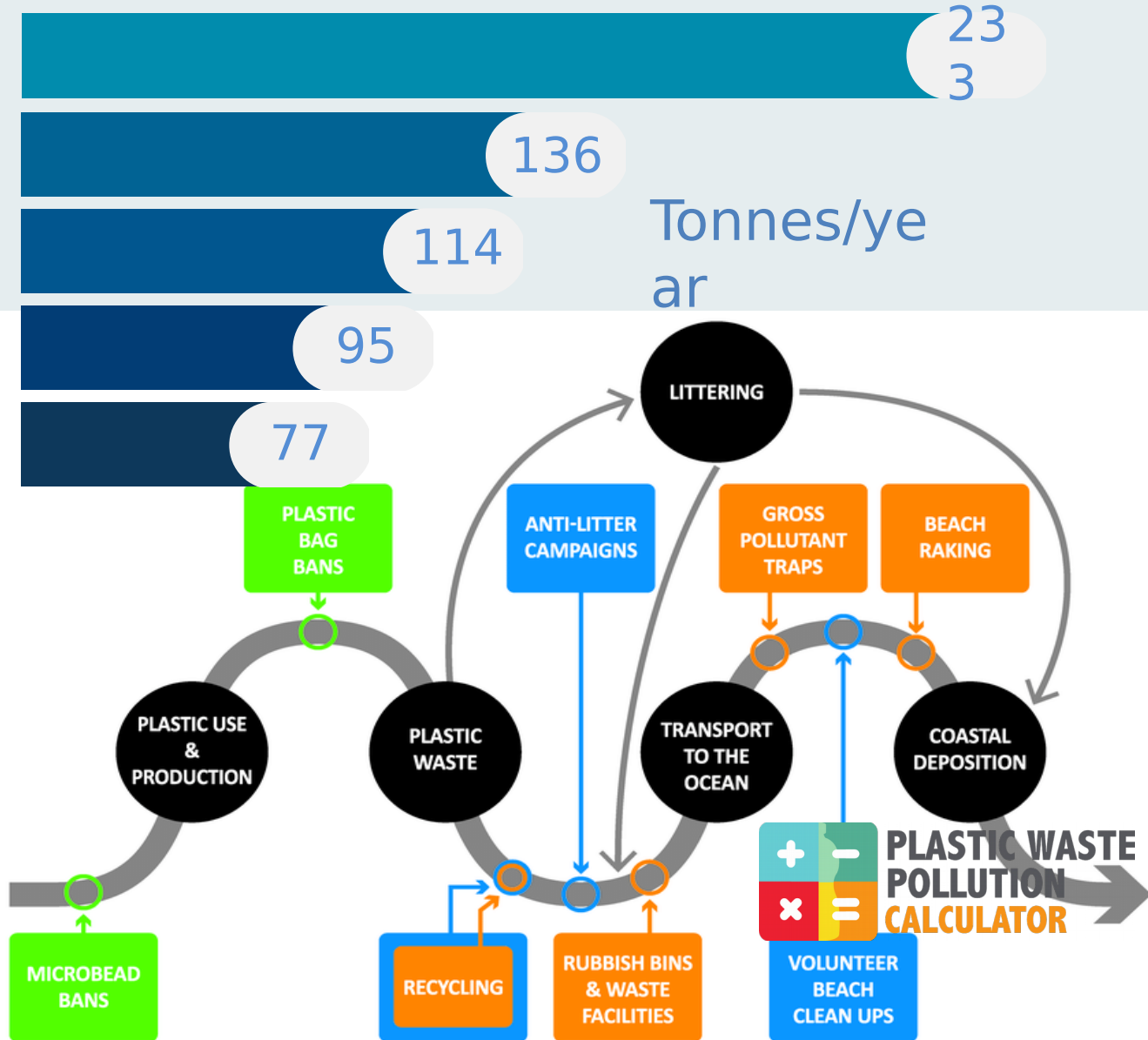
Engage with residents to tackle littering and dumping

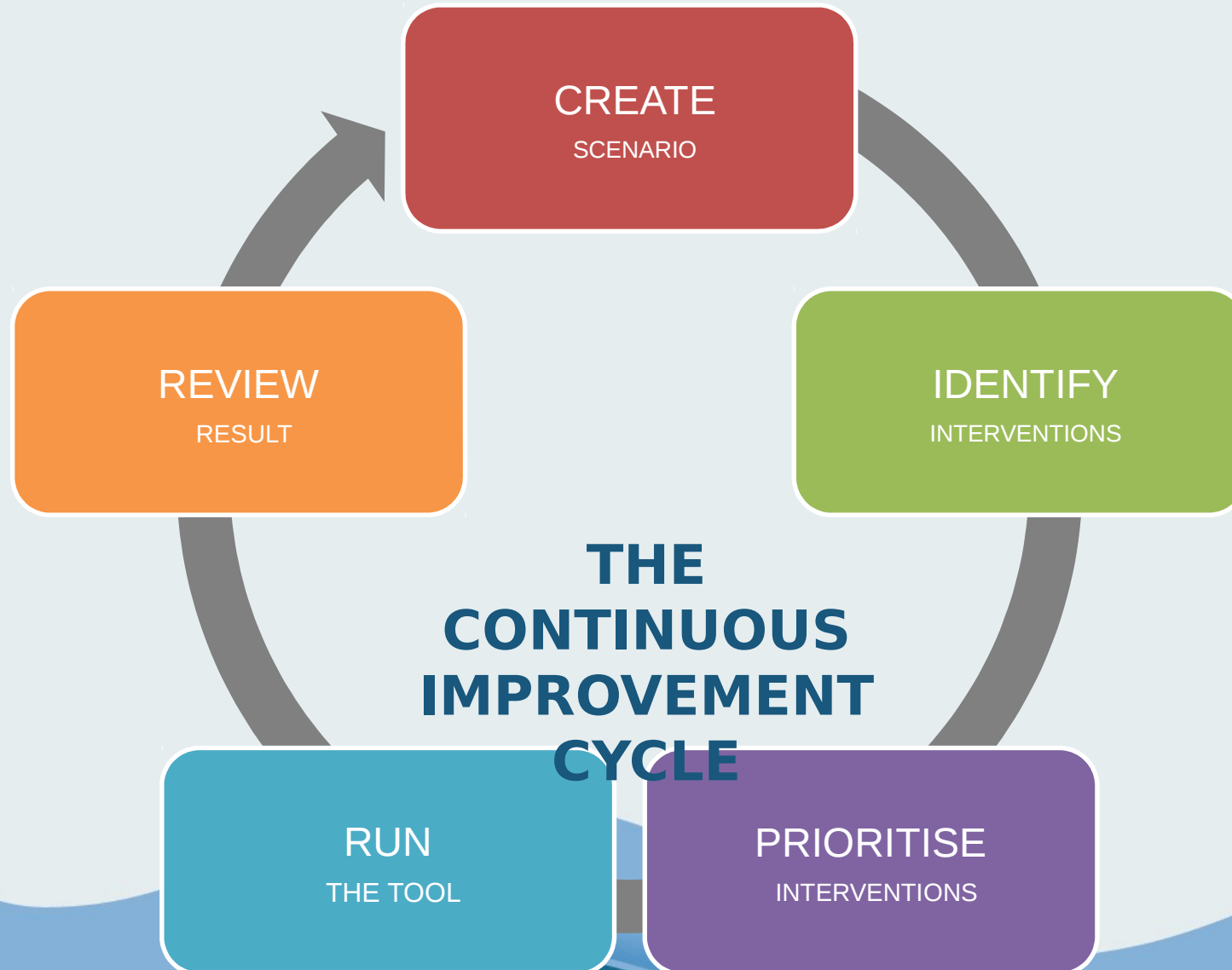
Enclose storm drains



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INTERVENTIONS WITHIN THE TOOL





Validate Run case studies to expand database

Partnership Come alongside us!

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NEXT STEPS...

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Get in touch: