



Significance of harmonized monitoring and data compilation: Monitoring and survey in Indonesia

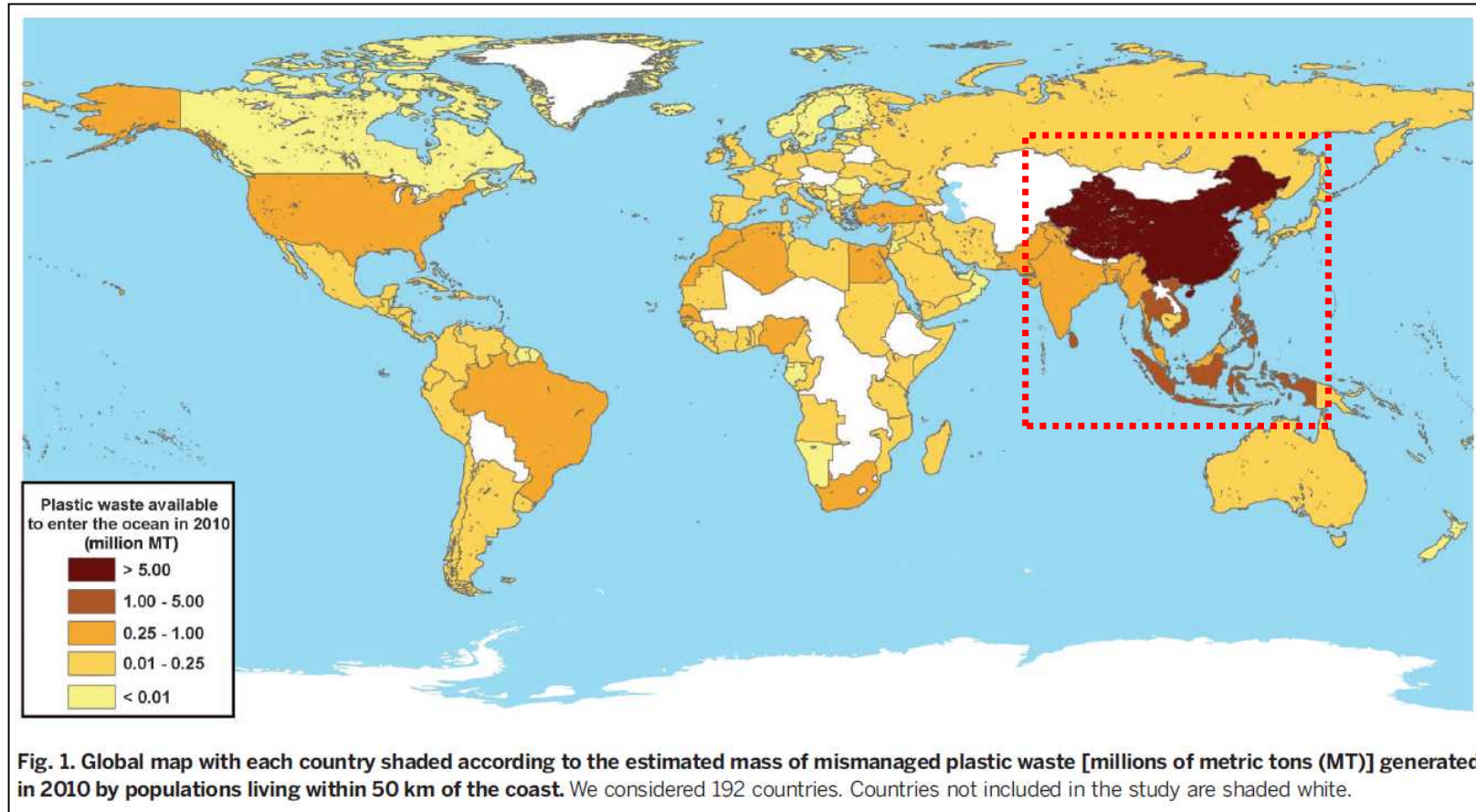
G20 Workshop on harmonized monitoring and data compilation of marine plastic litter

7th September 2020

Source:
NATIONAL
GEOGRAPHIC

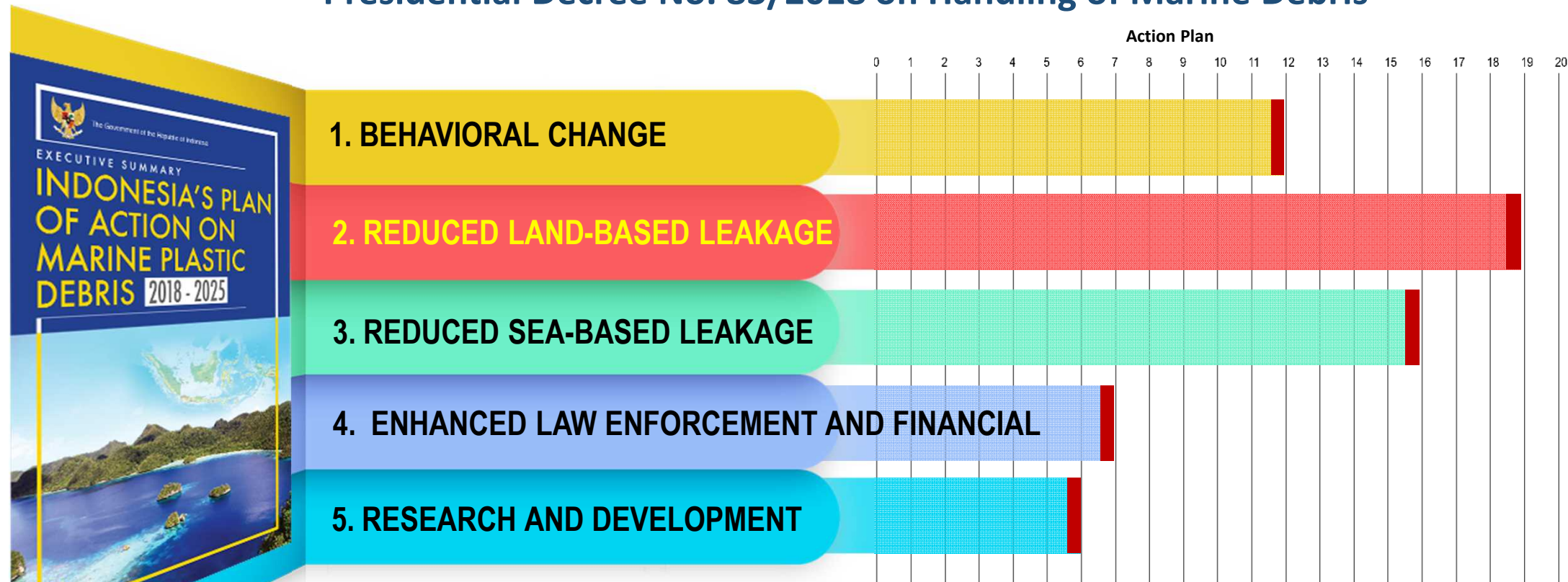
Where is all the plastic?

Plastic waste input from land to ocean: Asia_hot spot



Indonesia's Plan of Action on Marine Plastic Debris

Presidential Decree No. 83/2018 on Handling of Marine Debris



Achieving the target of plastic waste reduction (70% by 2025) at sea is implemented in an integrated manner through the program in 16 Ministries and Institutions with 59 activities supporting the above 5 Strategies

Lesson Learn

Monitoring marine litter in Indonesia

Some of marine debris study in Indonesia published from 1986 to 2018.

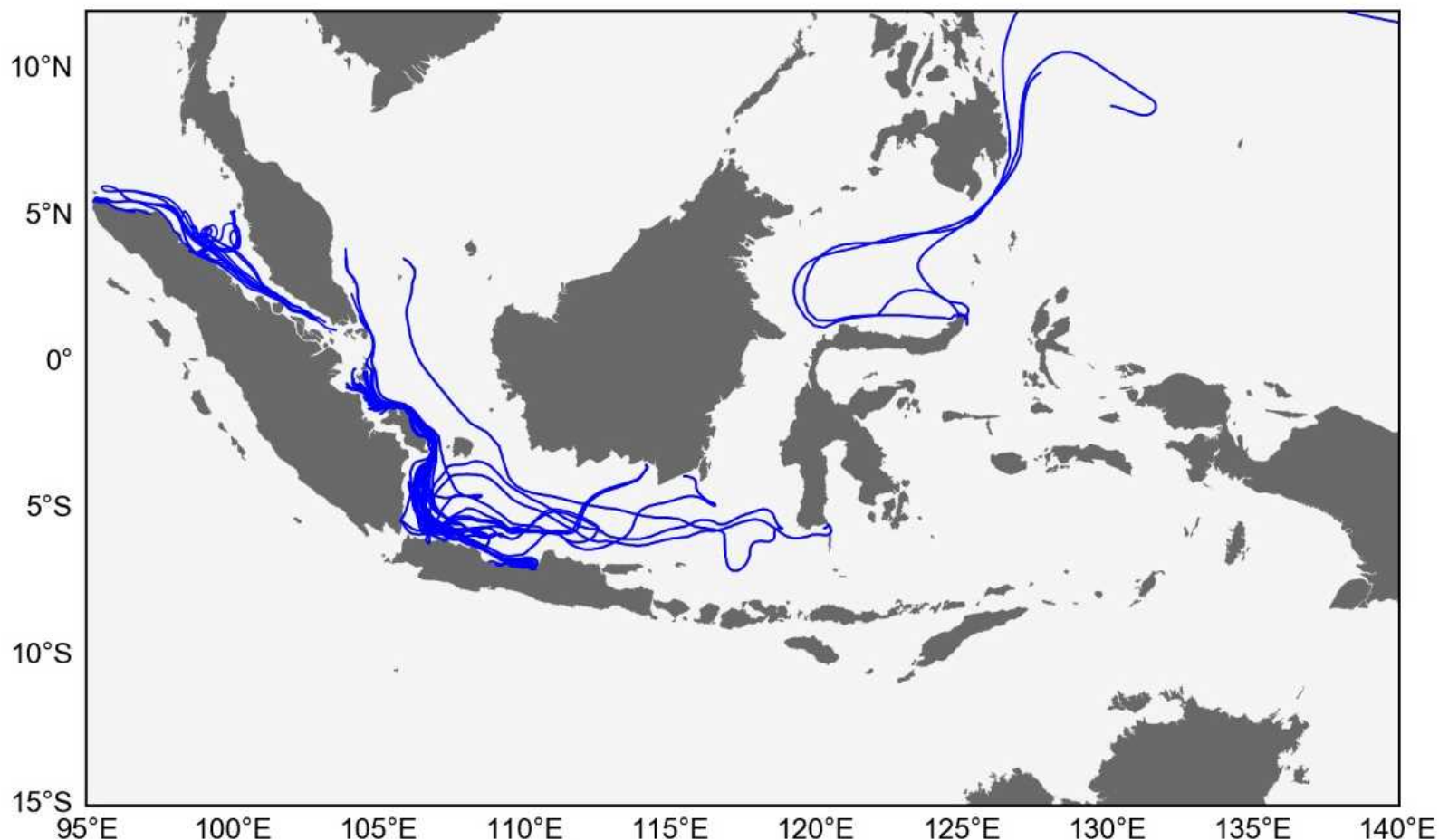
No.	Geographical area	Type of environment	Object	Dominant debris	References
1	Pulau Seribu, DKI Jakarta	Beach and ecosystem	Macro debris	Polyethylene bags	Willoughby, 1986a, 1986b
2	Jayapura, Irian Jaya	Water column	Macrodebris	Plastic bags	Nash, 1991
3	Ambon Bay, Maluku	coastal area	Macro debris	Plastics and metal objects	Evans et al., 1995
4	Ambon Bay, Maluku	Water column	Plastic debris	Plastics	Uneputti and Evans, 1997
5	Pulau Seribu, DKI Jakarta	Beach and ecosystem	Macro debris	Bottles	Uneputti and Evans, 1997
6	Pulau Seribu, DKI Jakarta	Beach and ecosystem	Macro debris	Polystyrene blocks	Willoughby, 1986a
7	Barrang Lompo, South Sulawesi	Water column and ecosystem	Macro debris	Plastics	Oktaviana et al., 2014
8	Jakarta Bay, DKI Jakarta	Mangrove ecosystem	Macro debris and microplastics	Plastics and films	Hastuti et al., 2014
9	Kuta, Bali	NA	Modelling debris	NA	Yunanto et al., 2014
10	Kuta, Bali	Water column	Modelling debris	Plastics	Attamimi et al., 2015
11	Muara Badak, East Borneo	Sediment	Microplastic	Fragments	Dewi et al., 2015
12	Makassar, South Sulawesi	Fishes	Microplastic	Plastics	Rochman et al., 2015
13	Southwestern Sumatera, West Sumatra	Deep Sea	Microplastic	Granules	Cordova and Wahyudi, 2017
14	North Indramayu, West Java	Modelling micro-debris	Floating debris	Fragments	Pangestu et al., 2016
15	Jakarta Bay, DKI Jakarta	Sediment	Microplastic	Fragments	Manalu et al., 2017
16	NA	Monitoring marine debris	NA	NA	Syakti, 2017
17	Cilacap Coast, Central Java	Beach, mangrove, and coastal area	Microdebris and microplastics	Plastics and polypropylene	Syakti et al., 2017
18	Biawak Island, West Java	Beach and ecosystem	Macro debris	Plastics Ropes	Purba et al., 2017
19	Takalar Regency, South Sulawesi	Beach	Macro Debris	Plastics	Zulkarnaen et al., 2017
20	Kupang and Rote, East Nusa Tenggara	Beach	Macro debris	food wrapper and plastic bag	Purba et al., 2018
21	Sekotong, West Nusa Tenggara	Sediment and coral reef	Micro-plastic	foams	Cordova et al., 2018
22	Untung Jawa Island, DKI Jakarta	Mangrove Ecosystem	Macro debris	food wrappers	(Maharani et al., 2018
23	Takalar Regency, South Sulawesi	River mouth	Macro Debris	Plastics	Tangdesu et al., 2018
24	15 Cities located in Coastal	Beach	Macro Debris	Plastic bags	World Bank, 2018
25	Spermonde, South Sulawesi	Education outreach	Macro Debris	Plastic bags	Sur et al., 2018
26	Tambak Lorok Coastal area, Central Java	Fishes	Microplastic	Common plastics	Khoironi et al., 2018
27	Langkat, North Sumatera	Sediment and macrozoobenthos	Macro and micro plastics	Films	Bangun et al., 2018
28	Pangandaraan, West Java	Beach	Macro Debris	Cigarette butts	Purba et al., 2018
29	Pacific ocean	Water column	modelling microplastic	NA	Ramos et al., 2018
30	Kuta, Bali	Beach	Macrodebris	Plastics	Husrin et al., 2017
31	Pangandaraan, West Java	Beach	Microplastic	Fibers	Septian et al., 2018
32	West Aceh, Aceh	Education outreach	NA	NA	Kusumawati et al., 2018

Purba et al (2019) <https://doi.org/10.1016/j.marpolbul.2019.05.057>

Challenge and limitation:

- Limits to staff capacity and expertise are the main challenges to monitoring
- Terminology, guidelines, and reporting tools make monitoring even more challenging
- Different method used – underestimate or overestimate
- Harmonization method and data will help Indonesia to monitor marine litter pollution ‘apple to apple’ not only between Indonesian area but also globally

What will happen to debris in the ocean?



Where will debris go?

- JAMSTEC OFES (Ocean General Circulation Model for the Earth Simulator)
- Backward trajectory simulation
- 365 days
- Debris comes from riverine area
- Mostly ended in local beach
- It will be transboundary debris

Lesson Learn

Monitoring marine litter in Indonesia: stranded beach litter



- UNEP (2009)
- NOAA (2012)
- CSIRO (2014)
- RCO-LIPI (2018)
- MOF-KOEM (2019)
- Indonesian MOEF (2020)*
*draft, unpublished

The approach is the same : waste per area
Difference :

- which areas were sampled
- waste categorization
- sampling time

Challenge: periodical observation



In Indonesia, most observations are only made when there is no periodical event, so the data has a big bias.



promote and implement citizen science

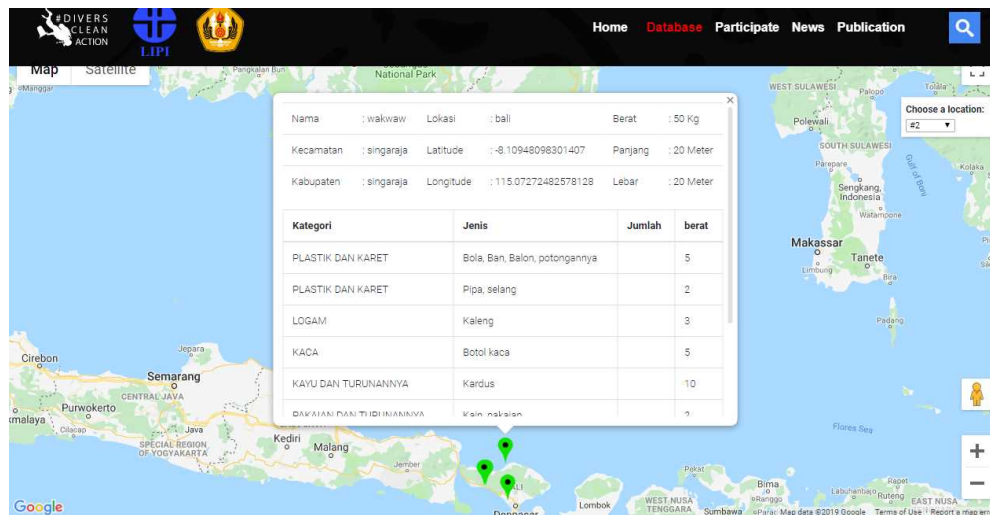
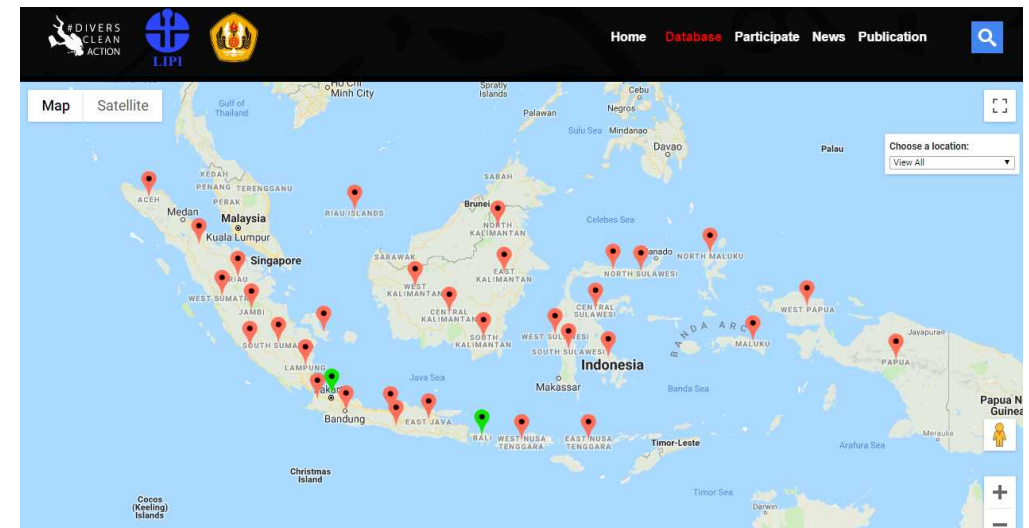
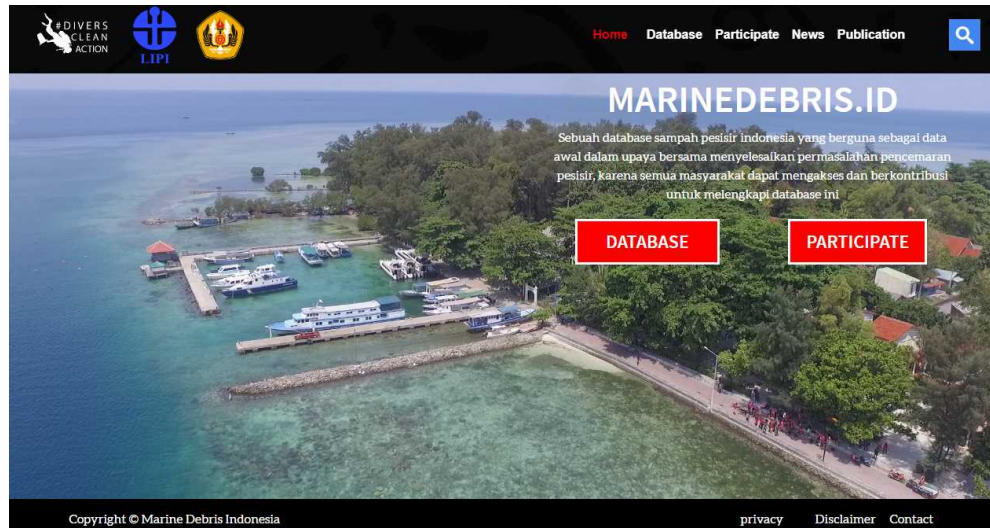
Lesson Learn: Marine Debris Monitoring in Indonesia



To get precision marine litter data

- Adapt NOAA and UNEP shoreline debris assessment for stranded debris (150 m x 6 m)
- 18 sites monitoring for 13 months (Feb 2018 - March 2019)
- Collect monthly sample in exact same location and similar time (spring tides at full moon or new moon)

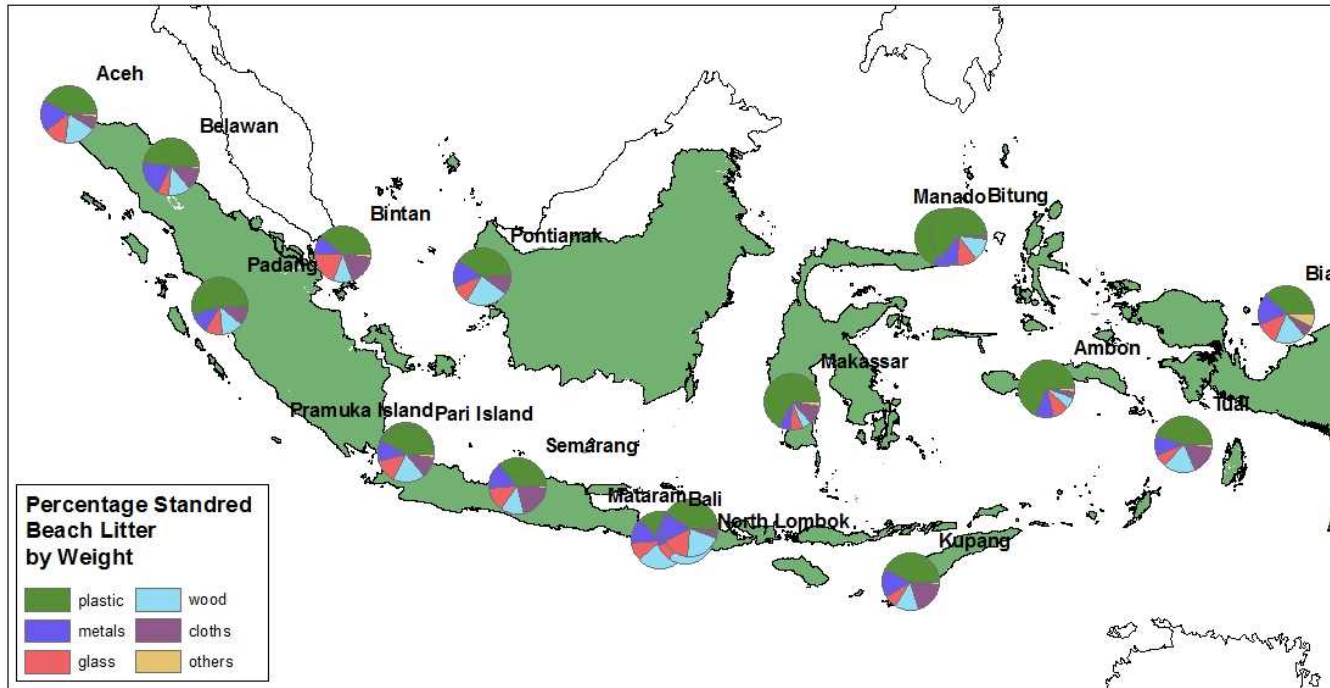
Citizen Science Marine Debris Monitoring : www.marinedebris.id*



* Website on update and maintenance process since 1st September 2020

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Lesson Learn: Marine Debris Monitoring in Indonesia



Average percentage stranded plastic litter $47.58 \pm 11.79\%$ (by weight)
Dominated by single use plastic

With an assumption

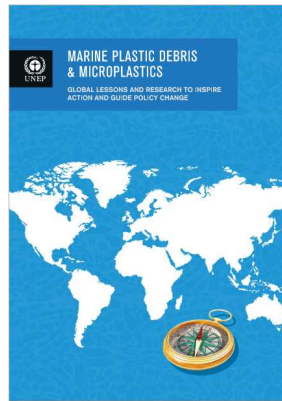
- ~30% plastic debris accumulate in the coastline
- Indonesian coastline 99,093 km
- No input of plastic debris from outside Indonesia
- Does not take into account mangrove, seagrass and coral reefs as well as other areas that accumulate plastic debris

An estimation of plastics litter to the ocean from Indonesian anthropogenic activity, by monthly monitoring & modeling

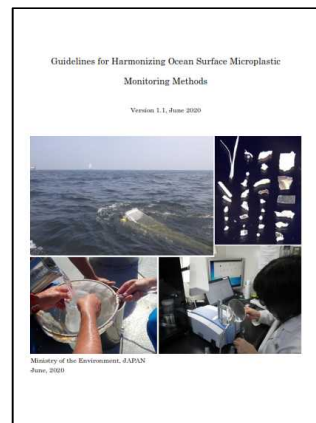
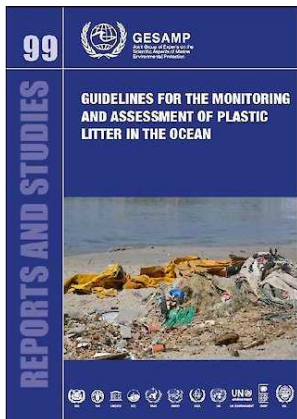
0.27 – 0.59 MMT per-year

Lesson Learn: Microplastic

Monitoring microplastics in Indonesia



- NOAA (2015)
- UNEP (2016)
- GESAMP (2019)
- MOE Japan (2019, 2020)



The approach is the same :

- microplastics per area
- Microplastics per volume
- Microplastics density

Difference :

- sampling tools
- extraction method
- laboratory condition



There is no available agreed method globally, there is a need for method harmonization



Data is needed for scientific evidence such as debris hotspots, prediction of its number and movement

Lesson Learn: initiatives for harmonizing monitoring measures at the national level



Collaboration with the Government of Japan (Ministry of the Environment)

- August-September 2019, Japan
 - 28 August - 5 Sept, Sampling Method in Shinyo-Marui Vessel
 - 7-9 Sept, FTIR Analysis and Measurement of Microplastic in Sanyo Techno Marine
 - 30 Sept - 9 Oct 2019 Marine litter survey targets: floating marine litter, floating microplastics, beach litter, Jakarta Bay, Indonesia
- March 2019 and February 2020
 - Expert Meeting in Japan on Monitoring Methods for Microplastic
- The Indonesian Ministry of Environment and Forestry will establish a Regional Capacity Center for Clean Seas (RC3S) in Bali, which aims to protect coastal and marine ecosystems from the activities of land-based sources of pollution.

Terima kasih

Thank you – どうもありがとうございました – شكرا لك

Gracias – Danke – תודה לך – Grazie – ขอขอบคุณ

