



Port Dickson's Marine Debris Case Studies

Kannan Narayanan Ph.D

Smart Green Consultancy Sdn Bhd

Malaysia National Stakeholder Consultation on Marine Litter – Solving Plastic Pollution at Source. 5 & 6 November, 2019, Klana Beach Resort, Port Dickson, Negeri Sembilan, Malaysia



Things to know

- Planet earth is Organic
- Planet earth is dynamic
- Planet earth is vulnerable
- It is a closed system like a spaceship

Environmental Pollution 47 (1987) 147–163

Highly Toxic Coplanar PCBs: Occurrence, Source, Persistency and Toxic Implications to Wildlife and Humans

S. Tanabe, N. Kannan, An. Subramanian, S. Watanabe & R. Tatsukawa

Department of Environment Conservation, Ehime University, Tarumi 3-5-7, Matsuyama 790, Japan

(Received 9 February 1987; revised version accepted 30 April 1987)

Arch. Environ. Contam. Toxicol. 18, 850–857 (1989)

Archives of
EEnvironmental
CTContamination
and
TToxicology
© 1989 Springer-Verlag New York Inc.

Critical Evaluation of Polychlorinated Biphenyl Toxicity in Terrestrial and Marine Mammals: Increasing Impact of Non-ortho and Mono-ortho Coplanar Polychlorinated Biphenyls from Land to Ocean

Narayanan Kannan, Shinsuke Tanabe¹, Mitsuhiro Ono, and Ryo Tatsukawa

Department of Environment Conservation, Ehime University, Tarumi 3-5-7, Matsuyama 790, Japan

Bull. Environ. Contam. Toxicol. (1988) 41:267–276
© 1988 Springer-Verlag New York Inc.

Environmental
Contamination
and
Toxicology

Toxic Potential of Non-ortho and Mono-ortho Coplanar PCBs in Commercial PCB Preparations: “2,3,7,8-T₄ CDD Toxicity Equivalence Factors Approach”

N. Kannan, S. Tanabe, and R. Tatsukawa

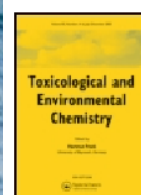
Department of Environment Conservation, Ehime University, Tarumi 3-5-7, Matsuyama 790, Japan

KANNAN ET AL.: J. ASSOC. OFF. ANAL. CHEM. (VOL. 70, NO. 3, 1987)

451

Coplanar Polychlorinated Biphenyls in Aroclor and Kanechlor Mixtures

NARAYANAN KANNAN, SHINSUKE TANABE,¹ TADA AKI WAKIMOTO, and RYO TATSUKAWA
Ehime University, Department of Environment Conservation, Tarumi 3-5-7, Matsuyama 790, Japan



Toxicological & Environmental Chemistry

Publication details, including instructions for authors and subscription information:
<http://www.tandfonline.com/loi/gtec20>

Isomer-specific determination and toxic evaluation of potentially hazardous coplanar PCBs, dibenzofurans and dioxins in the tissues of “Yusho” PCB poisoning victim and in the causal oil



Archives of Environmental Health: An International Journal

Publication details, including instructions for authors and subscription information:
<http://www.tandfonline.com/loi/vzeh20>

Potentially Hazardous Residues of Non-Ortho Chlorine Substituted Coplanar PCBs in Human Adipose Tissue

Narayanan Kannan Ph.D. ^a, Dr. Shinsuke Tanabe Ph.D. ^a & Ryo Tatsukawa Ph.D. ^a

^a Department of Environment Conservation, Ehime University, Tarumi 3-5-7, Matsuyama 790, Japan

Version of record first published: 03 Aug 2010.





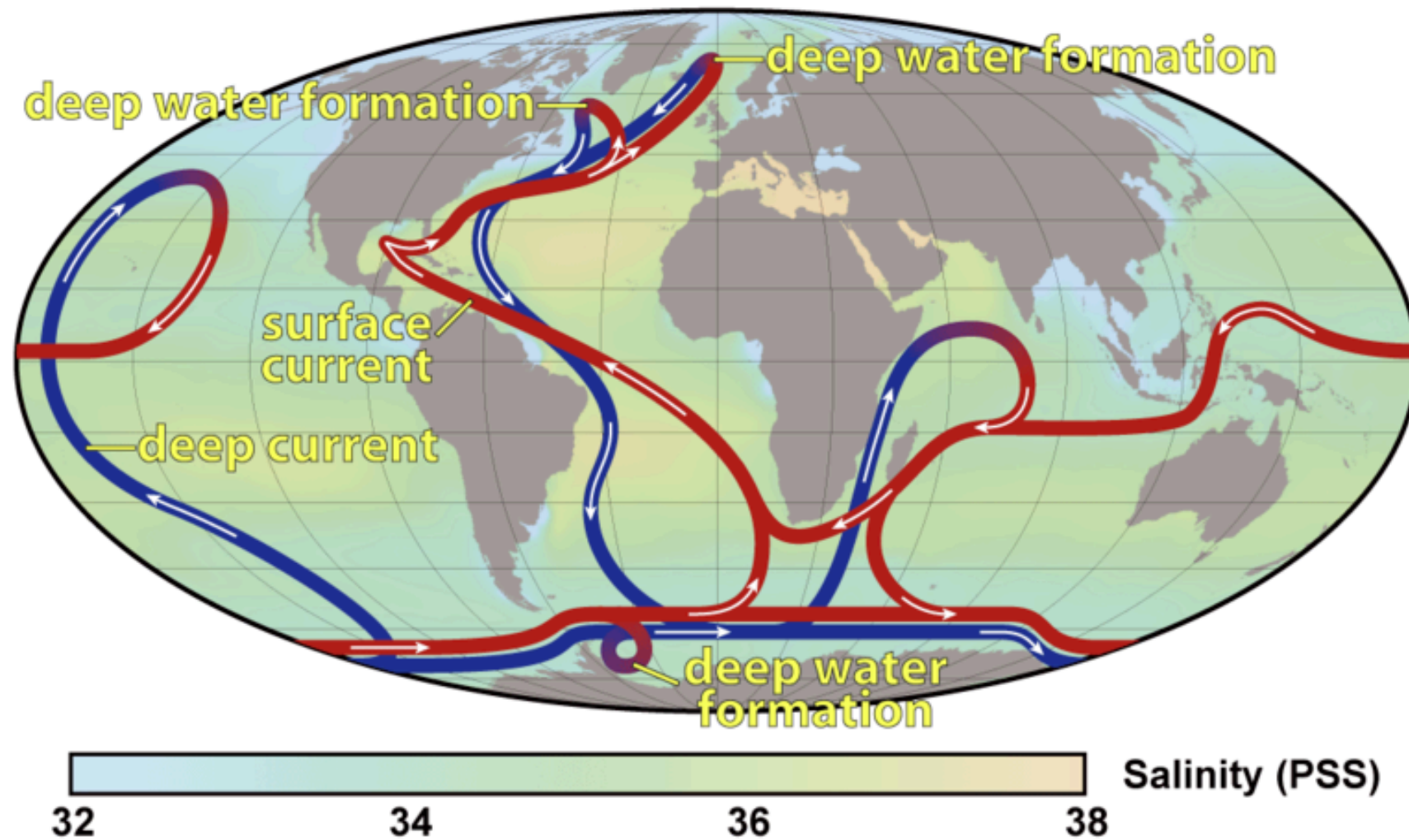
Things to know

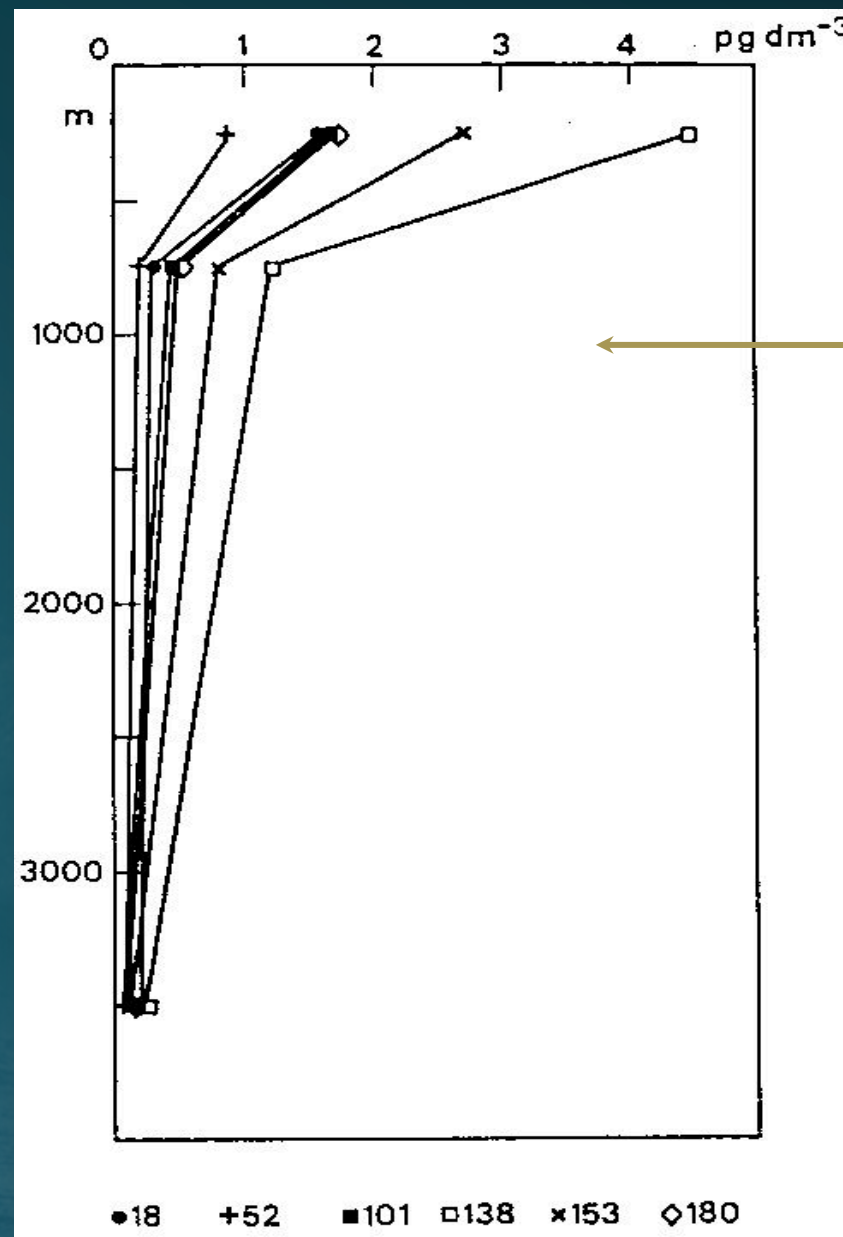
- Planet earth is Organic
- Planet earth is dynamic
- Planet earth is vulnerable
- It is a closed system like a spaceship

Great Conveyor Belt



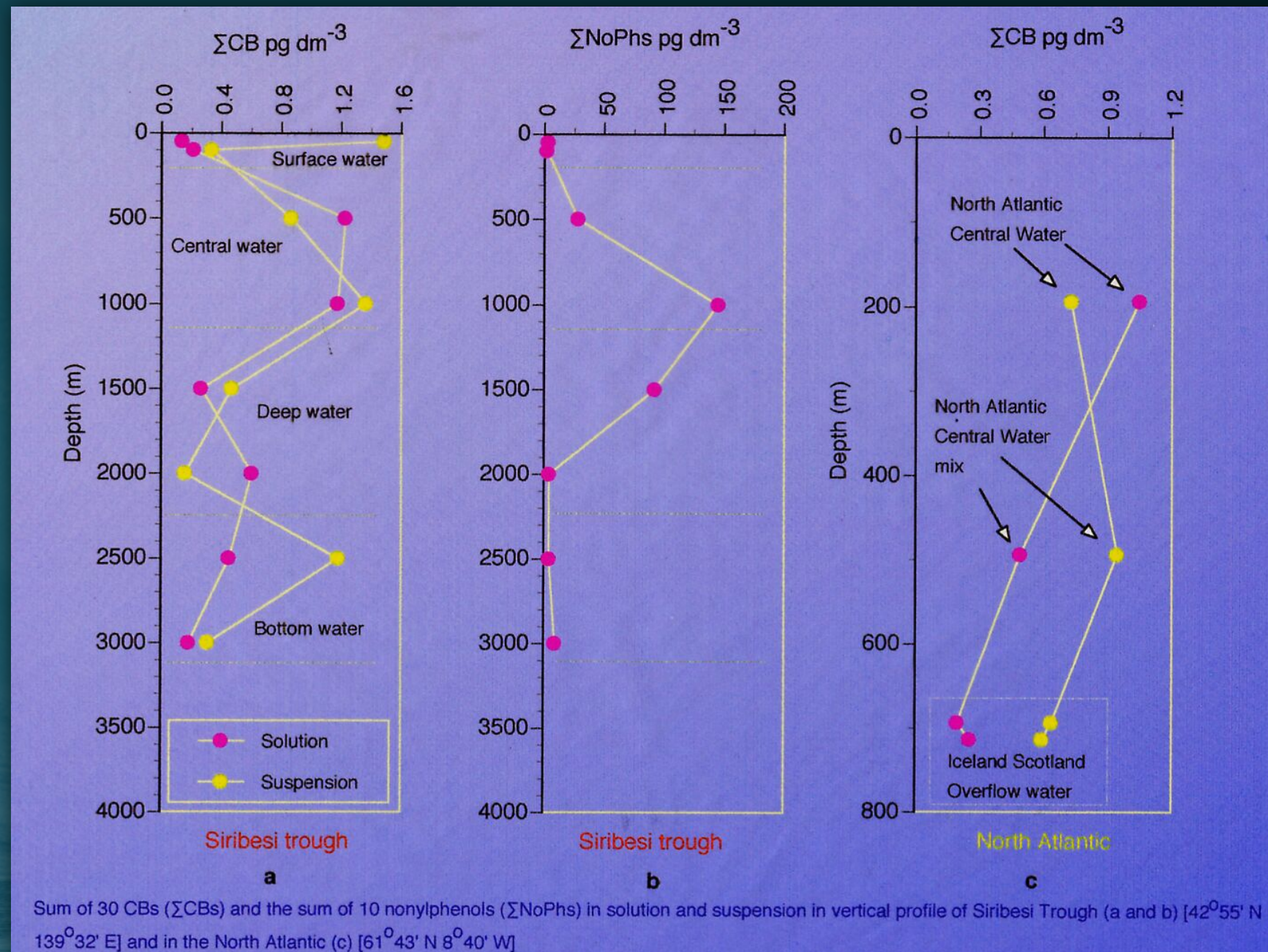
Thermohaline Circulation



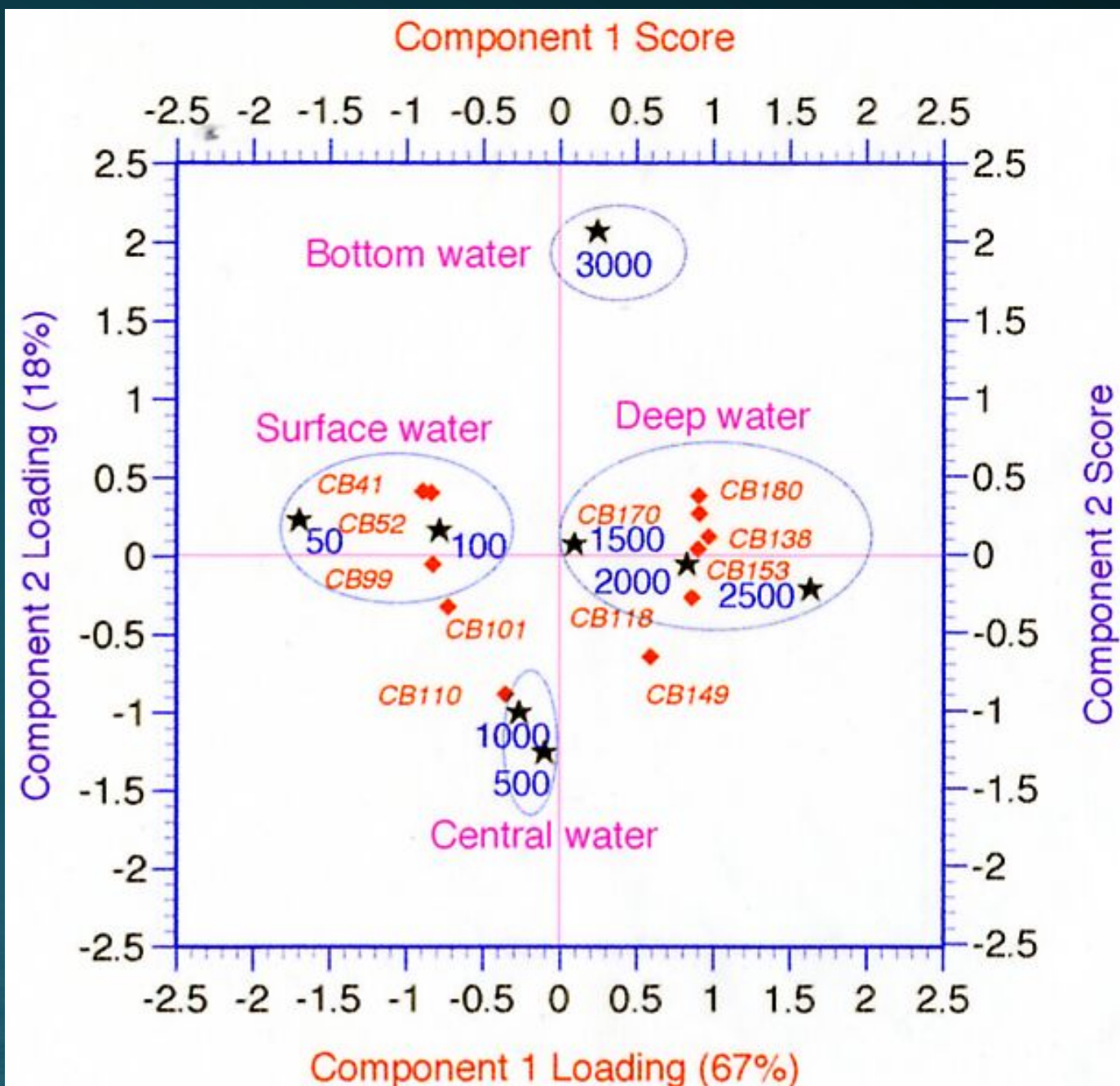


Vertical profile of the Atlantic

Vertical profile in Siribesi trough



Vertical



Box model of Japan sea

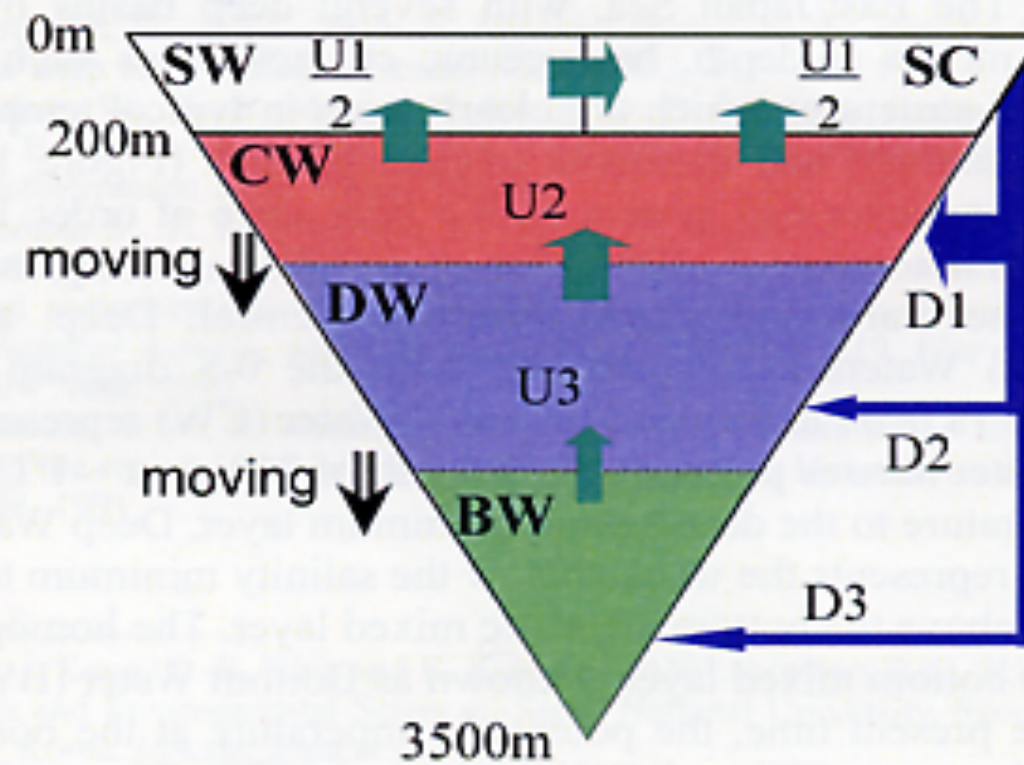


Figure 2. A schematic diagram of the moving-boundary box model for the East Sea (SW: Surface Warm Water, SC: Surface Cold Water, CW: Central Water, DW: Deep Water, BW: Bottom Water). D1, D2, D3, U1, U2, and U3 represent fluxes between boxes. Boundaries of CW/DW and DW/BW have been moving with time according to the changes in D1 and D3.



Things to know

- Planet earth is Organic
- Planet earth is dynamic
- Planet earth is vulnerable
- It is a closed system like a spaceship



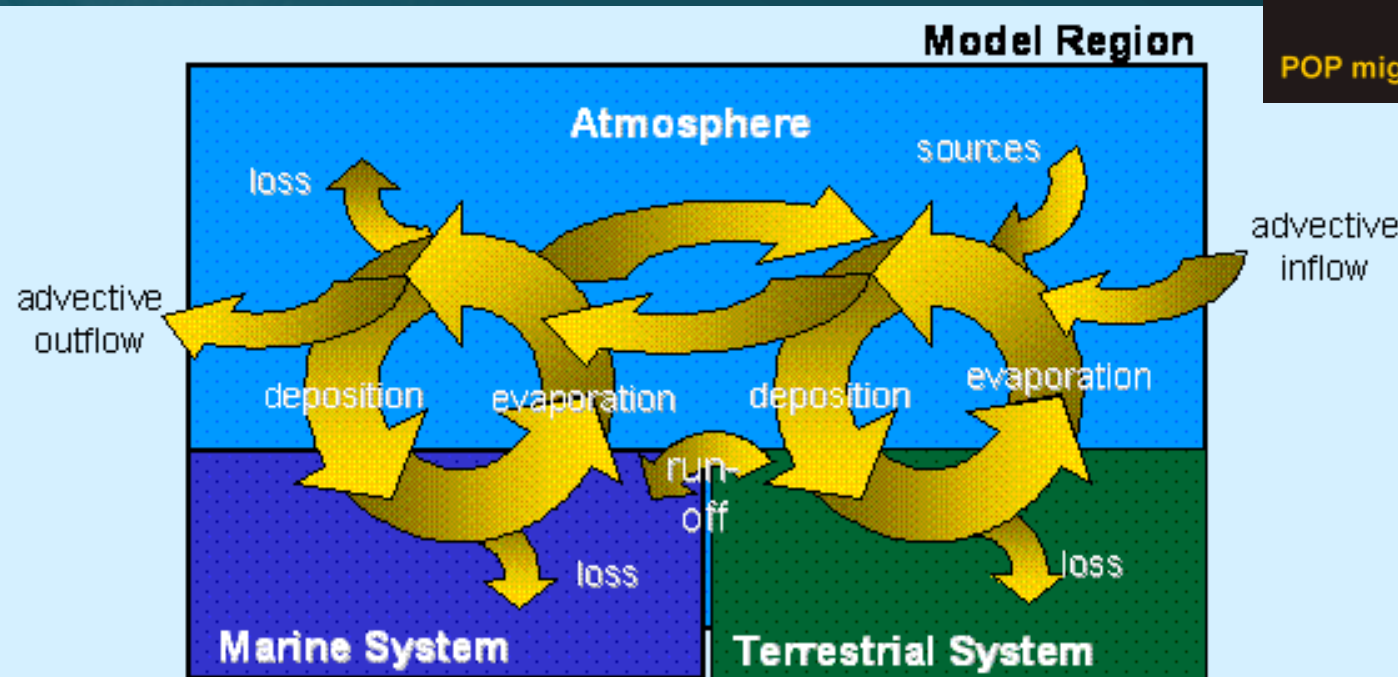
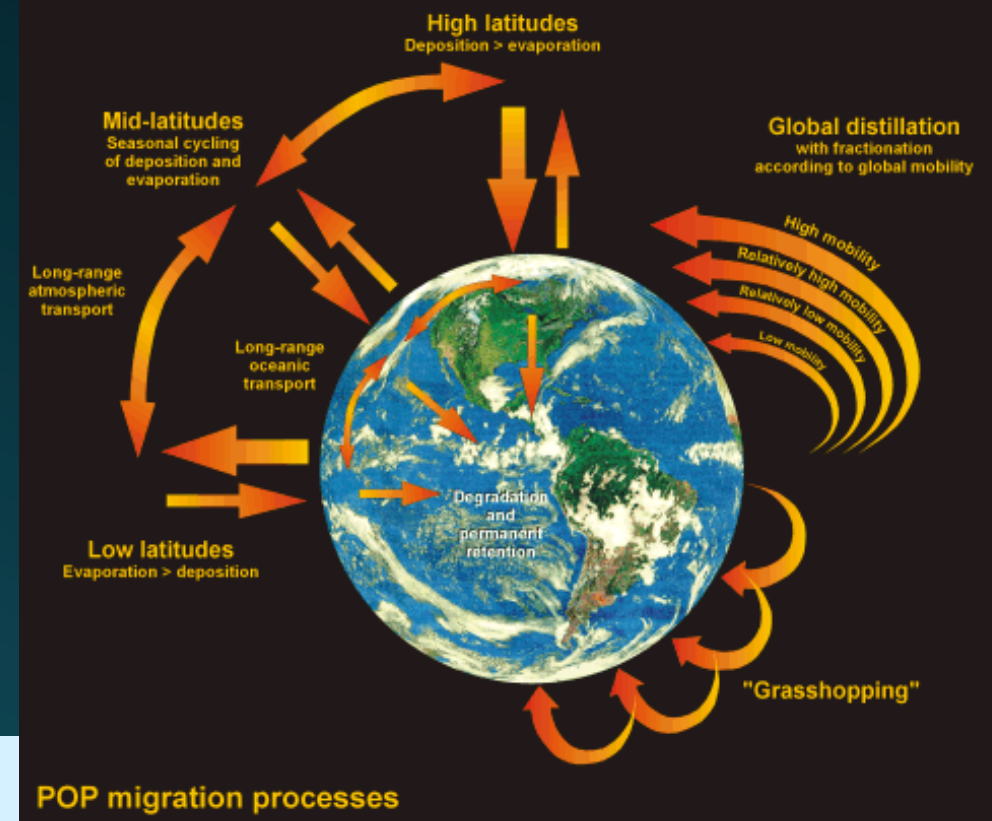
Earth is vulnerable

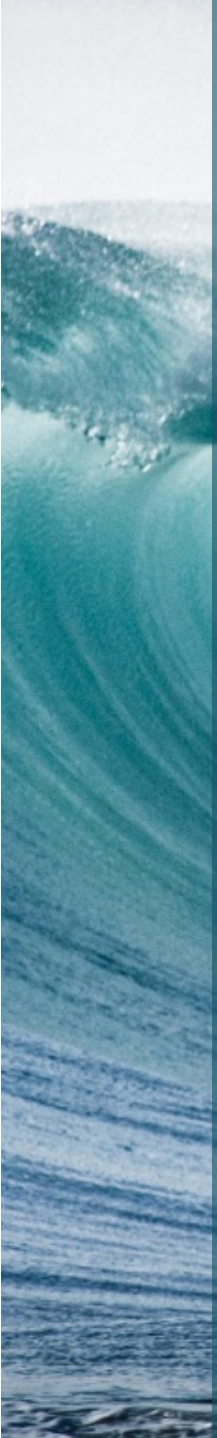
Ecosystem Emergency

- ❖ The global biomass of wild mammals has fallen by 82%.
- ❖ Natural ecosystems declined by 47% on average, relative to their earliest estimated states
- ❖ Live coral cover on reefs has nearly halved (this one over the past 150 years).
- ❖ Animals in freshwater ecosystems have declined by 75%.

UN Biodiversity (IPBES) report

Spaceship Earth



- 
- Planet earth is Organic
 - Planet earth is dynamic
 - Planet earth is vulnerable
 - It is a closed system like a spaceship

The earth is like a spaceship that didn't
come with an operating manual.

R. Buckminster Fuller

Marine Debris



**Solid Waste Transportation through Ocean Currents:
Marine Debris Sightings and their Waste
Quantification at Port Dickson Beaches, Peninsular
Malaysia**





EnvironmentAsia

The international journal published by the Thai Society of Higher Education Institutes on Environment

Available online at www.tshe.org/ea/index.html
EnvironmentAsia 9(2) (2016) 39-47
DOI 10.14456/ea.2016.6

**Solid Waste Transportation through Ocean Currents: Marine Debris Sightings
and their Waste Quantification at Port Dickson Beaches, Peninsular Malaysia**

Chong Jing Yi and Narayanan Kannan

Faculty of Environmental Studies, Universiti Putra Malaysia, Serdang 43400, Selangor, Malaysia

Pantai Nelayan

Sandy and muddy beach

The most dirtiest beach in Port Dickson

The highest amount of debris collected is around 17kg in 50m x 50m area.



Pantai Cermin

- Less visitors and moderately clean, rural



Pantai Bagan Pinang

- Coordinate: 2.51162N, 10182688E
- Popular beach for activities such as volley ball competition, and PLKN.



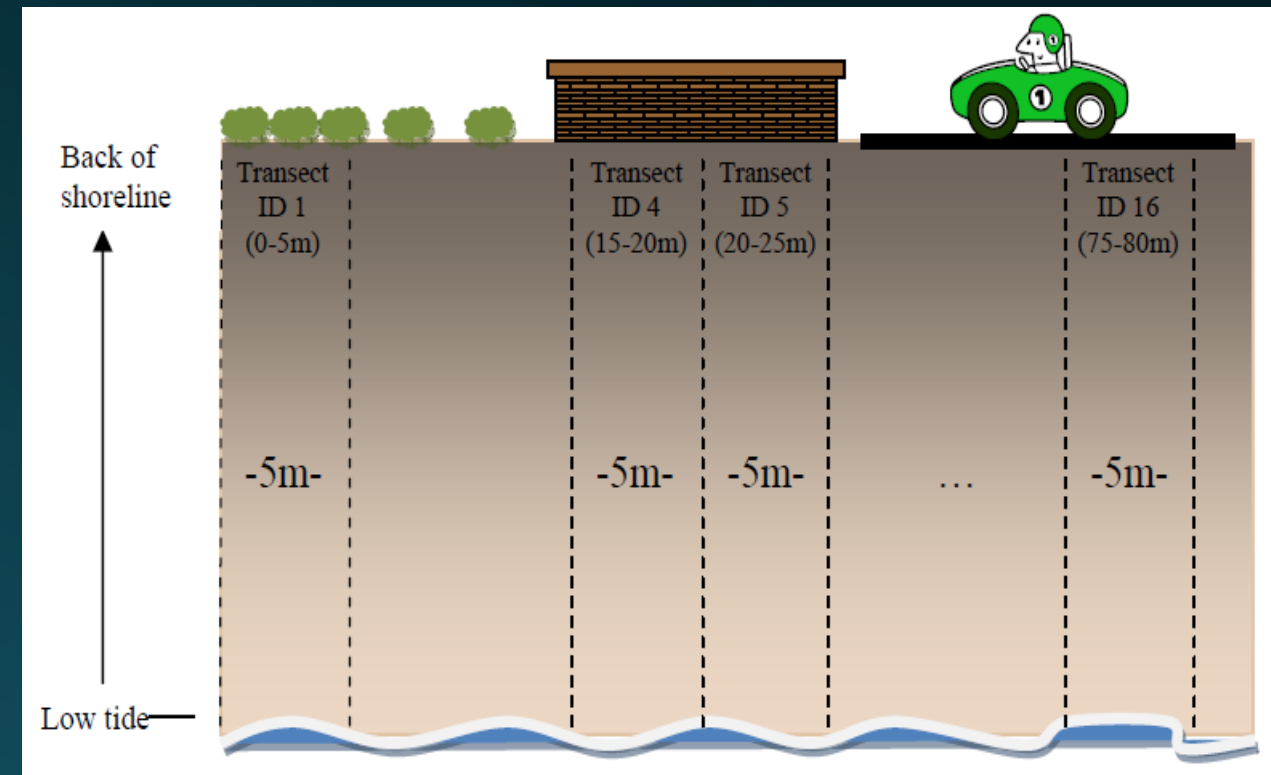
Pantai Saujana

Well-known beach, many visitors during weekend



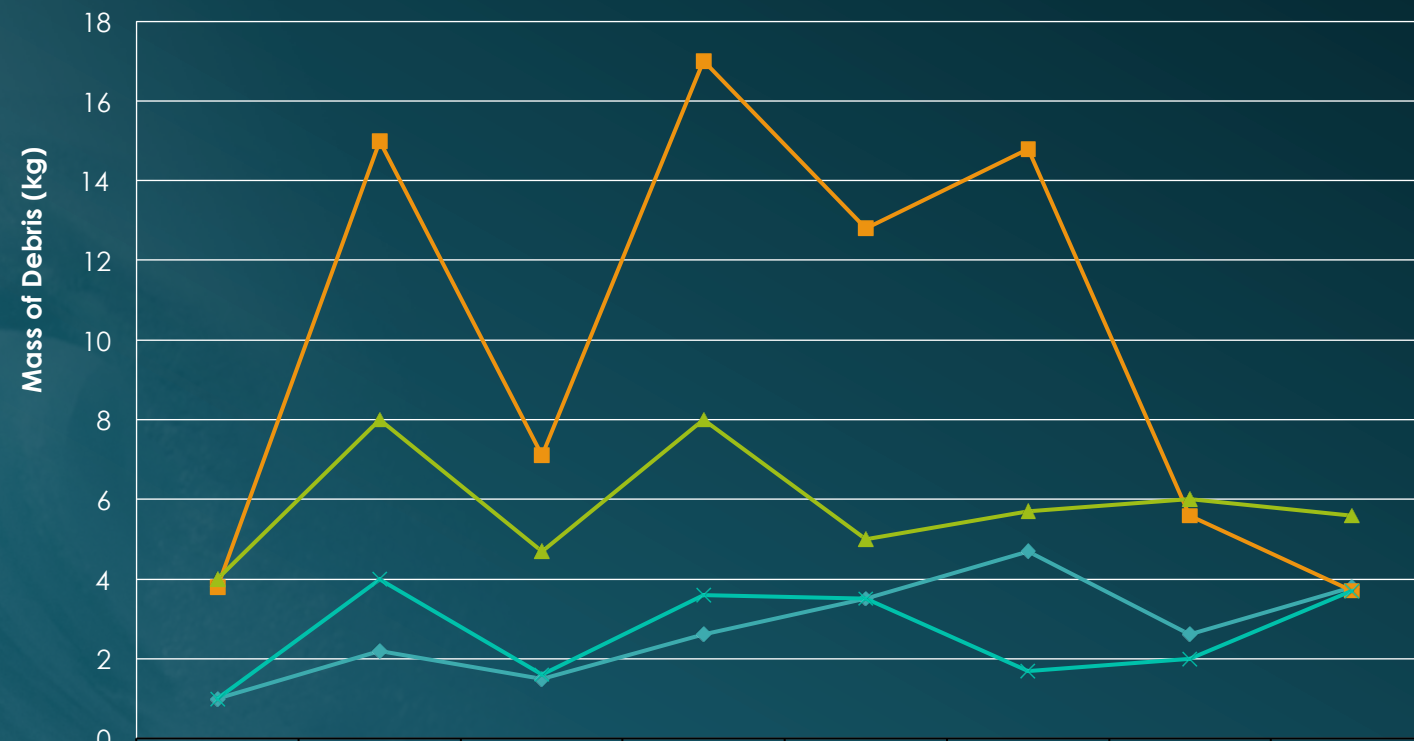
Methodology

OSEAN/AMETEC protocol



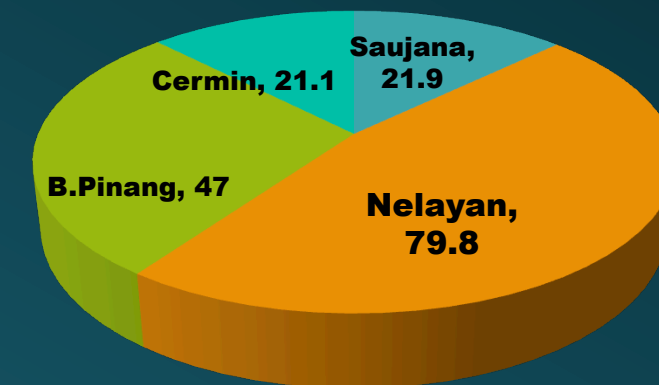
OSEAN (Our Sea of East Asia Network) /AMETEC (APEC Marine Environmental Training and Education Center) protocol, from The Korea Institute of Ocean Science and Technology (KIOST), Geoje, Korea

Mass of debris collected in four beaches in 8 Days

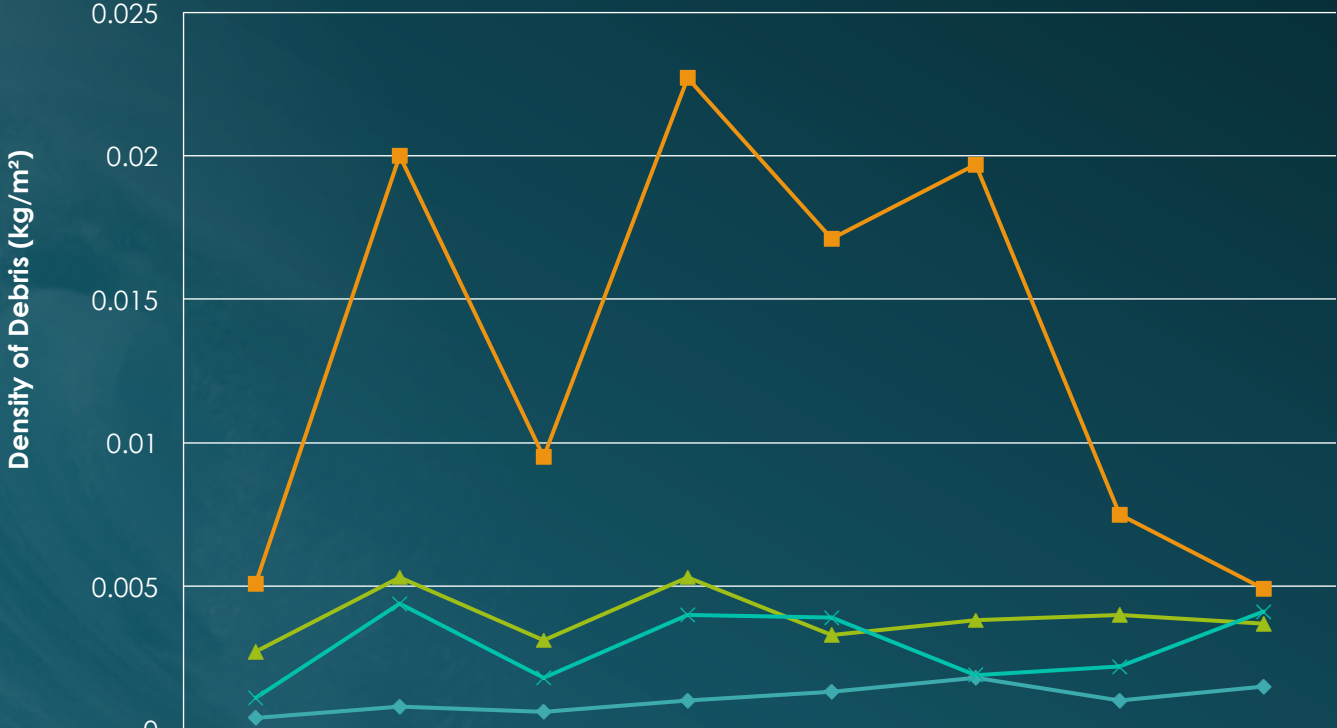


	7th June	14th June	21st June	28th June	5th July	12th July	19th July	26th July
Saujana Beach	1	2.2	1.5	2.6	3.5	4.7	2.6	3.8
Nelayan Beach	3.8	15	7.1	17	12.8	14.8	5.6	3.7
B.Pinang Beach	4	8	4.7	8	5	5.7	6	5.6
Cermin Beach	1	4	1.6	3.6	3.5	1.7	2	3.7

Total Mass(169.8 kg)

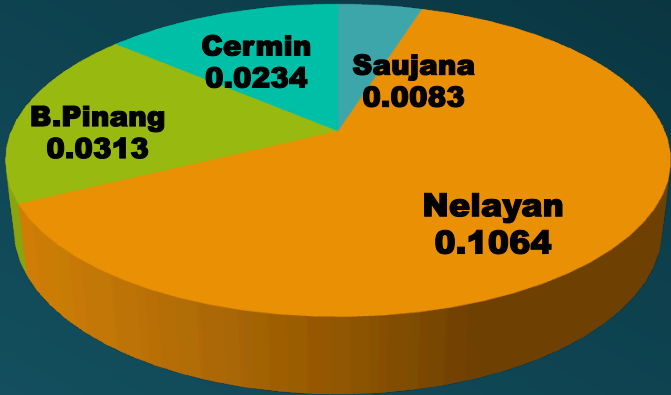


Density of debris collected in four beaches in 8 Days

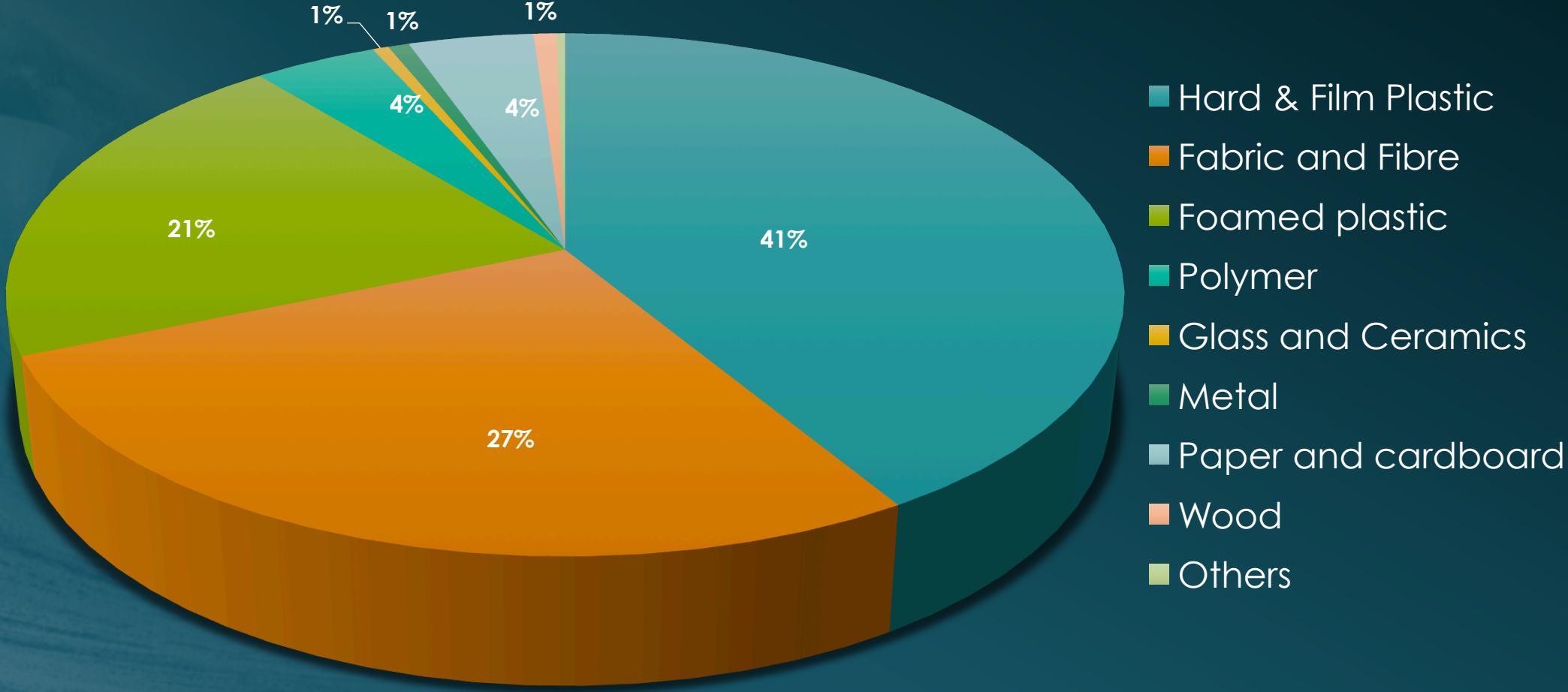


	7th June	14th June	21st June	28th June	5th July	12th July	19th July	26th July
◆ Saujana Beach	0.0004	0.0008	0.0006	0.0010	0.0013	0.0018	0.0010	0.0015
■ Nelayan Beach	0.0051	0.0200	0.0095	0.0227	0.0171	0.0197	0.0075	0.0049
▲ B.Pinang Beach	0.0027	0.0053	0.0031	0.0053	0.0033	0.0038	0.0040	0.0037
× Cermin Beach	0.0011	0.0044	0.0018	0.0040	0.0039	0.0019	0.0022	0.0041

Total Density (kg/m²)

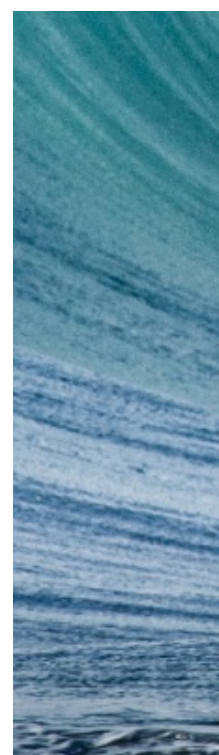


Categories of Debris Items

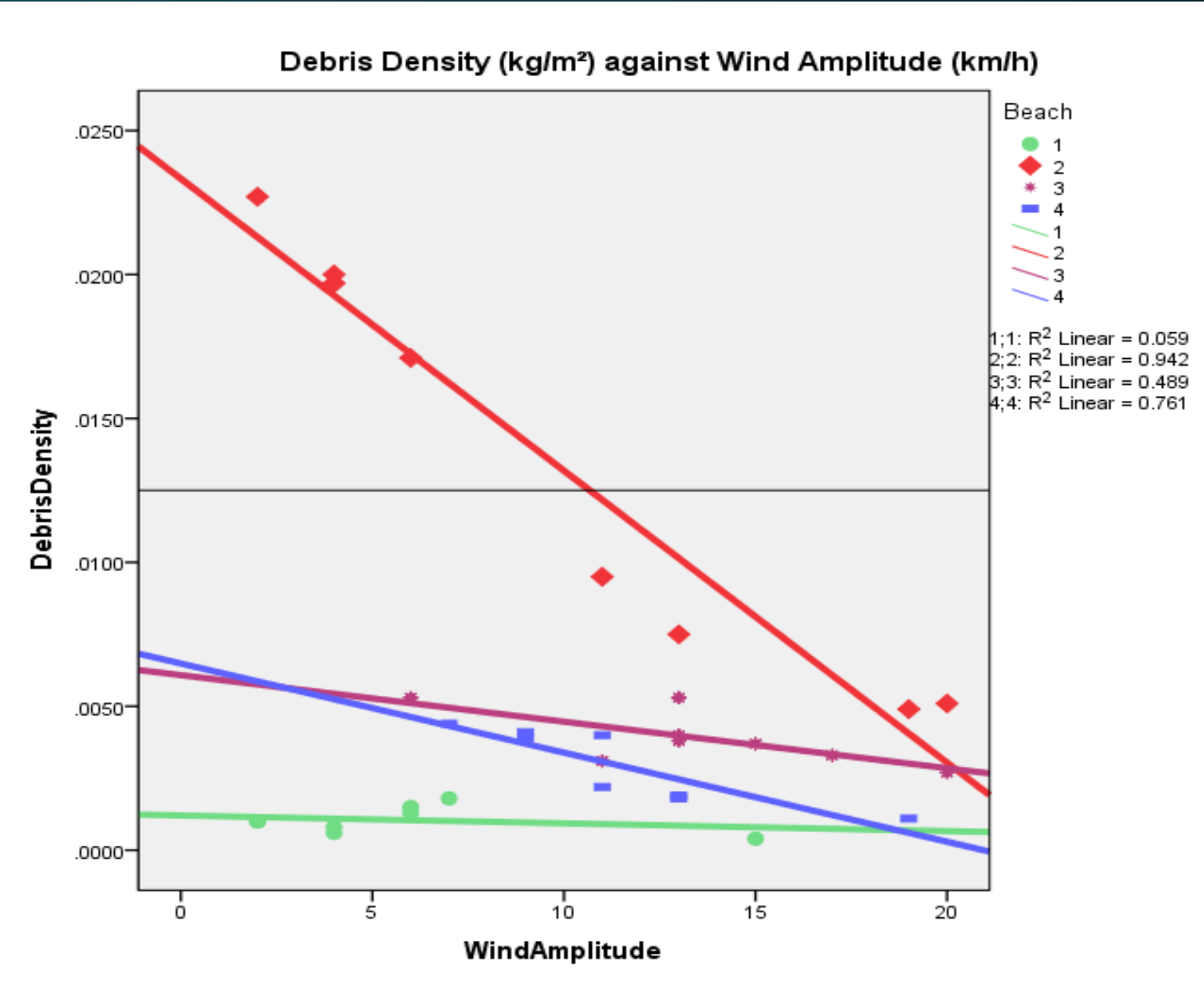


Country/Location						People	Kilograms	Kilometres of Coast	Total Items Collected (Numbers)
Malaysia						12,817	36,895.48	1463.15	546,614
Cigarette Butts (No.)	Plastic Beverage Bottles (No.)	Plastic Bottle Caps (No.)	Food Wrappers (Candy,etc) (No.)	Plastic Grocery Bags (No.)	Plastic Lids (No.)	Straws, Stirrers (No.)	Glass Beverage Bottles (No.)	Other Plastic Bags (No.)	Foam Take-Away Containers (No.)
148,691	139,958	21,715	81,841	47,004	9,132	12,111	2,759	15,915	6,836

Source: Reef Check Malaysia and Trash Hero Malaysia – Combined data for International Coastal Clean Up Day and World Clean Up Day 2019



#	Item	Number of pieces
1	Cigarette Butts	3,421
2	Foam Fragments	2,645
3	Food Wrappers	1,384
4	Plastic Cutleries	1,049
5	Hard Plastic Fragments	948
6	Plastic Bottle Caps	419
7	Food Containers	405
8	Rubber Bands	322
9	Plastic Beverage Bottles	321
10	Plastic Grocery Bags	315



The Relentless (and Growing) Problem of Plastic 'Nurdle' Pollution

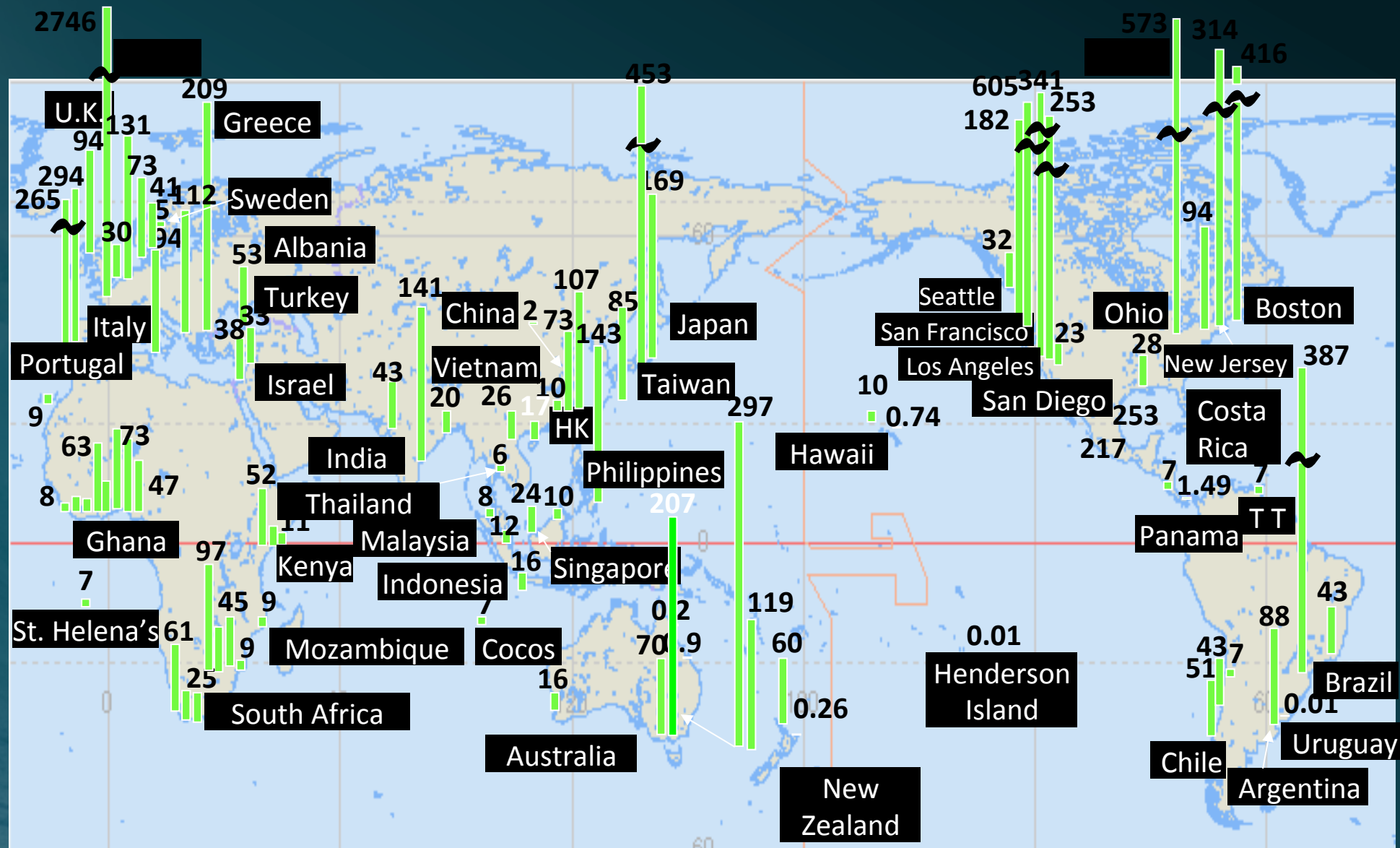


The tiny pellets used to make plastic products are washing up on beaches everywhere, posing a huge environmental threat.



<https://undark.org/2019/07/03/nurdle-plastic-pollution/?fbclid=IwAR1t3l3Dg8uOMzP6XiHBP2sfhHJrOodsbQRaSWd0Cpl2UHnuT7Q4cx5fgOY>





Concentration of PCBs* in beached plastic resin pellet (ng/g-pellet)

*sum of concentrations of CB#66, 101, 110, 149, 118, 105, 153, 138, 128, 187, 180, 170, 206

PCBs in beached pellets

thanks
for
listening



WhatsApp: +60 14 338 5307