

Synergy of Traditional and Digital tools for Waste Management in Developing Regions

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Amila Abeynayaka
@litterlifecycle



abeynayaka@iges.or.jp



Amila Abeynayaka (PhD)

Policy Researcher,

IGES Centre Collaborating with UNEP on Environmental Technologies (CCET),
Institute for Global Environmental Strategies (IGES), Japan





Agenda

Training Programm for Development Officers (Environment)

Auditorium of the Ministry of Environment

2023.03.16

- 08.30 - 09.00 - Refreshment and Registration
- 09.00 - 09.15 - Opening Remarks: Dr. Anil Jasinghe, Secretary, Ministry of Environment
- 09.15 - 10.00 - Practical Aspects of Plastic Identification and Recycling: Mr. Palitha Gamage, Director, Polica PVC Industry
- 10.00 - 10.15 - Discussion
- 10.15 - 11.00 - Regulation Related to Plastic Waste Management: Ms. Sarojini Jayasekara, Director (SWM), Central Environmental Authority
- 11.00 - 11.15 - Discussion
- 11.15 - 12.00 - Synergy of Traditional and Digital tools for Waste Management in Developing Regions: Dr. Amila Abeynayaka, Institute for Global Environmental Strategies (IGES)
- 12.00 - 12.15 - Discussion
- 12.15 - 13.15 - Lunch
- 13.15 - 14.00 - Food Waste Management: Ms. Sujeewa Fernando, Assistant Director (EPC&CM), Ministry of Environment
- 14.00 - 14.15 - Discussion
- 14.15 - 15.00 - Greening the Institution: Ms. Sujeewa Fernando, Assistant Director (EPC&CM), Ministry of Environment
- 15.00 - 15.45 - Discussion
- 15.45 - - Evening Tea and End of the Program

Marine life (මුහුදු ජීවීන්)

- Suffocation (හුස්ම හිරවීම)
- Starvation (ආහාර ගැනීමේ අපහසුතා)
- Injury (තුවාල වීම)
- Toxic effects (විෂ වීම)



Many seabirds starve to death when their stomachs fill with plastic waste and they lose their sense of hunger. (Photo: © NOAA)



Sea turtle entangled in plastic waste
(Photo: © Michel Gunther / WWF)



Fish Ingestion of Microplastics
(Photo: © BBC)

Human (මිනිසුන්)

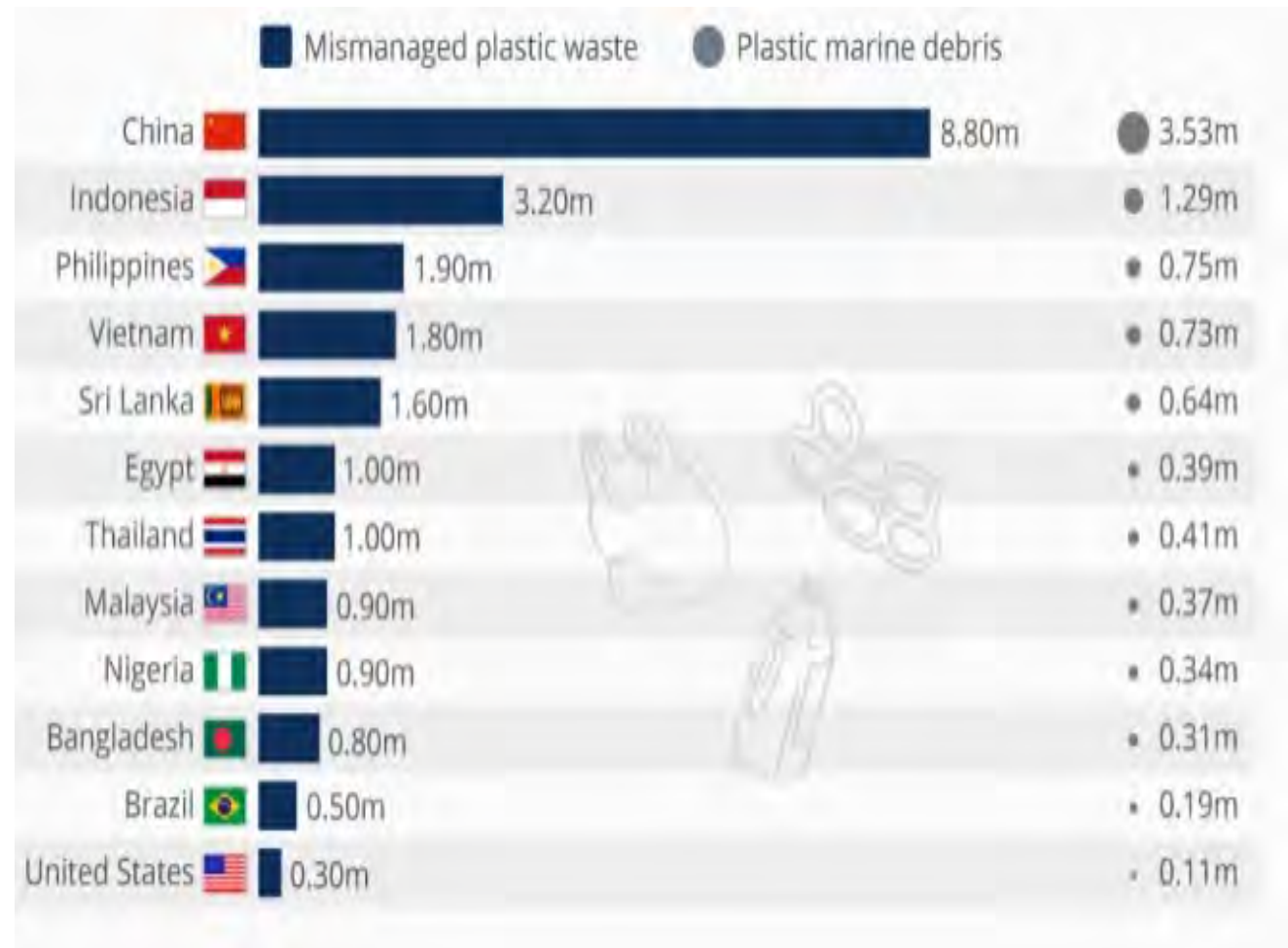
- Drinking water and Food chain related ingestions, airborne micro and nano plastic inhalation. (පානීය ජලය සහ ආහාර දාම ආශ්‍රිතව මිනිස් සිරුරට ඇතුළුවීම, වාතයෙන් ඇති ක්ෂුද්‍ර හා නැනෝ ප්ලාස්ටික් ආශ්වාස කිරීම.)
- Currently being researched the toxicity effects. We should know more within the next 2-3 years. (ප්ලාස්ටික් වල විෂ සහිත බවින් මිනිස් සිරුරට වන බලපෑම් ගැන පර්යේෂණ කරමින් සිටී. ඉදිරි වසර 2-3 තුළ අපි වැඩි විස්තර දැනගත හැක.)



Annual mismanaged plastics ending up in oceans! (Jambeck, 2015).

Cited by 6240 — Science

Why Sri Lanka is among the top 5?



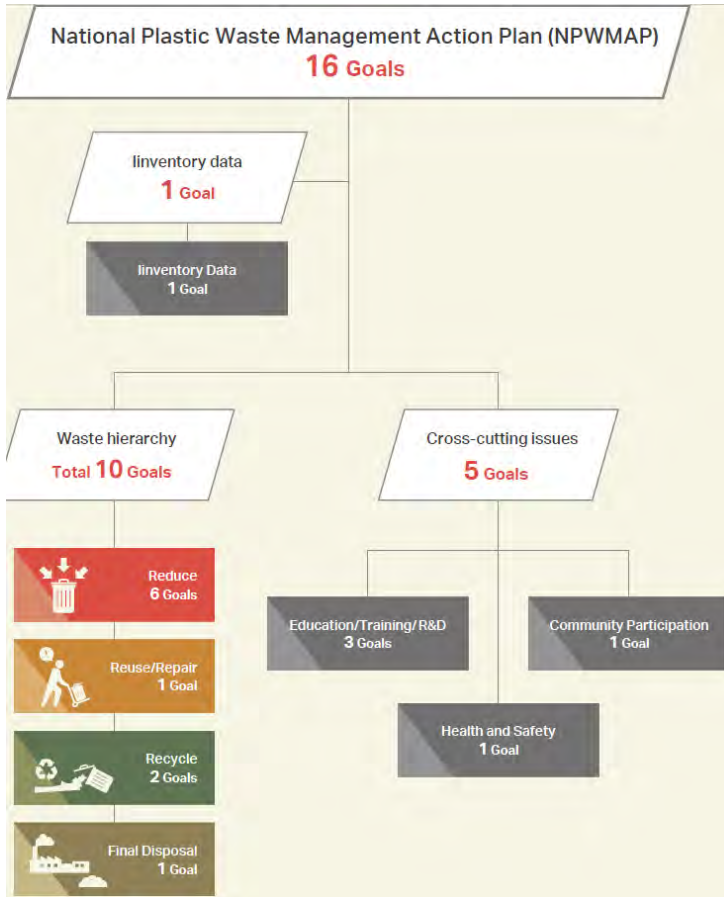
Annual mismanaged plastics ending up in oceans! (Jambeck, 2015).

Cited by 6240 — Science

Rank	Country	Econ. classif.	Coastal pop. [millions]	Waste gen. rate [kg/ppd]	% plastic waste	% mismanaged waste	Mismanaged plastic waste [MMT/year]	% of total mismanaged plastic waste	Plastic marine debris [MMT/year]
1	China	UMI	262.9	1.10	11	76	8.82	27.7	1.32-3.53
2	Indonesia	LMI	187.2	0.52	11	83	3.22	10.1	0.48-1.29
3	Philippines	LMI	83.4	0.5	15	83	1.88	5.9	0.28-0.75
4	Vietnam	LMI	55.9	0.79	13	88	1.83	5.8	0.28-0.73
5	Sri Lanka	LMI	14.6	5.1	7	84	1.59	5.0	0.24-0.64
6	Thailand	UMI	26.0	1.2	12	75	1.03	3.2	0.15-0.41
7	Egypt	LMI	21.8	1.37	13	69	0.97	3.0	0.15-0.39
8	Malaysia	UMI	22.9	1.52	13	57	0.94	2.9	0.14-0.37
9	Nigeria	LMI	27.5	0.79	13	83	0.85	2.7	0.13-0.34
10	Bangladesh	LI	70.9	0.43	8	89	0.79	2.5	0.12-0.31
11	South Africa	UMI	12.9	2.0	12	56	0.63	2.0	0.09-0.25
12	India	LMI	187.5	0.34	3	87	0.60	1.9	0.09-0.24
13	Algeria	UMI	16.6	1.2	12	60	0.52	1.6	0.08-0.21
14	Turkey	UMI	34.0	1.77	12	18	0.49	1.5	0.07-0.19
15	Pakistan	LMI	14.6	0.79	13	88	0.48	1.5	0.07-0.19
16	Brazil	UMI	74.7	1.03	16	11	0.47	1.5	0.07-0.19
17	Burma	LI	19.0	0.44	17	89	0.46	1.4	0.07-0.18
18*	Morocco	LMI	17.3	1.46	5	68	0.31	1.0	0.05-0.12
19	North Korea	LI	17.3	0.6	9	90	0.30	1.0	0.05-0.12
20	United States	HIC	112.9	2.58	13	2	0.28	0.9	0.04-0.11

*If considered collectively, coastal European Union countries (23 total) would rank eighteenth on the list

ජලාජිවික් අපද්‍රව්‍ය කළමනාකරණය පිළිබඳ ජාතික ක්‍රියාකාරී සැලැස්ම



<https://youtu.be/uFLFWBfZJy0>

Goal 5 Reduction of marine plastics pollution comprising macro & micro plastics flowing into ocean through land-based activities by 80% by 2030

- Beach collections and other current data are available from MEPA
- Recent survey by NARA on micro-plastics in the ocean
- "Surakimu Ganga" National Program on Conservation of Rivers in Sri Lanka

Recycle

Goal 9 Increase plastic waste recycling from 4% to 15% by 2025 ensuring quality, health and safety requirements

- Waste Management Authority of Western Province (WMA) baseline data

Recycle

Goal 10 Increase PET bottle collection and recycling rates from 27% to 100% by 2025 to ensure production of safe, high quality, durable products

- Current data available from private sector stakeholders
- According to a report by the Coca-Cola Foundation, Sri Lanka (primarily through its informal sector) is estimated to collect and recycle around 25–30% of PET bottles

PET bottle recycling
Japan collection more than 90% and Mechanical recycling is 85%

Is it possible to achieve 100% PET bottle recycling?

Taking Action

Plastic Waste Estimation

- Established methods
 - Waste sample collection
 - Sorting and Measuring
- Innovative Methods
 - Drones surveys
 - Smartphones/Satellites
 - AI/ML



Waste Profiling Tools



Day 1



Day 2



+

Day 3



+

Day 4



+

Day 5



+

Day 6



+

Day 7



+

Day 8

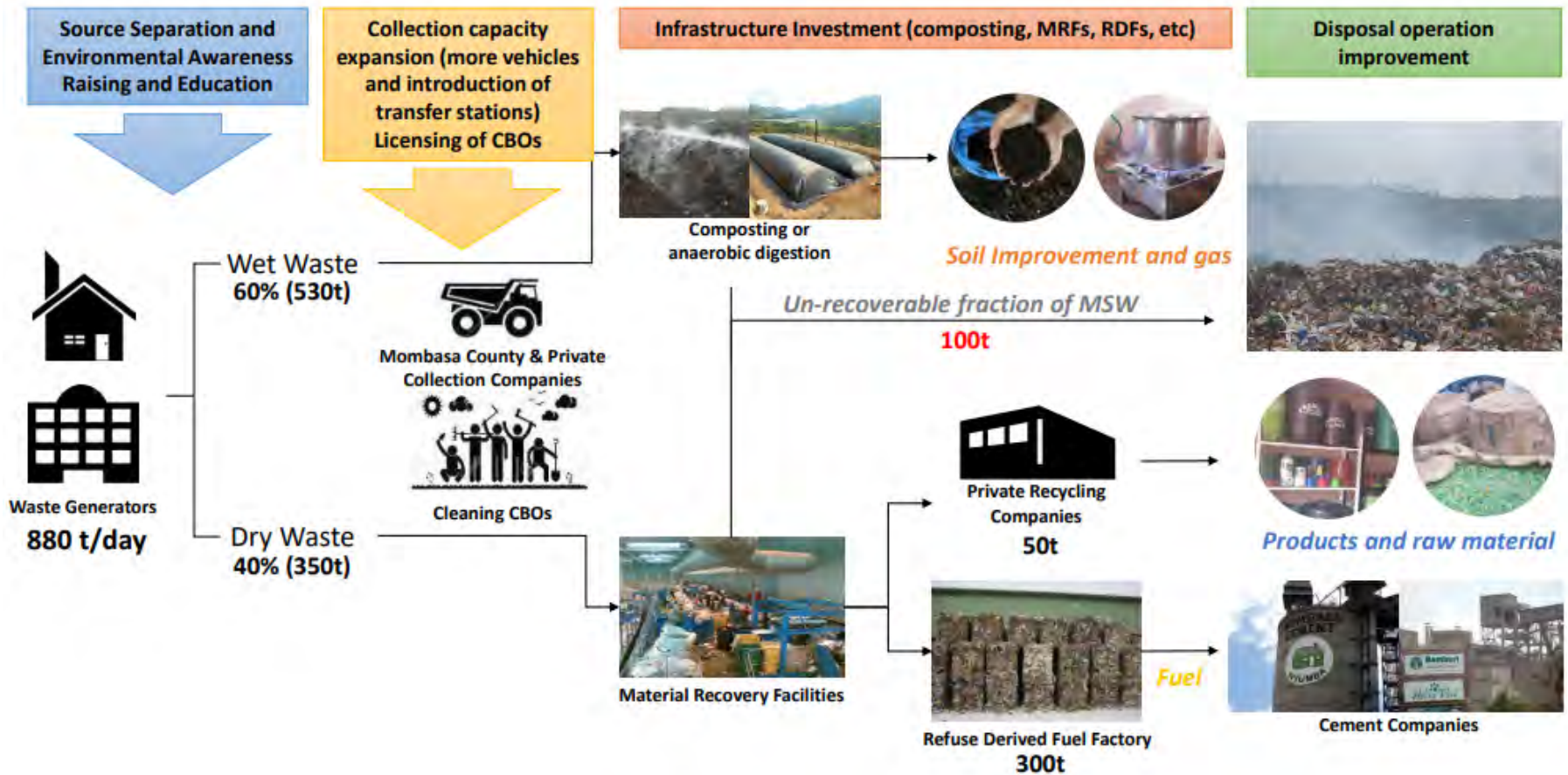


7 x 4

- Collection
- Reduction
- Sorting
- Weighing



Waste Profiling Tools



සමාජ මාධ්‍ය මෙවලම් Anti-Litter App



අපද්‍රව්‍ය එකතු කරන සමාජ මාධ්‍ය මෙවලම්
 Waste clean-up social media platforms

කසල සමීක්ෂණ මෙවලම් Litter Survey and Reporting

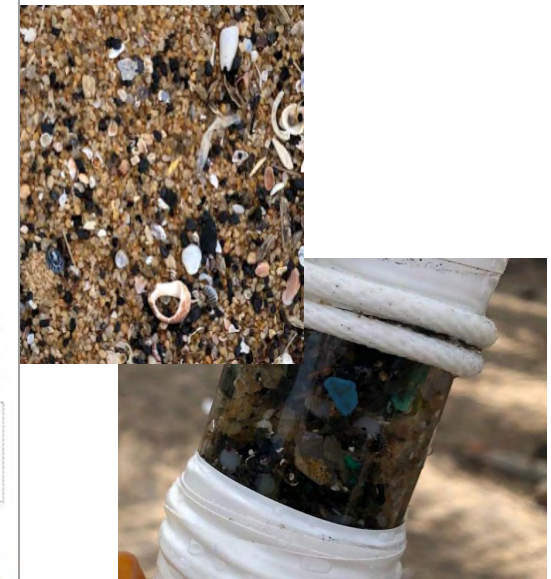


Plastic litter identification using vision and AI

Moving-camera	Fixed-camera	Moving Aerial camera	Mobile-App
<ul style="list-style-type: none"> Littering heatmap city-scale Number of objects identified 	<ul style="list-style-type: none"> Analytics of floating objects 	<ul style="list-style-type: none"> Plastic litter snapshot along channels 	<ul style="list-style-type: none"> Analytics of collected data with geolocation
<ul style="list-style-type: none"> - Completed 1st city (Ubon) - Completed 2nd city (Chiang Rai) - Next: Sri Lanka and Can Tho, Vietnam 	<ul style="list-style-type: none"> - Ongoing prototype - Installed 2 cameras at Chiang Seng port, Chiang Rai 	<ul style="list-style-type: none"> - Ongoing prototype 	<ul style="list-style-type: none"> - Planning stage

කෘතීම බුද්ධිය (AI) සහ ස්මාර්ට් ජංගම දුරකථනය හරහා කසල නිරීක්ෂණය.
 Tracks litter distribution through AI & smartphone & other devices

ක්ෂුද්‍ර ප්ලාස්ටික් නියැදි Microplastics Survey & Data Sharing

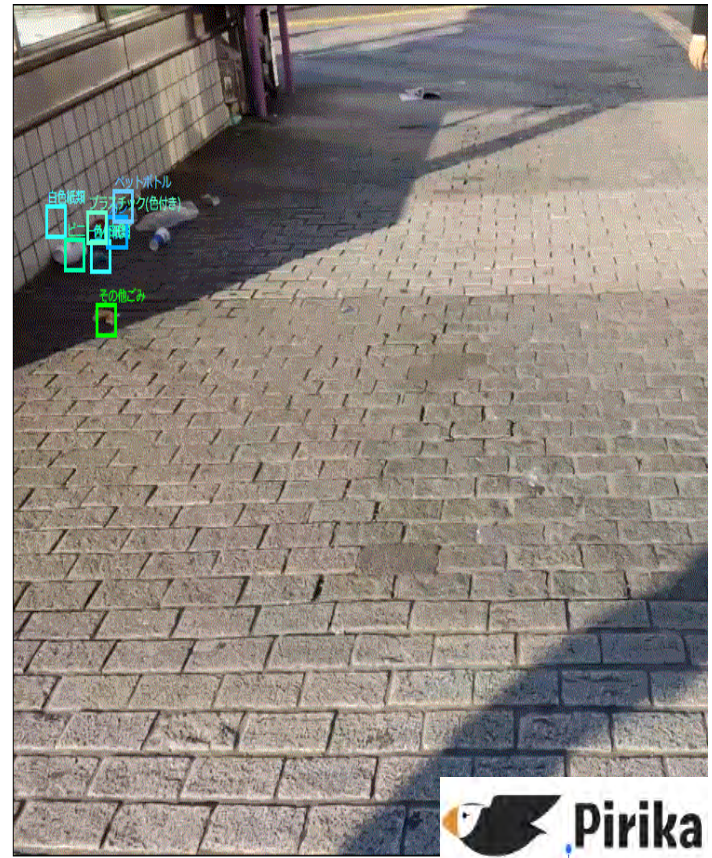
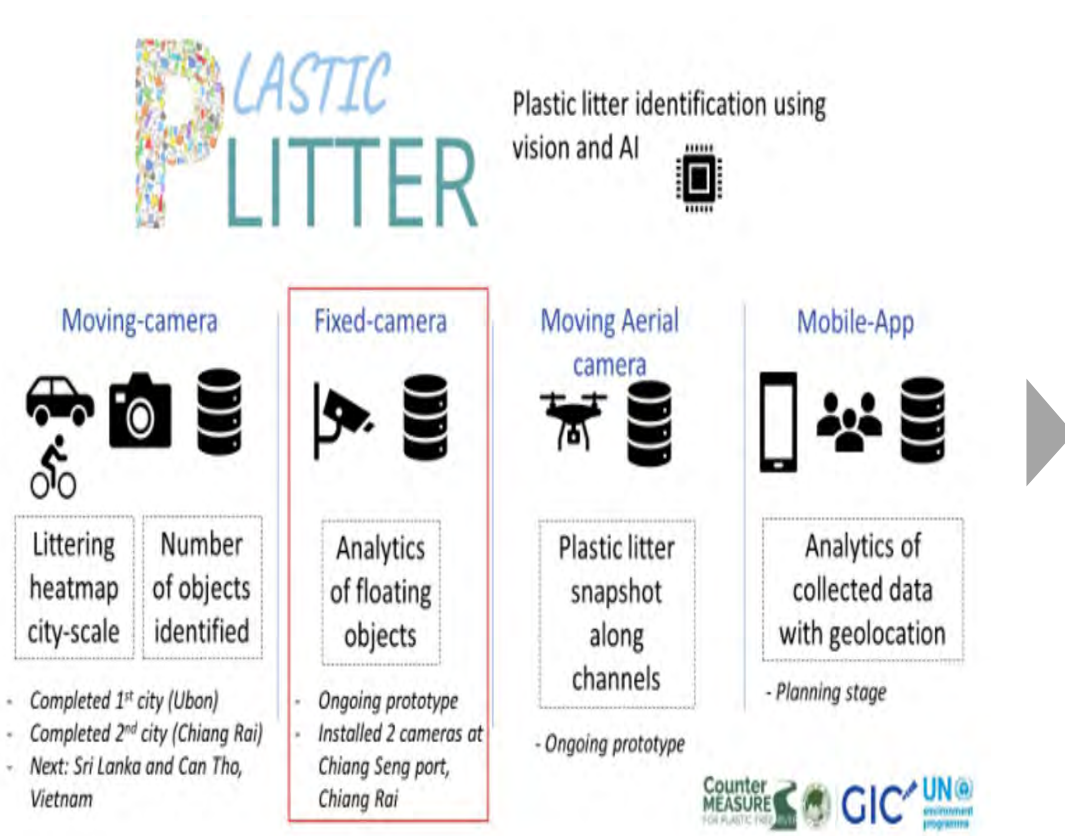


ක්ෂුද්‍ර ප්ලාස්ටික් සමීක්ෂණ පද්ධති
 Microplastics survey systems

2011 සිට මේ දක්වා කසල කැබලි මිලියන 190 කට වඩා ඉවත් කර ඇත

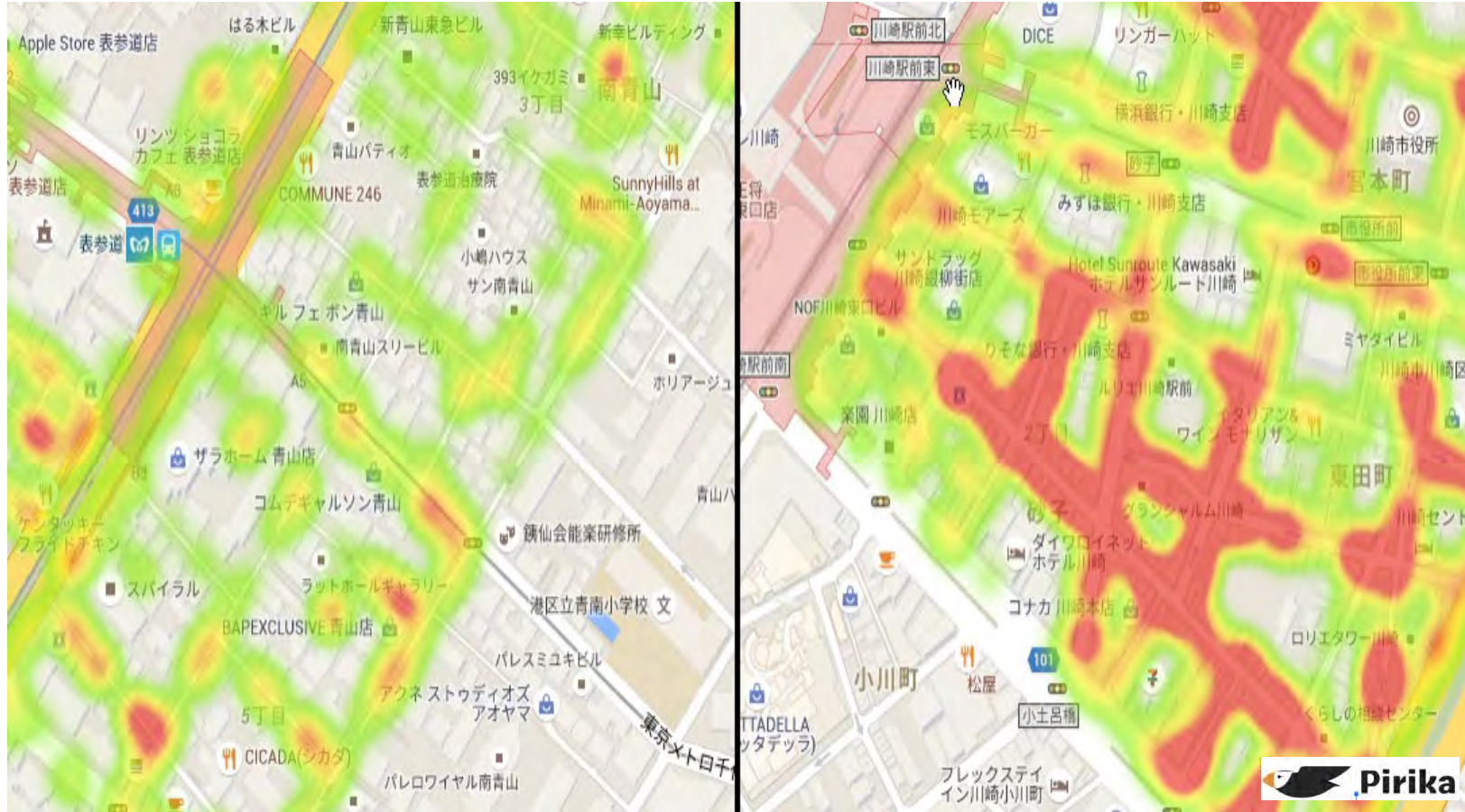


කෘතීම බුද්ධිය (AI) සහ ස්මාර්ට් ජංගම දුරකථනය හරහා කසල නිරීක්ෂණය.



① Capture target areas with a device.
ඉලක්ක ගත ප්‍රදේශ වීඩියෝ කරන්න

② Identify litter using video and visual analysis.
වීඩියෝ විශ්ලේෂණ භාවිතයෙන් කසල හඳුනා ගන්න



③ Heat map visualization provide useful insight to inform future sanitation policy
“හීට්-මැප්” සිතියම: හඳුනා ගැනීම, ක්‍රියාමර්ග, රෙගුලාසි ...



දේශීය හවුල්කරුවන්
සමඟ සිදු කෙරෙන ක්ෂුද්‍ර
ඵලාස්ටික් සමීක්ෂණ



ශ්‍රී ලංකාව, (We closely works with IUCN and National Universities)



Counter MEASURE
FOR PLASTIC FREE RIVERS

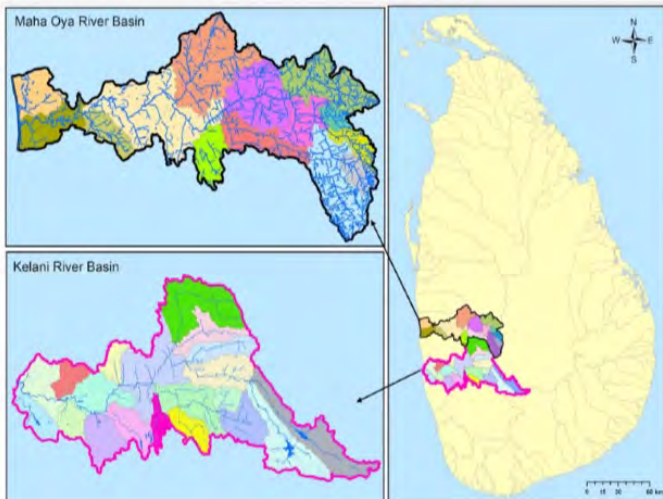


Implemented by

and

CounterMeasure II Sri Lanka

Plastic Hotspot Identification and Piloting Solutions to manage plastic pollution



පේරාදෙණිය විශ්වවිද්‍යාලය
பேராதனைப் பல்கலைக்கழகம்
UNIVERSITY OF PERADENIYA

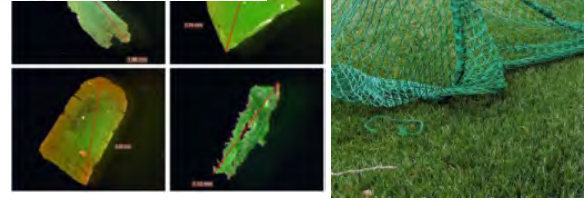


University of Sri Jayewardenepura
ශ්‍රී ජයවර්ධනපුර විශ්වවිද්‍යාලය
ஸ்ரீ ஜயவர்த்தனபுர பல்கலைக்கழகம்



THE OPEN UNIVERSITY OF SRI LANKA

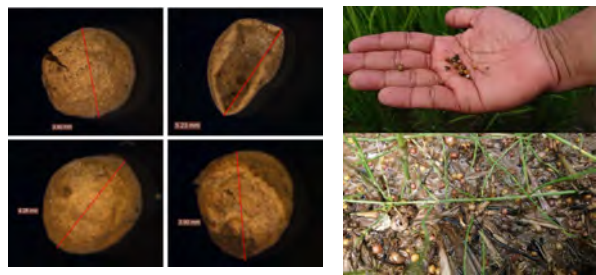
Pirika



Artificial Turf

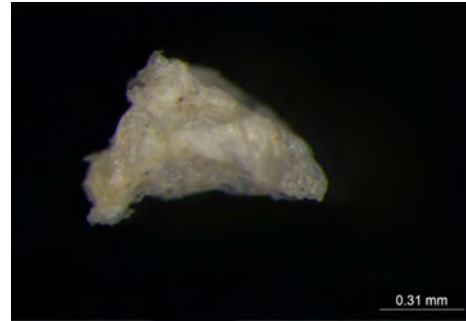


Resin Pellets



Plastic Coated Fertilizer

- Pollution is different from country to country (ප්‍රමුඛතා රටින් රටට වෙනස් වේ).
- Mekong river, Styrofoam gained more attention. අග්නිදිග ආසියාවේ අවධානයට ලක්විය යුතු කරුණක් ලෙස පොලිස්ටරෝප්‍රීන් (ස්ටයිරෝෆෝම්) ක්ෂුද්‍ර ජලාස්පික් හඳුනාගැනීම
- Which type of Styrofoam is contributing more? එවිට වැදගත් ප්‍රශ්නය වන්නේ කුමන ස්ටයිරෝෆෝම් ප්‍රභවය වැඩි දායකත්වයක් දක්වන්නේද යන්නයි එකදු යන්නයි.
 - Polystyrene sheets (food packaging)
 - or the EPS (such as fisherman buoyant).
- Policy measures (ජාතික හා ප්‍රාදේශීය බලධාරීන් සමඟ එක්ව ප්‍රතිපත්තිමය පියවර සහ දැනුවත් කිරීමේ වැඩසටහන් කිරීමට තීරණය කරන ලදී.)



PSP



EPS



- The Coated Fertilizer Increase the Efficiency and Reduce the Nitrate Leaching
- Reduce fertilizer usage by 20-50%
- Reduce fertilizer leakage into environment by 55%



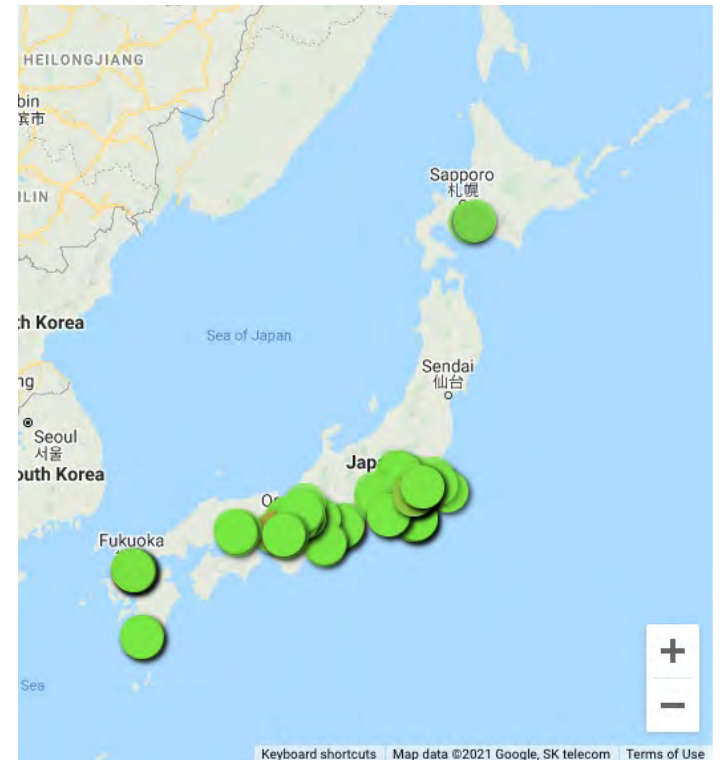
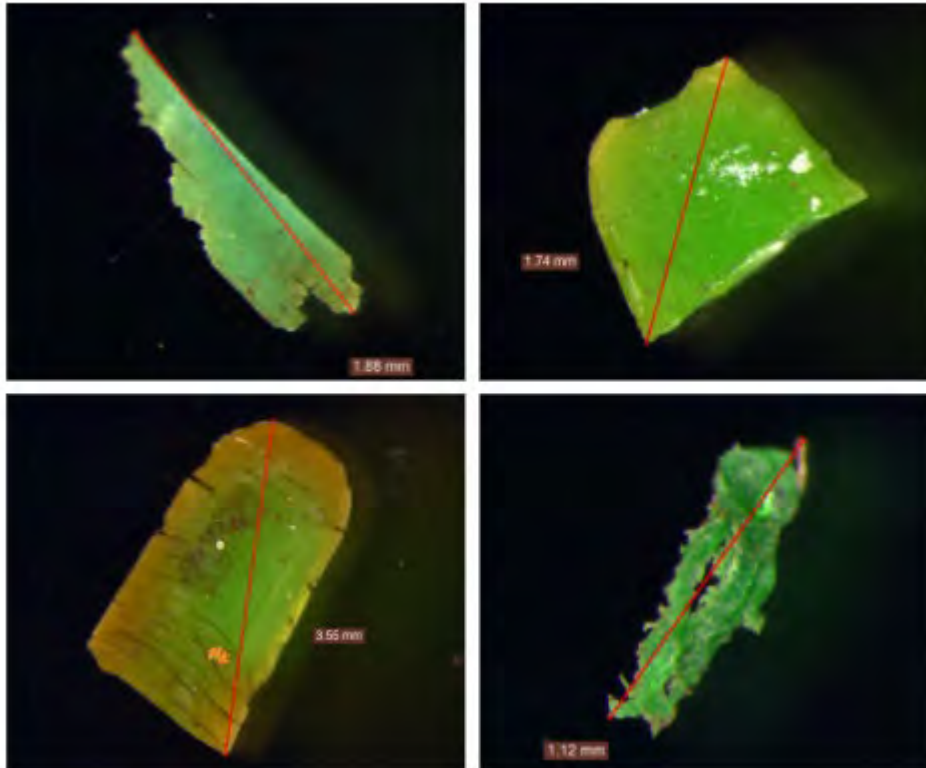
Published: 21 November 2004
Use of polyolefin-coated fertilizers for increasing fertilizer efficiency and reducing nitrate leaching and nitrous oxide emissions
Saito, Shoji & Hiroshi, Kazuo
Fertilizer, *2004*, 38, 147-152 (1994) | [Cite this article](#)
845 Accesses | 84 Citations | Metrics

Abstract

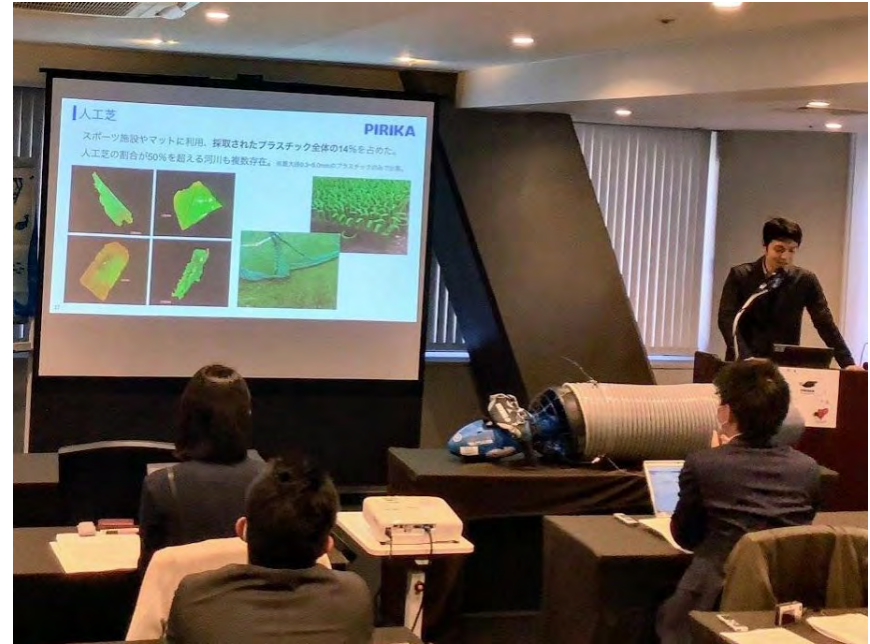
This paper reviews some of the benefits of polyolefin-coated fertilizers (POCFs) with accurate controlled release properties. They are helpful in developing innovative rice farming systems, such as no-till direct seeded rice with single basal fertilization and transplanting of rice seedlings with single basal fertilization. These new cultivation systems can increase fertilizer efficiency and reduce farming costs. The recovery of basal N can be increased from 22–23% with conventional broadcast application of ammonium sulfate or urea to 79% without-in-situ application of polyolefin-coated urea. The no-till rice cultivation of transplanting of rice seedlings with single basal application of POCFs decreased the farming cost by 6% as compared to that of the conventional rice cultivation. In-situ application of POCFs containing NPK reduced nitrate leaching and nitrous oxide emissions from cultivated soils with heavy fertilization. Since POCFs have various nutrient compositions and release types, a variety of application methods to agricultural and horticultural plants are being developed in Japan.



Revealing Tremendous leakage of Artificial Turf



Establishing data-driven solutions through press releases and open sourcing data



Media: NHK, FujiTV, NihonTV, TBS, TVTokyo, Nikkei Shimbun, Asahi Shimbun, Mainichi Shimbun, Kyodo Comm., etc.
Presentations: National Assembly, Yokohama, Kawasaki, Sakai, Osaka City Assemblies, etc.

Communicate with

- Local government
- City council
- Artificial turf company
- Construction company

Finally they couldn't ignore the problem and start developing solutions.



1. **Creating guidelines** about maintenance with the Artificial turf company
2. **Developing a filter** to stop leakage with the construction company
3. **Recycling efforts** with the support of a plastic company



- Data?
- Established approaches such as waste profiling tools and emission trackers should be recognized as important tools to tackle marine plastic pollution.
- Innovative approaches such as, AI based litter survey with drones, smartphones are gaining attention and have high potential. However the data validation, and finding proper partners for the development is essential.
- Innovative technologies for Microplastic Pollution is a good example of developing new methods and continuous improvement.



National Inventory and Material Flow Analysis

- i.e. Selection of management options: Recycling or only material recovery facility and transfer to a common recycling plant?

City (Plastic) Waste Profiles

- i.e. Plastic quantities in each types information can be used for management system design etc.

Litter picking apps. and community participation

- Public awareness -> Participation -> source of data. Use these information into monitor, stakeholder involvement, management of plastic litter.

Digital tools

- Continues monitoring, couple with digital platforms, city engage with global actions.

Microplastic survey

- Awareness, source tacking, hotspot identification etc.

Thank You!



Amila Abeynayaka

@litterlifecycle



abeynayaka@iges.or.jp



Amila Abeynayaka

Policy Researcher,

IGES Centre Collaborating with UNEP on Environmental Technologies (CCET),

Institute for Global Environmental Strategies (IGES), Japan

IGES

CCET

**IGES Centre Collaborating with
UNEP on Environmental Technologies**

[Institute for Global Environmental Strategies \(IGES\)](http://www.iges.or.jp)