MARITIME INSTITUTE OF MALAYSIA

Monitoring and Assessment Methodologies Using Practical Examples

Application of the Clean Coast Index (CCI) – The Selangor State level case study

National Stakeholders Consultation on Marine Litter – Solving Plastic Pollution at Source

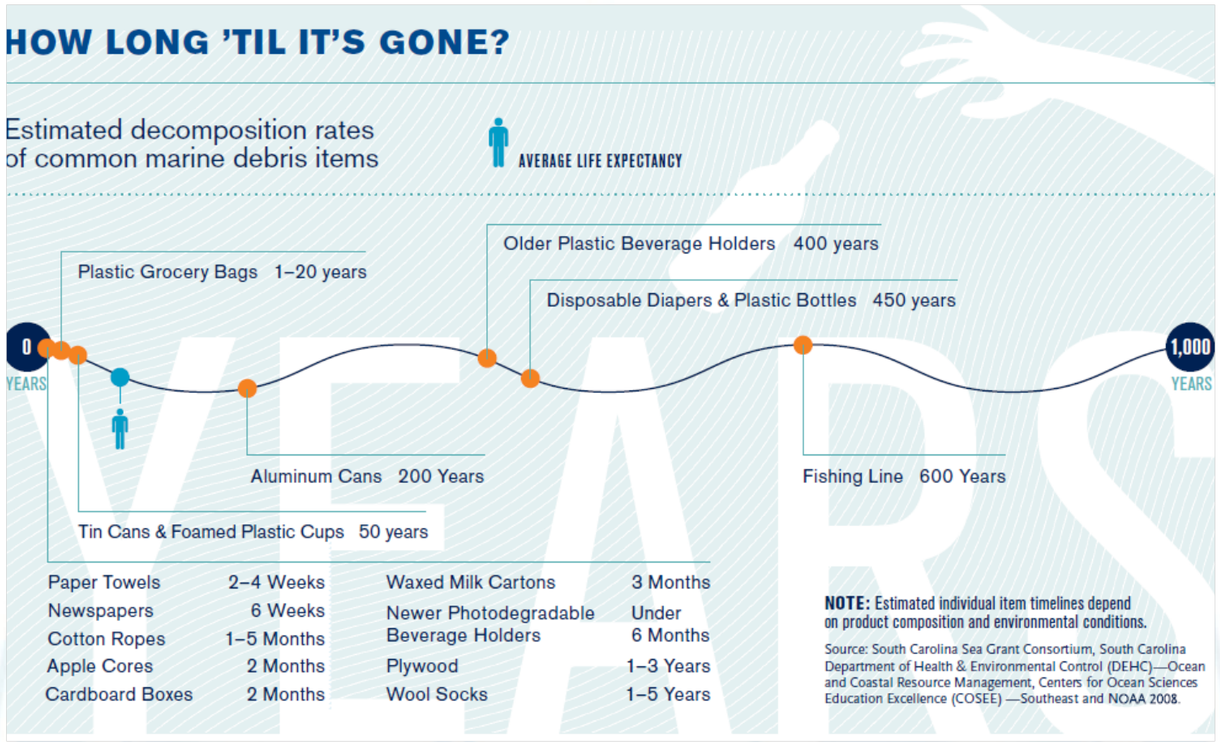
Port Dickson: 5 – 6 November 2019

Outline

- Introduction
- The pilot study
- Methodology
- CCI application at the Selangor State level
- Limitations and suggestions

Introduction

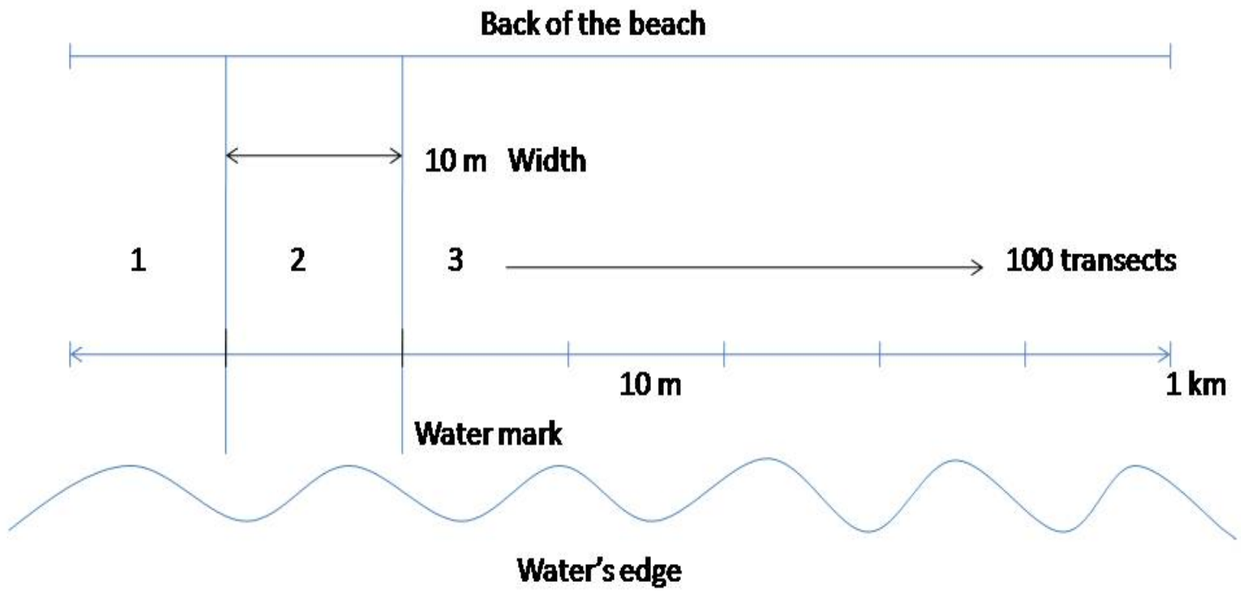
- MIMA study on ‘Management of Coastal Litter’
- Plastic debris as an indicator



Source: Ocean Conservancy’s Report on Trash Travel, 2010

The pilot study

Methodology



In the actual sampling, 1 km stretch of selected beach will be divided into 100 transects measuring 10 m each. 30 transects will be selected randomly.

Transects are performed from the water's edge at the measuring moment to the border of the coast, represented by any obstacle (sand dune, cliff, vegetation, road or fence).

The Survey Form

Clean Coast Index Project
Survey Form

Thank you for your kind participation in the ***Developing a Clean Coast Index for Cleanliness Assessment of Coastal Areas in Malaysia's*** project. We appreciate your commitment and passion in the coastal conservation issue.

This survey sheet will be filled out by one representative for each transect/sampling site.

BEACH LITTER DATA SHEET	
Organisation	
Date	
Beach Name	
Region/State	

BEACH CHARACTERISTIC					
					Remarks
Ecological type	Sandy	☐	Estuarine	☐	
	Rocky	☐	Coral	☐	
	Mangrove	☐	Sea grass	☐	
	Mud flat	☐	Coastal forest	☐	
Tidal range					**For office use only.**
Shoreline description					Describe the landward limit (Rock wall, Cliff,Dune, Anthropogenic, exposed, solid man made structures)

SAMPLE UNIT/TRANSECT INFORMATION				
				Remarks
Coastal type and use (please	Recreational	Picnic	☐	
		Swimming	☐	

tick where applicable)		Camping	☐	
		Surfing	☐	
		Boating	☐	
	Non recreational	Cage culture	☐	
		Residential	☐	
		Factory	☐	
		Agriculture	☐	
		Fishing	☐	
		Boat access	☐	*with or without jetty
		Remote	☐	
	Others (please indicate the activity)			
Access to sampling site	Vehicular (can drive on beach)		☐	
	Pedestrian (must walk)		☐	
	Isolated (need a boat)		☐	
Other information (tick where applicable)	Strait front		☐	
	Open sea		☐	
	Bay front		☐	
Weather condition (pelase tick where applicable)	Hot sunny		☐	
	Strong wind		☐	
	Raining		☐	

SAMPLE UNIT/TRANSECT INFORMATION	
Name of transect/unit	T J/P/SD/KK/K/SL/M/L
Date	
Time start, end	
Latitude (office use)	
Longitude (office use)	
Number of persons	
Length of beach being surveyed	
Width of beach	

*T=transect, J=Johor, P=Pahang, SD=Sandakan, KK=Kota Kinabalu, K=Kuching, SL=Selangor, M=Melaka, L=Langkawi

(Please sort the items according to the description and indicate the amount of the litter collected. Plastic particles larger than 2 cm in size are chosen to be the numerator of the index in the study.)

LITTER DATA	
Litter description (fill in where applicable)	Count/piece
Polystyrene	
Bottle caps	
Sweet wrappers	
Cigarette stubs	
Plastic bags	
Plastic cutlery/straws	
Balloon	
Drink cans	
Plastic bottles	
Glass bottles	

LITTER DATA	
Litter description (fill in where applicable)	Count/piece
Aluminum caps	
Aluminum tin	
Newspaper	
Paper particles	
Fishing line	
Rubber pieces	
Textile	
Bulky waste (e.g. furniture)	
Shoes	
Rope	
Wood	
Others (please indicate) 1. 2. 3. 4. 5.	

Training of Trainers (ToT)

- Lecture conducted by MIMA and MNS representatives at the multipurpose hall, Majlis Daerah Kuala Langat
- Manual practice conducted at Pantai Morib
- Attended by 80 representatives from five local councils (PBT)


Sampling model

Program Pembersihan Pantai

- Launched by HRH Tengku Zatashah on 14th October 2017 at Pantai Morib, Kuala Langat
- Simultaneous event with four other coastal areas
  - Pantai Remis, Kuala Selangor
  - Pantai Bagan Lalang, Sepang
  - Pantai Tanjung Harapan, Klang
  - Pantai Bagan Nakhoda Omar, Sabak Bernam


LOGO PANTAI SELANGOR
PROGRAM PEMBERSIHAN PANTAI
NEGERI SELANGOR
PANTAI MORIB, KUALA LANGAT
PANTAI REMIS, KUALA SELANGOR
PANTAI BAGAN LALANG, SEPANG
PANTAI TANJUNG HARAPAN, KLANG
PANTAI BAGAN NAKHODA OMAR, SABAK BERNAM
14 OKTOBER 2017

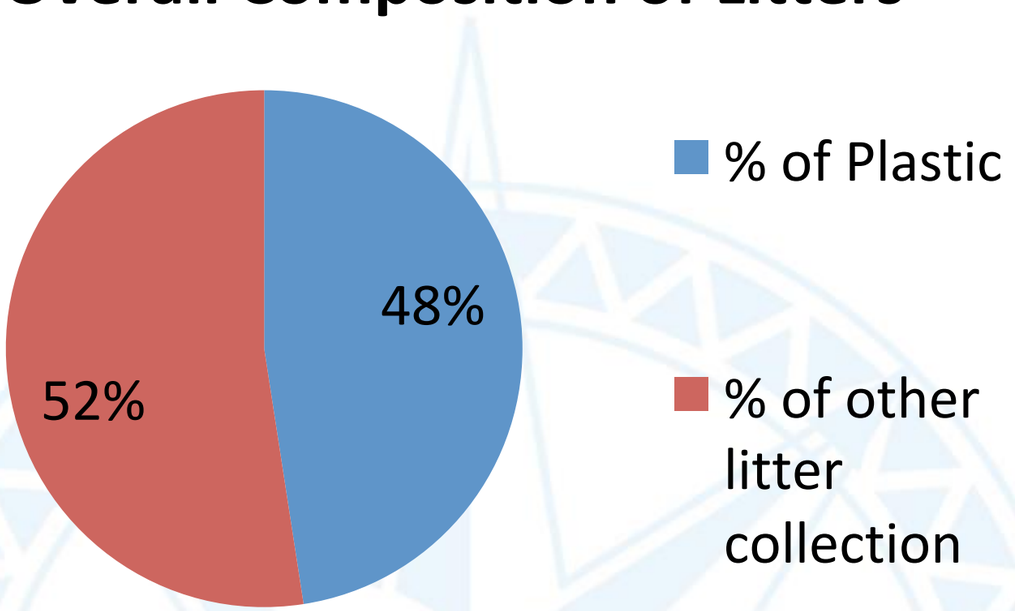

PROGRAM PEMBERSIHAN PANTAI
NEGERI SELANGOR
PANTAI MORIB, KUALA LANGAT
PANTAI REMIS, KUALA SELANGOR
PANTAI BAGAN LALANG, SEPANG

Beach type and length during sampling

Beach	Condition	Length (m)
Pantai Morib	Seawall, Sandy	350
Pantai Remis	Sandy	500
Pantai Bagan Lalang	Sandy	380
Pantai Tanjung Harapan	Rocky	500
Pantai Bagan Nakhoda Omar	Rocky	174

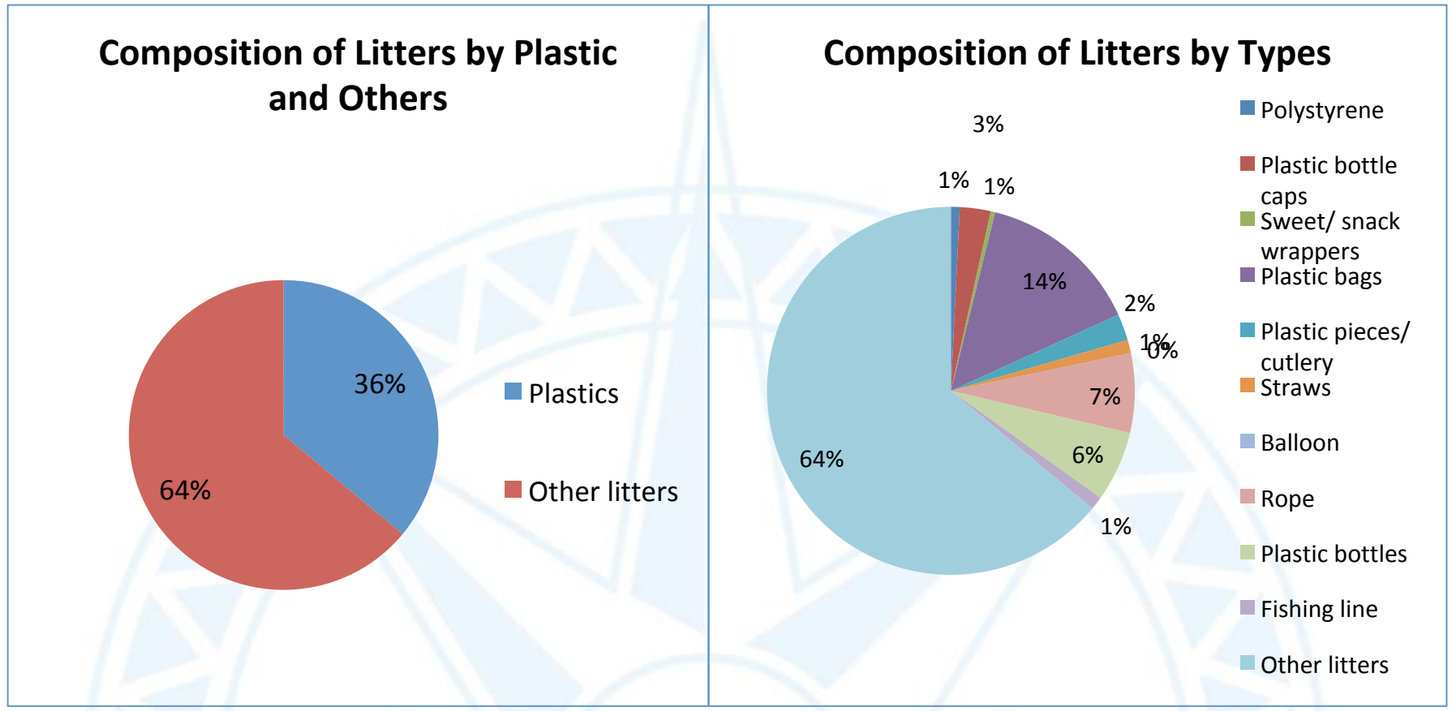
Results

Overall Composition of Litters

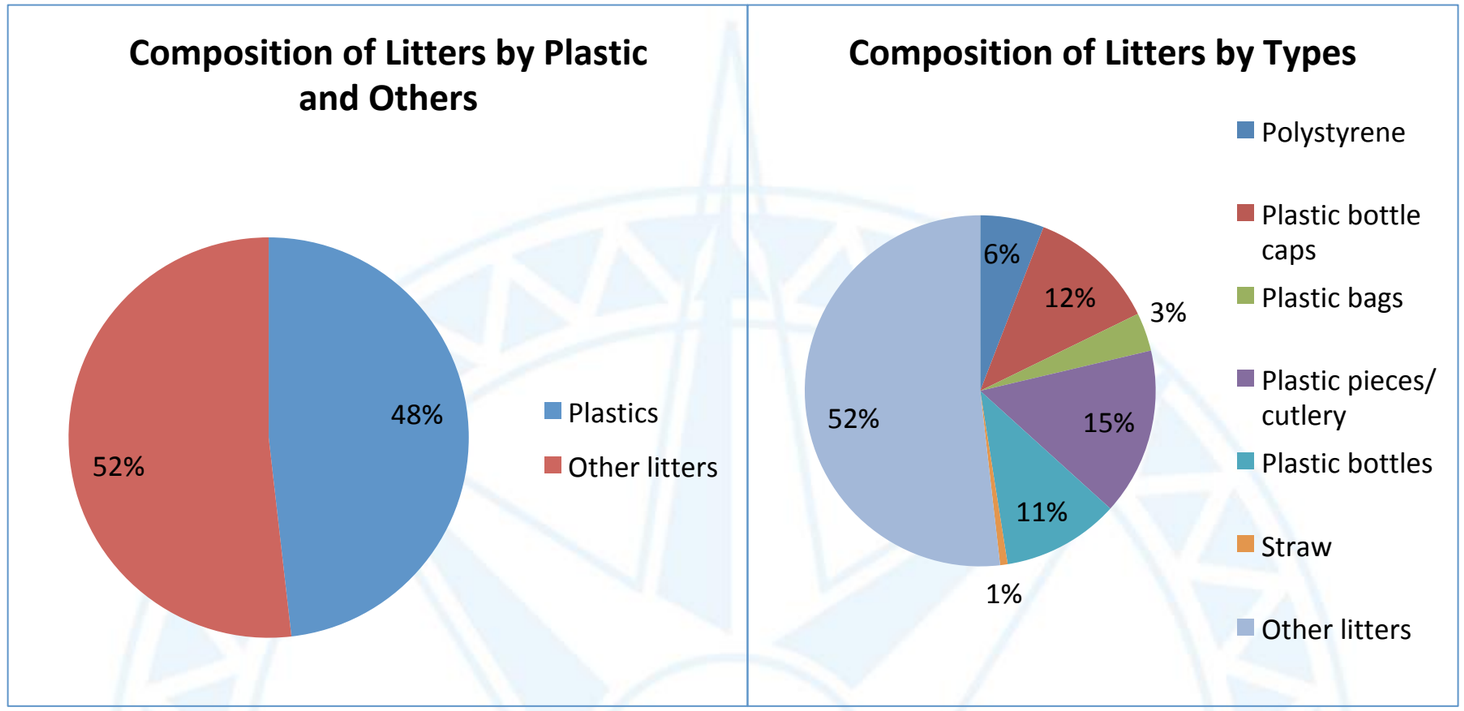


Type of litter	Bagan Lalang	Pantai Remis	Pantai Morib	Tanjung Harapan
Plastic pieces/cutlery	**306**	**335**	6	**115**
Plastic bottle caps	89	259	7	34
Plastic bottles	144	235	16	89
Polystyrene	144	128	2	44
Balloon	10			1
Plastic bags	196	77	37	122
Rope	13		18	25
Straws	81	15	3	111
Sweet/snack wrappers	117		1	58
Fishing line	23		3	23
Paper particles	64	222	1	62
Cigarette stubs	**659**	**645**	**60**	**208**
Bulky waste (e.g.furniture)	4			
Drink cans	30			29
Metal	17			10
Newspaper	22			
Glass	9	86	**72**	26
Wood	36	50	4	61
Rubber pieces	40	26		9
Shoes	7	25		6
Glass bottles	7	15	1	75
Aluminum caps	21	4		5
Aluminum tin	19		7	16
Textile	22		20	14
Pampers	4			
Fishing rod	5			
Lighter	6			
Zink	1			
Others (Battery)				32
Others (Fruit skin)		55		
Others (Fishing bag)				1
Others (Socket box)				1
Others (PVC)				1
Other (Cigarette box)				16
Total	**2,096**	**2,177**	**258**	**1,194**

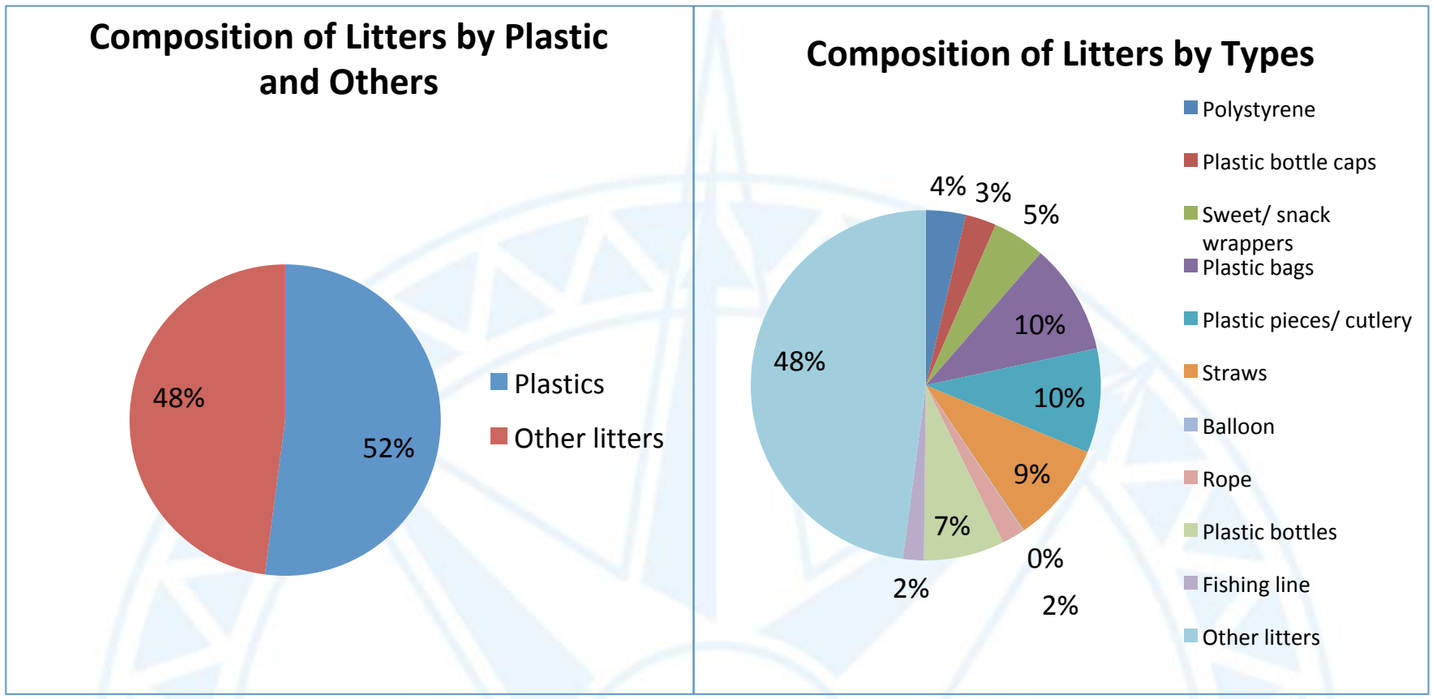
- Pantai Morib



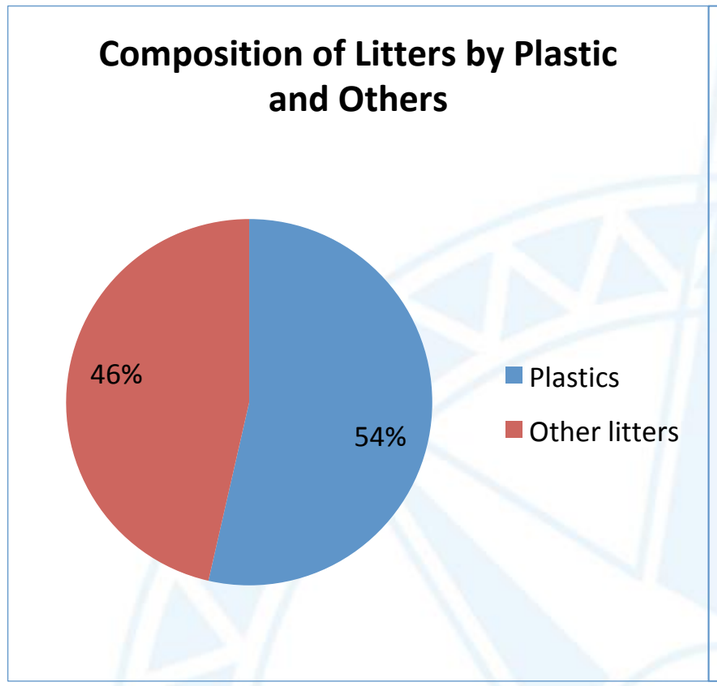
- Pantai Remis

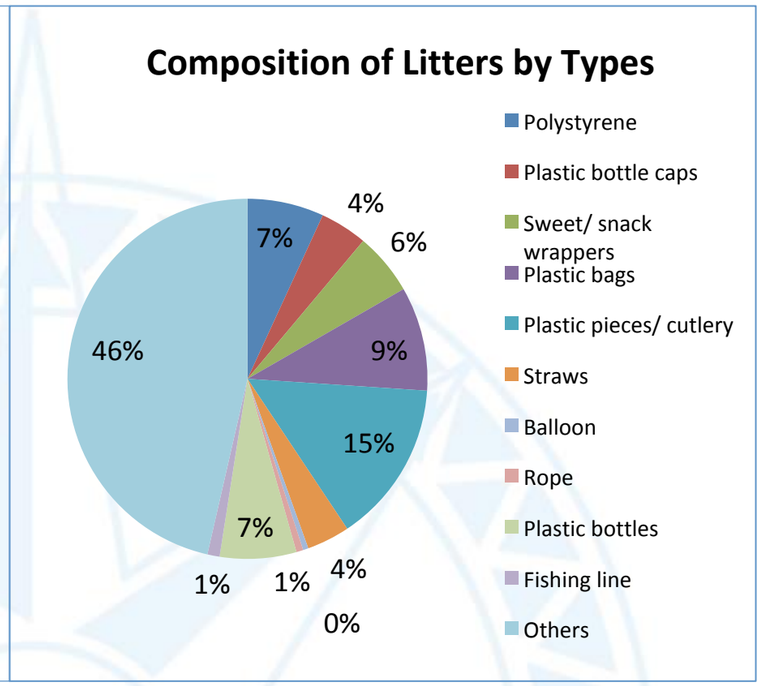


- Tanjung Harapan



- Bagan Lalang





Data Analysis

The calculation of the CCI is presented in the following equation:

$$\frac{\text{Total plastic parts counted in Z lines}}{\text{Z x beach width (m) x beach length (m)}} = \text{Plastic parts/m2}$$

Results for appearance of litter on the coasts were graded as follows:

Coast index	Very clean	Clean	Moderate	Dirty	Extremely dirty
Numeric index	0–2	2–5	5–10	10–20	20+

Findings (Pantai Remis)

No	Transect	Plastic pieces	Width (m)	Length (m)	CCI plastic parts	Numeric Index
1	3	0	10	15	0	0 to 2
2	4	0	10	15	0	0 to 2
3	6	0	10	15	0	0 to 2
4	14	113	10	15	0.753333	0 to 2
5	32	117	10	15	0.78	0 to 2
6	35	52	10	15	0.346667	0 to 2
7	36	200	10	15	1.333333	0 to 2
8	37	100	10	15	0.666667	0 to 2
9	40	250	10	15	1.666667	0 to 2
10	43	37	10	15	0.246667	0 to 2
11	44	10	10	15	0.066667	0 to 2
12	46	65	10	15	0.433333	0 to 2
13	48	44	10	15	0.293333	0 to 2
14	50	61	10	15	0.406667	0 to 2
	Total	1049			6.993333	
				CCI	**0.5**	**0 to 2**

Data analysis

- Overall Clean Coast Index (CCI)

Type of litter	Bagan Lalang	Pantai Remis	Pantai Morib	Tanjung Harapan
Clean Coast Index	0.1	0.5	1	0.3
Beach Status	**Very clean**	**Very clean**	**Very clean**	**Very clean**

Results for appearance of litter on the coasts were graded as follows:

Coast index	Very clean	Clean	Moderate	Dirty	Extremely dirty
Numeric index	0–2	2–5	5–10	10–20	20+

Comparison

TYPE OF LITTER	Pt. Morib &Pt. Kelanang	Pt. Desaru	Pt. Cenang	Pt. Balok	Pt. Puteri Melaka	Tg. Tuan &PtCermin	Pt. Puteri Sarawak	Tg. Aru Sabah
Coastal Clean Index	**5.68**	7.08	1.18	4.97	6.79	4.62	2.95	3.8
Beach Status	**Moderate**	Moderate	Very Clean	Clean	Moderate	Clean	Clean	Clean

Type of litter	Pantai Morib (2010)	Pantai Morib (2017)
Clean Coast Index	5.68	1
Beach Status	**Moderate**	**Very clean**

Better comparison:

1. Seasonal
2. Weekdays
3. Weekend
4. Litter management practice

Limitations

- More transects = more representative data
  (to have at least 30% representation)
- Technical difficulties with regards to the different beach type.

Suggestions

- More sessions of the Training of Trainers (ToT).
- CCI to be expanded other areas for monitoring and cleanliness assessment.
- Other efforts

- Data sharing with the International Coastal Cleanup (ICC)

INTERNATIONAL CLEANUPS

2016 Ocean Trash Index

COUNTRY/LOCATION	PEOPLE	POUNDS	KILOGRAMS	MILES	KILOMETERS	TOTAL ITEMS COLLECTED
ALBANIA	1	2	1	0.5	0.8	15
ANTARCTICA	2	2	1	0.5	0.8	7
ARGENTINA	192	767	348	2.5	4.1	1,964
AUSTRALIA	7,627	234,218	106,240	756.5	1,217.5	9,375
AZERBAIJAN	10	161	73	2.5	4.0	260
BANGLADESH	520	4,630	2,104	0.2	0.3	38,608
BARBADOS	807	6,708	3,043	27.5	44.2	55,683
BELGIUM	1	11	5	0.5	0.8	162
BELIZE	937	11,289	5,121	29.9	48.0	91,884
BERMUDA	429	8,151	3,697	28.2	45.4	28,355
BONAIRE	125	1,764	800	1.4	2.3	1,032
BRAZIL	1,977	3,082	1,398	34.5	55.5	31,255
BRITISH VIRGIN ISLANDS	76	845	383	0.9	1.5	4,889
BRUNEI	811	8,770	3,978	15.0	24.1	22,012
BURMA	2	2	1	0.5	0.8	24
CAMBODIA	134	681	309	1.8	3.0	9,895
CANADA	24,475	128,331	58,210	970.8	1,563.5	518,686
CAYMAN ISLANDS	87	1,362	618	0.9	1.5	6,455
CHILE	10,176	188,521	85,512	127.1	204.6	251,910
CHINA	5,525	90,256	40,940	37.8	60.8	20,856
COLOMBIA	223	2,792	1,267	6.1	9.8	322,841
COSTA RICA	470	7,881	3,575	5.3	8.5	42,797
CROATIA	4	180	82	0.5	0.8	273
CUBA	35	683	310	1.0	2.0	1,201
CURAÇAO	18	63	29	1.6	2.5	126
CYPRUS	11	4	2	0.5	0.8	1,833
DENMARK	63	284	129	10.5	16.9	3,561
MACAU	11	159	72	0.5	0.8	2,607
MALAWI	203	4,475	2,030	1.9	3.0	1
MALAYSIA	198	761	345	7.8	12.5	6,788
MALDIVES	187	1,496	679	4.9	7.9	12
MALTA	39	825	374	7.5	12.0	297
MARSHALL ISLANDS	43	794	360	0.5	0.8	8,728
MAURITIUS	156	1,631	740	2.6	4.3	8,703

Thank you

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