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Charting a New Decade of Healthy Oceans, People and Economies

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Collab 5

Measure! Monitor! Manage! Innovative approaches to evidence-based plastic pollution prevention

5 August 2021, 1:00 PM - 4:00 PM (GMT+7)
Online via Zoom

ORGANIZERS:



Plymouth Marine Laboratory



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and Social Commission
for Asia and the Pacific



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East Asian Seas (EAS) Congress 2021
“Charting a New Decade of H.O.P.E (Healthy Ocean, People, and Economies)”

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Innovative Approaches To Evidence-Based Plastic Pollution Prevention

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PROCEEDINGS

1. Introduction

The **Measure! Monitor! Manage!** session showcased learnings from the Closing the Loop Project, a UNESCAP project implemented with the support of the Government of Japan. It supported theory was examples from real life application, and provided opportunities for the invited participants to share their learning and understandings.

Key points of the session:

- Online learning session hosted by PEMSEA and PML on the UNESCAP Closing the Loop project
- The project seeks **Measure** and **Monitor** plastic waste through innovative and smart technologies, and **Manage** using policy and investment strategies.
- In project areas, a baseline study is undertaken, matched with new monitoring strategies, and city action plans.
- So far, this process has been implemented in Kuala Lumpur (Malaysia), Da Nang (Viet Nam), Surabaya (Indonesia), and Nakhon Si Thammarat (Thailand).
- A free eLearning course has been developed to help build capacity in local government.

2. OPENING OF THE SESSION

- 2.1.** The project was opened by **Ms. Janet Salem** of UNESCAP and **Mr. Takayuki Shigematsu** from the Ministry of Environment, Japan. By directly connecting the impacts of marine litter on the favorite marine animals of the attendees, Ms. Salem brought specific clarity to what is often a nebulous issue. Mr. Shigematsu noted the importance of the ASEAN region within the global issue of plastic pollution, as well as the Government of Japan’s support for monitoring capacity in ASEAN countries.
- 2.2.** A special message was given by **Ms. Melati Wijsen**, one of the founders of the Bye Bye Plastic Bags movement (<http://www.byebyeplasticbags.org>). Starting as a campaign to ban plastic bags on the island of Bali, this campaign has spread as a youth movement to other cities around the world. The importance of the ocean was emphasized with the thought that the ocean provides the oxygen for half of all breaths. Progress against marine plastic pollution is happening, with around forty countries banning plastic bags in some form. Through her work, Ms. Wijsen has

found that one of the most common excuses to change is requiring more research. Research is needed and useful, but should not be an excuse not to change. For the research that is useful, citizen science is a powerful tool. As a practical example, Sungai Watch (<https://makeachange.world/sungaiwatch>), a community river clean-up group in Indonesia, was given. Data provided the ability to start conversations with business, government, and consumers.

As a final word, Ms. Wijsen noted the importance of inviting youth to events, and including them in plastic pollution discussions. Together with UNESCAP, Bye Bye Plastic bags has produced animated videos to drive engagement towards the plastic pollution issue.

3. PRESENTATIONS

- 3.1.** A summary of the Closing the Loop approach to plastic pollution was given by **Ms. Janet Salem**. The aim of the project is to see how cities near the ocean can reduce their plastic pollution. It centers around the themes of the session, **Measure** and **Monitor** through innovative and smart technologies, and with this information **Manage** through policy and investment strategies. This is actualized by creating a baseline assessment for measurement, implementing a digital mapping tool to enhance monitoring, and creating city action plans to guide management.

The project has been implemented in four cities from four countries: Kuala Lumpur in Malaysia, Da Nang in Viet Nam, Surabaya in Indonesia, and Nakhon Si Thammarat in Thailand. These are collaborative efforts. In Da Nang, used as an example (<https://www.unescap.org/projects/closing-the-loop/cities/da-nang>), the development of the project has involved numerous partners, including the Department of Natural Resources and Environment (DONRE), the local branch of IUCN, a digital partner in Jspacesystems, and other technical and academic partners from the city and wider region.

Creating the baseline assessment is an intensive and involved process, not intended to be repeated annually. It involves a geographical assessment, seeing the path of plastic and most importantly potential leakage points, and an assessment of existing recycling, plastic pollution prevention efforts, and national goals.

The digital mapping tool developed for monitoring integrates satellite data, sensor data, and crowdsourcing. Machine learning is used to identify plastic debris, and resultant data can produce a clear picture of local plastic hotspots. This all feeds into a plastic pollution calculator, which finds that in Da Nang 1.3% of plastic waste becomes marine debris. Of this amount, 56.9% is plastic bags. The composition of plastic that becomes marine waste is different than overall plastic composition, due to differences in recyclability and other end-of-life treatment.

Developing a City Action Plan requires identifying appropriate policy intervention priorities, specific action plans, and investment strategies. It is not only physical process such as waste collection which need funding and planning, but capacity issues such as training among local officials. As part of Closing the Loop, an eLearning course has been developed to help build this capacity.

3.2. The eLearning course was introduced by Mr. Miho Hayashi of IGES (<https://www.unescap.org/projects/ctl/elearning>). This course was designed with the help of 10 different organizations as part of the Closing the Loop project. It is available for free, requiring only a laptop with internet connection. It is designed to be self-paced, allowing those participating to find the schedule best for them. It is written in English, although it should be possible to translate it if needed. There are a total of 7 modules, which are expected to take around 15 hours to complete. This course is targeted at local government officials, but is available for anyone interested in the topic. It is designed to facilitate city-level local government capacity building for the measurement and management of plastic pollution from land-based sources.

The 7 modules are as follows:

1. Cities and Marine Plastic Pollution
2. The Plastic Value Chain from Source to Sea
3. How to Measure Plastic Pollution
4. Detecting Waste from Land and Space
5. How do we Engage with the Informal Waste Sector?
6. Engaging Stakeholders to Reduce Plastic Pollution
7. Local Action Planning to Address Marine Pollution

3.3. Following the presentation of the course, more detailed technical information on monitoring questions was given **Mr. Tim van Emmerik** from Wageningen University and Lauren Biermann from PML. Mr. Emmerik noted that there was no silver bullet for monitoring success, with a constant trade-off between comprehensiveness and available resources, and the need to adjust for the unique circumstances of every study area. Monitoring needs to be done with pre-determined questions in mind. Some key questions include:

- o How to measure plastics?
- o What are the sources, sinks, and transport pathways?
- o How to optimize prevention and reduction strategies?

There is a gap between waste lost from the land, and waste that reaches the ocean. Perhaps only 2% of land-based plastic waste enters the ocean. Much of the other leaked plastic is thought to be stuck in “plastic reservoirs”, such as in river banks, suspended in waterways, or in biota. These need to be considered for measuring, monitoring, and management. They represent potential sources of later plastic movements, such as the recent floods in Europe which shifted huge amounts of plastic.

There are different ways to measure plastics. The most obvious way is to collect it, which can be done through active sampling, or through passive accumulation. This allows for detailed analysis, but is time- and effort-intensive.

Visual counting provides a less intensive effort that is also easy to learn, and is thus easy to build capacity for. A more advanced version of this is remote sensing, using video from drones and fixed-cameras. Drones and cameras collect a lot of data, but processing that data takes significant time. More advanced is hyperspectral and multispectral reflectance analysis, possible using satellite images. The different reflectance profiles of the materials even allows differentiation between some types of plastic.

- 3.4.** **Ms. Lauren Biermann** expanded on the use of high-resolution satellite data for rivers and coastal areas. This requires spectral information, for which some of the best accessible data comes from the Sentinel-2 satellite. The detail of this satellite, which has a resolution of up to 10m, allows natural sea surface items, such as seaweed, to be differentiated from plastic. (Some issues remain where plastic mixes with other substances on the surface.) Data can be obtained through the Copernicus Open Access Hub (<https://scihub.copernicus.eu>).

Understanding the unique situation of a particular river is essential for devising an effective monitoring plan, and identifying the best monitoring tools and techniques. For any river, there is a need to identify the questions that the monitoring is meant to achieve. A consideration of that river's characteristics is the next step. With this in mind, the available resources need to be considered. Once data is produced, there needs to be a plan for analysis and dissemination. It is crucial these are interlinked, for example the data collected must match the questions being asked.

Workflow for macroplastic monitoring

- **Questions**
 - Emission to ocean?
 - Hotspots in time/space?
- **River characteristics**
 - Wide (>500m) or narrow (<100m)?
 - Safe bridges available?
 - River mouth or upstream?
- **Available resources**
 - Number of observers?
 - High-tech or low-tech equipment?
 - Measurement frequency?
- **Data**
 - Normalize to standard units
 - Consistent with questions
- **Analysis and dissemination**
 - Clear visualization
 - Consider stakeholders and answer questions

A closer look at management in Viet Nam was given by Pham Van Hieu from the Vietnam Administration of Seas and Islands (VASI). Viet Nam is a considerable contributor to marine plastic pollution, with annual per capita use rapidly rising from around 3.8kg in 1990 to 81kg in 2019. Only 15% of plastic waste is thought to be recycled, while more than half is mismanaged in some way (around 3.6 MT/year).

A National Action Plan on Marine Plastic Debris Management is being set up to guide the country's policy. In creating this, the government cooperates with research institutions, with research projects so far including studying the impacts of mangroves as a sink for plastic waste. Core aims include to:

- Reduce plastic debris in the sea and in the ocean
- Collecting Abandoned, Lost or otherwise Discarded Fishing Gear (ALDFG)
- Prevent the use of single-use plastic products

- Establish Marine Protected Areas (MPAs) without plastic debris
- Every 5 years to access the state of marine plastic debris in 11 main river basins and 12 insular districts

To achieve this, 5 key tasks and solutions were identified:

- Raising awareness: communication and behavioural change
- Treatment: collection, separation, storage, transportation and disposal of plastic waste
- Controlling: at-source plastic waste control
- Cooperation and research: international cooperation, scientific research, treatment technologies
- Policy: development of mechanism for marine plastic debris management

Viet Nam seeks international cooperation to mitigate marine plastic debris, and to promote circular economic development. As part of this, the government aims to establish an international center for marine plastic debris research in the country.

- 3.5.** A final presentation was given by **Ms. Hien Nguyen** from IUCN Da Nang. On a city level, it is key that local governments are responsible for managing municipal solid waste. This connects with other city functions, such as drainage, tourism, health, the environment, and public services. Addressing waste and shifting to a circular economy is challenging, due to complexities in plastic value chain, different forms of plastic, the variety of stakeholders of the sector, and different local knowledge and activities. It is tricky to translate regional and national action plans into one the ground action.

Da Nang has been a pioneer in creating City Action Plans for ASEAN cities (<https://www.unescap.org/sites/default/d8files/event-documents/DN-ActionPlan.pdf>). It has an established research baseline, which they are seeking to connect directly to proposed actions.

A “digital Plastic Pollution Calculator” tool (<https://plasticpollution.leeds.ac.uk/toolkits/calculator/>) will be applied to assist with data analysis. This aims to provide models and local and regional levels, identifying potential leakage hot spots and allowing the identification of area-specific socio-technical interventions and policy actions.

Priority actions will be handled by different groups as appropriate. The actions are divided into four themes:

- Raise public awareness and change people's behaviour to reduce single-use plastic (9 actions)
- Implement targeted actions to reduce plastic waste generation and leakage in the city (7 actions)
- Prevent, reduce and control ocean plastic waste from land-based and marine sources (9 actions)
- International cooperation, scientific research, application, development and technology transfer on ocean plastic waste treatment (6 actions)

4. BREAKOUT GROUPS

After the presentations, the participants were divided into three breakout groups wherein they discussed:

- Plastic pollution on coastlines and oceans
- Plastic pollution in cities and rivers
- Policy to tackle plastic pollution

4.1. Breakout Group 1 discussed plastic pollution on coastlines and oceans wherein they had three guide questions to answer:

1. What are the key challenges we face measuring and managing marine plastic pollution?
2. How can we scale up engagement and action on marine plastic pollution?
3. What are the most exciting new innovations and projects to tackle marine plastic pollution in your oceans and coasts?

Group 1 agreed that the main challenge faced in measuring and managing marine plastic pollution is ignorance and lack of will. In order to scale up engagement and action on this matter, the group came to the solution that the youth should be well informed and included in discussions about plastic pollution. The group agreed that one of the most exciting new innovations and projects to tackle marine plastic pollution is the ability for many scientists to publish their work and research with open access, available to just about anyone.

4.2. Breakout Group 2 discussed plastic pollution in cities and rivers wherein they had three guide questions to answer:

1. What are the key challenges we face measuring plastic pollution?
2. How can we scale up engagement and action on plastic pollution?
3. What are the most exciting new innovations and projects to tackle plastic pollution in your cities and regions?

Group 2 discussed that the key challenges we face in measuring plastic pollution are getting baseline data, a need for continuous capacity, high temporal and spatial variability, and that the equipment for monitoring are expensive. The group agreed that in order to scale-up engagement and action on plastic pollution, there needs to be citizen science and large-scale volunteering, data integration, as well as educating and informing more individuals and groups about the matter. The group stated that the most exciting new innovations and project to tackle plastic pollution are mitigation system for plastic waste dispersal and the ability to monitor leakage hotspots.

4.3. Breakout Group 3 discussed policy to tackle plastic pollution wherein they had three guide questions to answer:

1. What are the key challenges we face creating policy to prevent plastic pollution?
2. How can we turn policy into action to reduce plastic pollution?
3. What are the most exciting policy innovations and projects to tackle plastic pollution in your countries and regions?

Group 3 deliberated that the key challenges in creating policies to prevent plastic pollution are government capacity, political will from the top, national policy to local action, Covid lockdowns,

and lack of information among civil society and local communities. The group discussed that in the matter of plastic pollution, policy can be turned into action by enhancing the enforcement capacity, raising public consciousness, and public awareness. The group agreed that the most exciting policy innovations and projects to tackle pollution would be Closing the Loop project, plastic litter recycling and chain certification, and national as well as city action plans.

5. **CLOSING**

Through the Closing the Loop project, it is aimed that cities will be able to establish data-driven policy making at local levels. Viet Nam, Indonesia, Malaysia, and Thailand have already developed national plans to which city-level plans could contribute, and the Philippines is in an advanced stage of preparing one. These would also complement existing regional plans (listed below). It is hoped that more cities will be able to adapt the processes and tools created through the Closing the Loop project, providing local actions to tackle the global crisis around marine plastic pollution.

A recording of the session is available on YouTube: https://youtu.be/qc6qmHvG_Qk.

Regional Plans

- ASEAN Framework of Action on Marine Debris
- G20 Osaka Blue Vision
(https://www.mofa.go.jp/policy/economy/g20_summit/osaka19/en/topics/plastic_marine.html)
- Bangkok Declaration on Combating Marine Debris in ASEAN Region
- Bangkok 3R Declaration Towards Prevention of Plastic Waste Pollution through 3R and Circular Economy
- COBSEA Regional Action Plan on Marine Litter
- ASEAN Regional Action Plan for Combating Marine Debris in the ASEAN Member States (2021-2025)