Philippine Coast Guard
Philippine Coast Guard Auxiliary
Coast Guard Auxiliary District Central Visayas
202nd AUXILIARY SQUADRON
Pier 3, Arellano Boulevard, Cebu City 6000

July 26, 2025

Our ref: 202-07-2025-3-AAR

From : **AUX AUDRIE KYLE HOLAYSAN PCGA**
DAS, 202nd Coast Guard Auxiliary Squadron

To : **AUX COMMO BETHLEHEM V HOLAYSAN JR PCGA**
District Auxiliary Director, CGADCV

Via : **CG CAPT JEROME Y LOZADA**
Station Commander, Coast Guard Station Central Cebu
(Attn: Station Staff for Community Relations Service, S7)

Subj : **AFTER ACTIVITY REPORT of Plastics Conference 2025**

Date : 24-25 July 2025

Encls : A. List of Participants / Attendance Sheets
B. Pictures taken during the activity
C. Supporting Documents

I. **TIME COVERED:** 08000H-1600H, 24-25 July 2025

II. **VENUE:** CGADCV, Pier 3 Cebu

III. **MISSION:**

- MAREP: Participation to the 1st National Conference on Plastics Pollution in the Philippines, 24-25 July 2025 at the University of the Philippines, Marine Science Institute (UP-MSI), Diliman, Quezon City, where results of Citizen Science Data Collection from the International Coastal Cleanup (ICC) Efforts 2022-2024 at Cogon, Pardo Riverine Mangrove and Il Corso Beach Cleanup sites are presented as part of the Macroplastics Transport Baselining studies conducted by AUX LCDR IAN DOMINIC F TABAÑAG PCGA, the ICC Area Coordinator since 2022.

IV. **CHRONOLOGICAL EVENTS:**

During the Scientific Committee meeting of the Plastics Research Network – Philippines (PlaReNet-Ph), which AUX LCDR TABAÑAG PCGA is a part of as a member of the board, last 18 February 2025, the committee has approved the conduct of the first National Plastics Conference at the UP-MSI 24-25 July 2025 with the following breakout session themes: baselining and environmental surveys; plastics in biota, ecotoxicology, and public health; solutions and interventions; policy interventions and social aspects; and initiatives from and involvement of the private sector (advocacy, EPR, etc.). Then the conference call for abstracts and registration was published and released last 06 March 2025 and closed last 30 June 2025. A total

of one hundred twenty (120) submission entries that correspond to respective plastics research studies from all over the country were received and forty (40) entries were accepted for oral presentation, and sixty (60) entries were accepted for poster presentation. The baseline study of AUX LCDR TABAÑAG PCGA entitled "Macroplastics Transport Baseline in a Selected Cebu Mangrove Area: A Material Balance Approach," was one of the studies accepted for oral presentation.

During the first day of the PlastiCon last 24 July 2025, the conference kicked started with a keynote message from Sec. Renato Solidum Jr., Department of Science and Technology, emphasizing on the role of Circular Economy in addressing the plastics pollution problem in the country. Further, Sec. Solidum also highlighted DOST's institutional circular economy framework for science, technology, and innovation which are: Think Green – understanding planning and attitude towards a circular economy; Make Green – cleaner processes, waste valorization, and treatment technologies; Turn Green – technology transfer and commercialization; and Keep Green – strategic actions towards sustainability. Then, programs and projects of DOST were presented as part of the solutions that provide opportunities for the Filipino people in addressing the serious problem of plastics. Following the keynote message of the DOST Secretary is a Plenary Session from the world-renowned oceanographer and microplastics researcher, Prof. Dr. Atsuhiko Isobe of Kyushu University Japan, which focused on the "Current abundance of ocean microplastics across the world's ocean – an estimate based on microplastic database and numerical model approach." Dr. Isobe's presentation focused on how microplastics are transported into the world's oceans and with the use of extensive database building and mathematical modeling, it was estimated that the ocean presently contains an average of <100 mg per cu. m. and that in a span of 50 years without plastics interventions, this concentration would increase to >1000 mg per cu. m, which presents a threat to existing ecosystems. Moreover, global inventory of mismanaged plastic wastes show that current plastics production is at ~30 million tones/year and that 95.3% of mismanaged plastic is missing on land, and 66.7% of ocean plastics are missing somewhere in the ocean. After the plenary session came the breakout sessions, and AUX LCDR TABAÑAG PCGA presented his study in the "Baselining and Risk Assessments" session. Briefly, AUX LCDR TABAÑAG PCGA shared that the 2022 macroplastics transport baseline for the Cogon, Pardo riverine mangroves and Il Corso beach areas reveal that mismanaged plastic waste from Bgy. Cogon, Pardo stay trapped within the riverine mangrove areas for ~ 28 days then gets transported to the Il Corso beach area and stays trapped in the beach for ~ 4 days before approximately 610 kg/day get discharged into the open sea. However, ICC data collected from 2022-2024 suggested that mismanaged macroplastic waste gets transported from the riverine mangrove areas are then transported into the open sea in just a span of ~ 5 days, revealing that policy level interventions are needed such that frequent beach cleanups could not keep up with how plastic waste accumulate in said riverine mangrove and beach areas. The day concluded with an art exhibit featuring the works of local artists that focus on the impacts of plastics pollution and the event has been graced by Hon. Joy Belmonte of the Quezon City LGU.

In the second day of the PlastiCon 2025, Hon. Ray Amador Bargamento, Punong Barangay of Mintal Davao City, has shared their approach on establishing a new culture for waste reduction as part of their efforts to address their problem of solid waste at the barangay level. He shared that the role of proper data collection helped in strategically crafting how to manage waste segregation at the household level. He emphasized that it does not cost the barangay anything when households perform segregation at source. This has been the best practice of the barangay as resource collectors (formerly garbage collectors) would only collect recyclables directly from the household and generate income from them. The only role of the barangay is to provide

collection of the residual wastes. Moreover, their efforts in utilizing black soldier fly technologies in addressing biodegradable (food) waste has led to the formation of the materials recovery system as opposed to having a dedicated facility for recovery. This shows that transitioning the solid waste management into a market-driven status gives a leeway and opportunity for the government to address the gaps in implementing solid waste management at the barangay level. Following this community-driven keynote message is a Plenary Session from one of the world's foremost researchers in plastics research for river systems, Prof. Dr. Tim van Emmerik of Wageningen University, Netherlands. Dr. van Emmerik discussed the "role of rivers in global plastic pollution," and provided empirical evidence on the proposition that most of the plastic does not flow into the ocean. He emphasized that less than 2% of the mismanaged plastic waste enters the ocean and that plastics accumulate in and around rivers with them acting as reservoirs, especially on plastics getting trapped in vegetation (e.g. mangrove systems, etc.). Moreover, it has been highlighted that riverine transport of plastics is dependent on many unknown factors that the need for comprehensive data collection to support advanced mathematical modeling techniques can provide a means to comprehend the plastics budget in rivers. After the plenary session, AUX LCDR TABAÑAG PCGA chaired the breakout session on "Policies, EPR, and Citizen Science" where Atty. John Menguito of the Philippine Earth Justice Center (PEJC) highlighted the role of scientists in providing the data required for localized policymaking. Atty Menguito highlighted how the local research data of AUX LCDR TABAÑAG PCGA and his colleagues at the University of San Carlos has helped shaped Single-Use Plastics Ban Ordinances around the various municipalities in Cebu Province. Moreover, Atty. Menguito has shared on how the PEJC's Green Clinics initiative has influenced aspiring lawyers to specialize in the practice of environmental law and litigation. The subsequent presentations in the said breakout session then focused on the willingness of consumers to pay for environmentally friendly food packaging alternatives, situation of the plastic pollution in Metro Manila, baseline macroplastic litter loads in Southern Mindanao coastal areas, and on how much plastic waste comes from the wasted space in dry food packaging. Then, the conference highlighted a screening of the "The Atom Araullo Specials: Republika ng Plastik" documentary followed by a plenary discussion with Mr. Atom Araullo and Dr. Deo Onda. The whole discussion focused on the key message that "Science that doesn't transcend to the Community is Useless," emphasizing the major role of science communication in shaping the societal and cultural views. Then, a commitment message given by the World Wide Fund for Nature Philippines on their support to the harmonized initiatives for addressing the country's plastics problem has been highlighted for developmental organizations. Lastly, the conference was concluded with a call to action or ways forward by forming a Technical Working Group comprised of the plastics researchers, national government agencies, industry, non-government and civil-society organizations whose function is to craft a 'Call Document' containing a collective statement on how relevant stakeholders address collectively the plastics problem in the country.

The overall conference has demonstrated the dedication and willingness of the relevant stakeholders from the scientific community, national government agencies, industry, non-governmental and civil-society organizations in addressing the plastics pollution problem by actively participating in the first National Conference on Plastics. The invited Plenary Sessions show how macroplastics are mostly trapped in rivers and that these conversely degrades into microplastics that gets transported into the world's ocean. Moreover, the participation of our CGADCV delegates: AUX LCDR IAN DOMINIC F TABAÑAG PCGA, and AUX LT EDEL FLORAMAY Y HAO PCGA, have demonstrated the commitment of the district in supporting science-based data-driven policymaking initiatives by properly collecting plastics data from ICC activities since

2022 and performing baseline macroplastics transport studies have helped shaped local policymaking initiatives that lead to enhanced efforts for MAREP by addressing the local plastics pollution problems in Cebu province. In addition, the conference also emphasized the lack of baseline plastics data for rivers and that it is highly recommended that the MAREP activities of the PCG-PCGA will somehow employ strategic cleanup and data collection of rivers in their respective areas of responsibility.

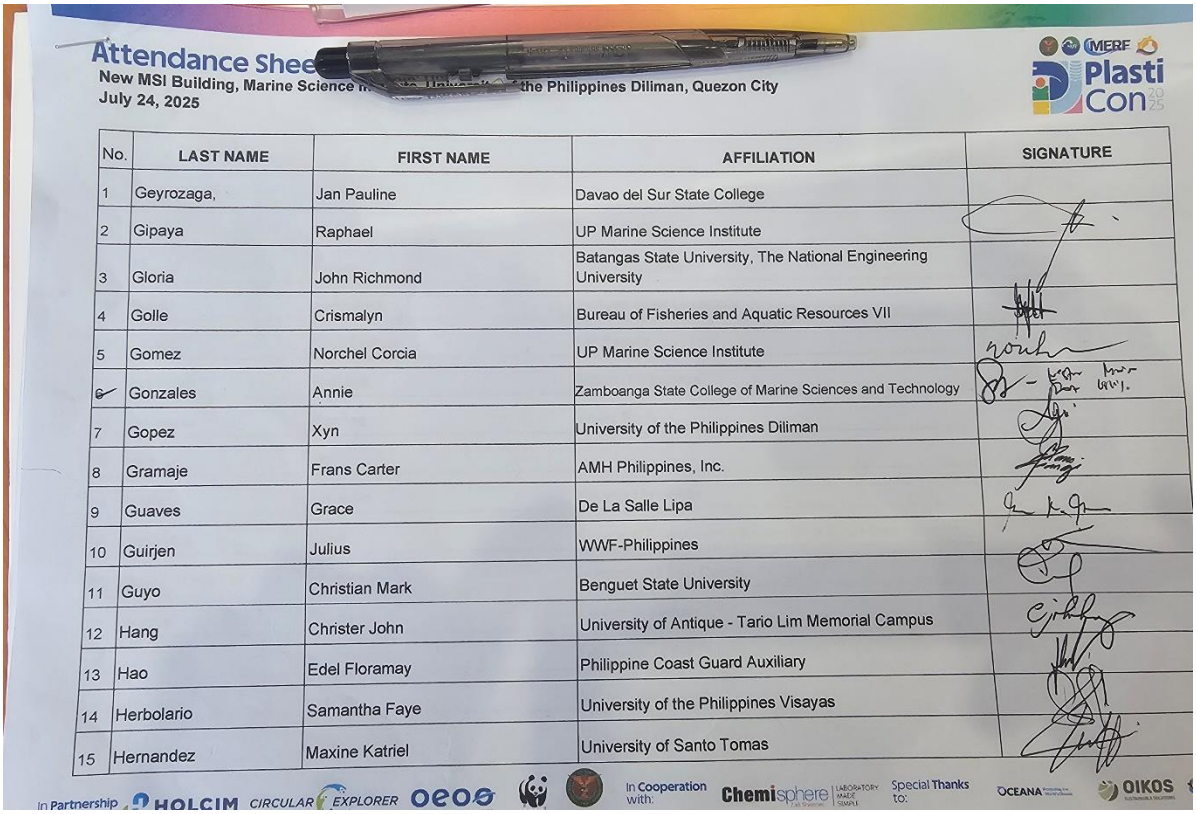
AUX CAPT AUDRIE KYLE K HOLAYSAN PCGA
Director Auxiliary Squadron
202nd Coast Guard Auxiliary Squadron

Noted by:

CAPT JEROME Y LOZADA PCG
Station Commander, Coast Guard Station Central Cebu
(Attn: Station Staff for Community Relations Service, S7

Encls: A. List of Participants / Attendance Sheets

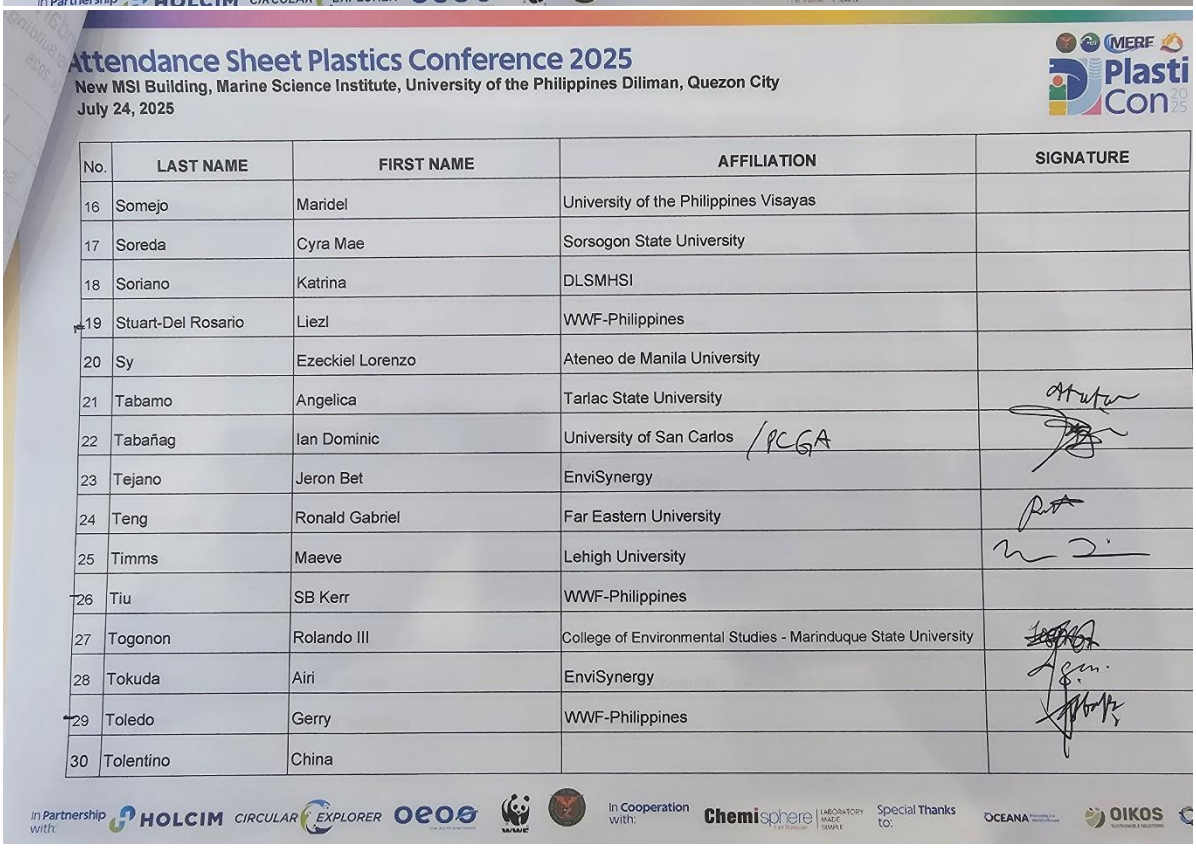
PlastiCon 2025 Day 1 | 24 July 2025



Attendance Shee
New MSI Building, Marine Science I... the Philippines Diliman, Quezon City
July 24, 2025

No.	LAST NAME	FIRST NAME	AFFILIATION	SIGNATURE
1	Geyrozaga,	Jan Pauline	Davao del Sur State College	
2	Gipaya	Raphael	UP Marine Science Institute	
3	Gloria	John Richmond	Batangas State University, The National Engineering University	
4	Golle	Crismalyn	Bureau of Fisheries and Aquatic Resources VII	
5	Gomez	Norchel Corcia	UP Marine Science Institute	
6	Gonzales	Annie	Zamboanga State College of Marine Sciences and Technology	
7	Gopez	Xyn	University of the Philippines Diliman	
8	Gramaje	Frans Carter	AMH Philippines, Inc.	
9	Guaves	Grace	De La Salle Lipa	
10	Guirjen	Julius	WWF-Philippines	
11	Guyo	Christian Mark	Benguet State University	
12	Hang	Christer John	University of Antique - Tario Lim Memorial Campus	
13	Hao	Edel Floramay	Philippine Coast Guard Auxiliary	
14	Herbolario	Samantha Faye	University of the Philippines Visayas	
15	Hernandez	Maxine Katriel	University of Santo Tomas	

In Partnership HOLCIM CIRCULAR EXPLORER OCEOS In Cooperation with: Chemisphere Special Thanks to: OCEANA OIKOS



Attendance Sheet Plastics Conference 2025
New MSI Building, Marine Science Institute, University of the Philippines Diliman, Quezon City
July 24, 2025

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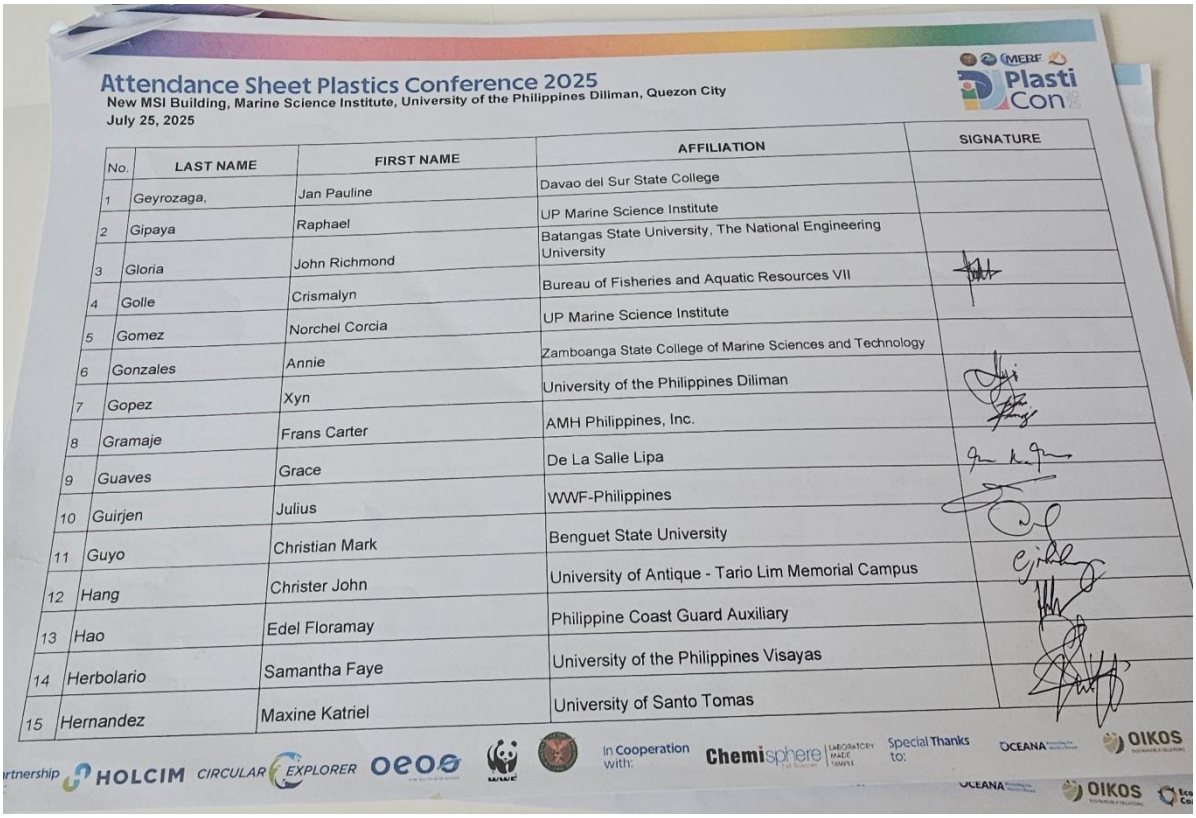
17	Soreda	Cyra Mae	Sorsogon State University	
18	Soriano	Katrina	DLSMHSI	
19	Stuart-Del Rosario	Liezl	WWF-Philippines	
20	Sy	Ezeckiel Lorenzo	Ateneo de Manila University	
21	Tabamo	Angelica	Tarlac State University	
22	Tabañag	Ian Dominic	University of San Carlos / PCGA	
23	Tejano	Jeron Bet	EnviSynergy	
24	Teng	Ronald Gabriel	Far Eastern University	
25	Timms	Maeve	Lehigh University	
26	Tiu	SB Kerr	WWF-Philippines	
27	Togonon	Rolando III	College of Environmental Studies - Marinduque State University	
28	Tokuda	Airi	EnviSynergy	
29	Toledo	Gerry	WWF-Philippines	
30	Tolentino	China		

In Partnership with: HOLCIM CIRCULAR EXPLORER OCEOS In Cooperation with: Chemisphere Special Thanks to: OCEANA OIKOS

PlastiCon 2025 Day 2 | 25 July 2025



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July 25, 2025

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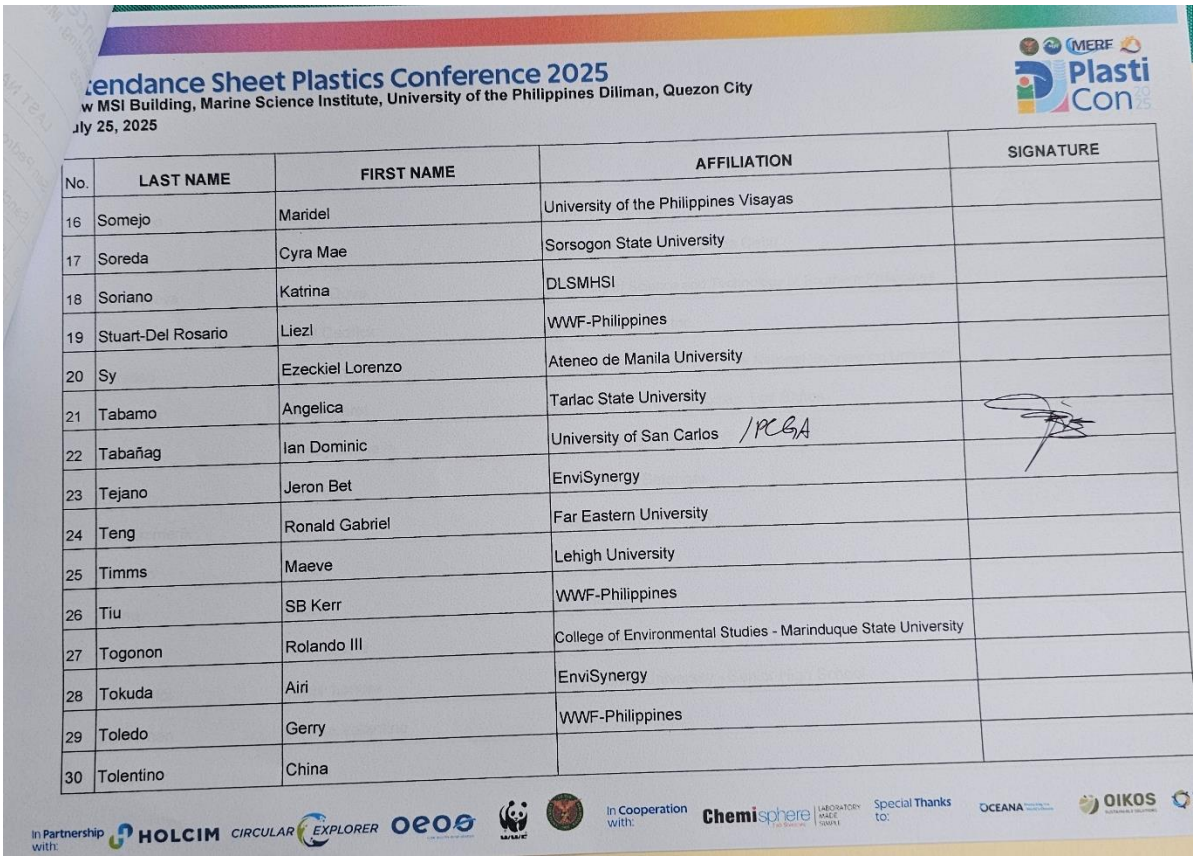

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30	Tolentino	China		

PlastiCon 2025 Certificates of Appearance

PlastiCon 2025

CERTIFICATE OF APPEARANCE

This is to certify that ~~Mr./Ms.~~ AUX LT EDEL FLORAMAY Y HAO PCGA of PHILIPPINE COAST GUARD AUXILIARY personally appeared at the **Plastics Conference (or PlastiCon)** held at the New Building of Marine Science Institute (MSI) at the University of the Philippines, Diliman, Quezon City, from July 24-25, 2025.

This Certification is issued upon the request of the above-named person for whatever purpose this may serve him/her best.

MARIE FRANCOISE THERESE E. MODESTO
Secretariat Head

In Partnership with: HOLCIM, CIRCULAR EXPLORER, oeos, WWF, UPD OVCRD
In Cooperation with: Chemisphere Laboratory Made Simple
Special Thanks to: OCEANA, OIKOS, EcoWaste Coalition

PlastiCon 2025

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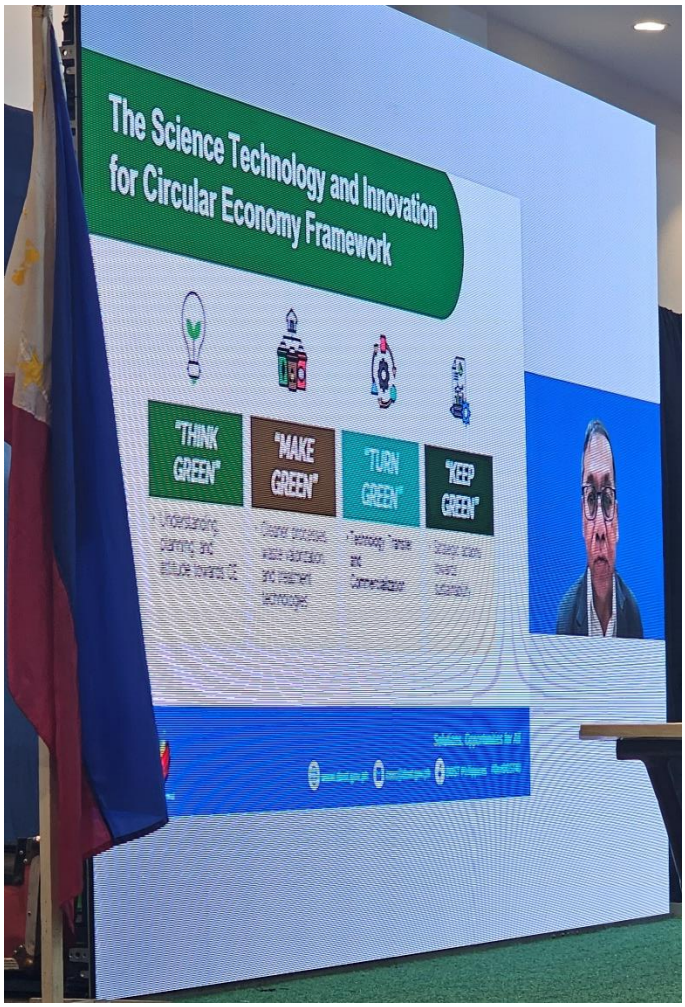
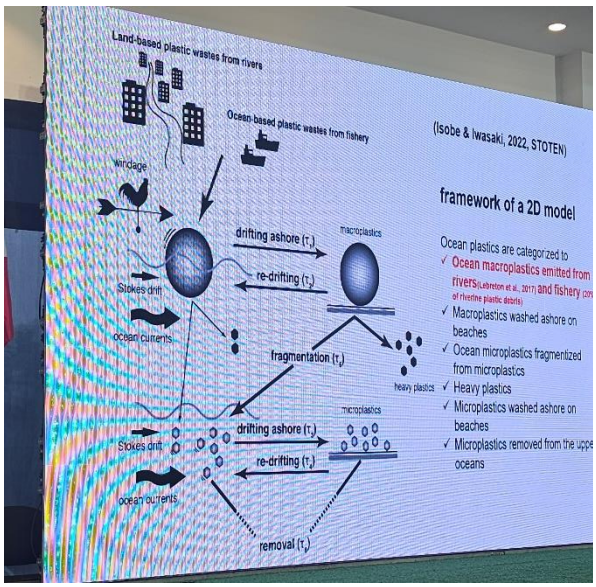
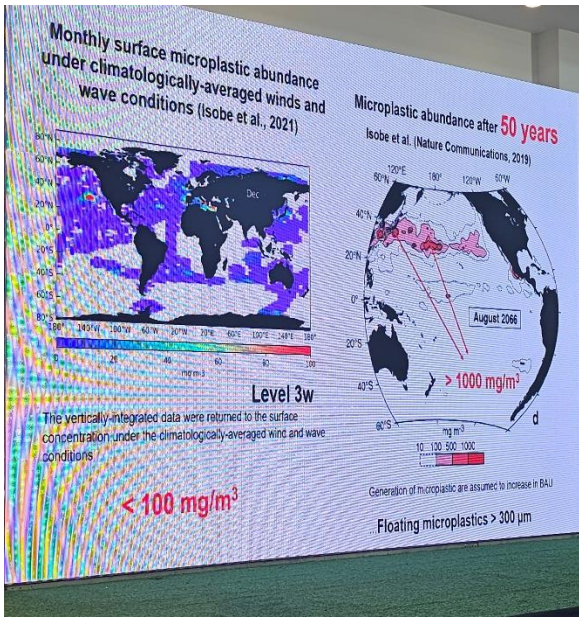
B. Pictures taken during the activity

PlastiCon 2025 Day 1 | 24 July 2025

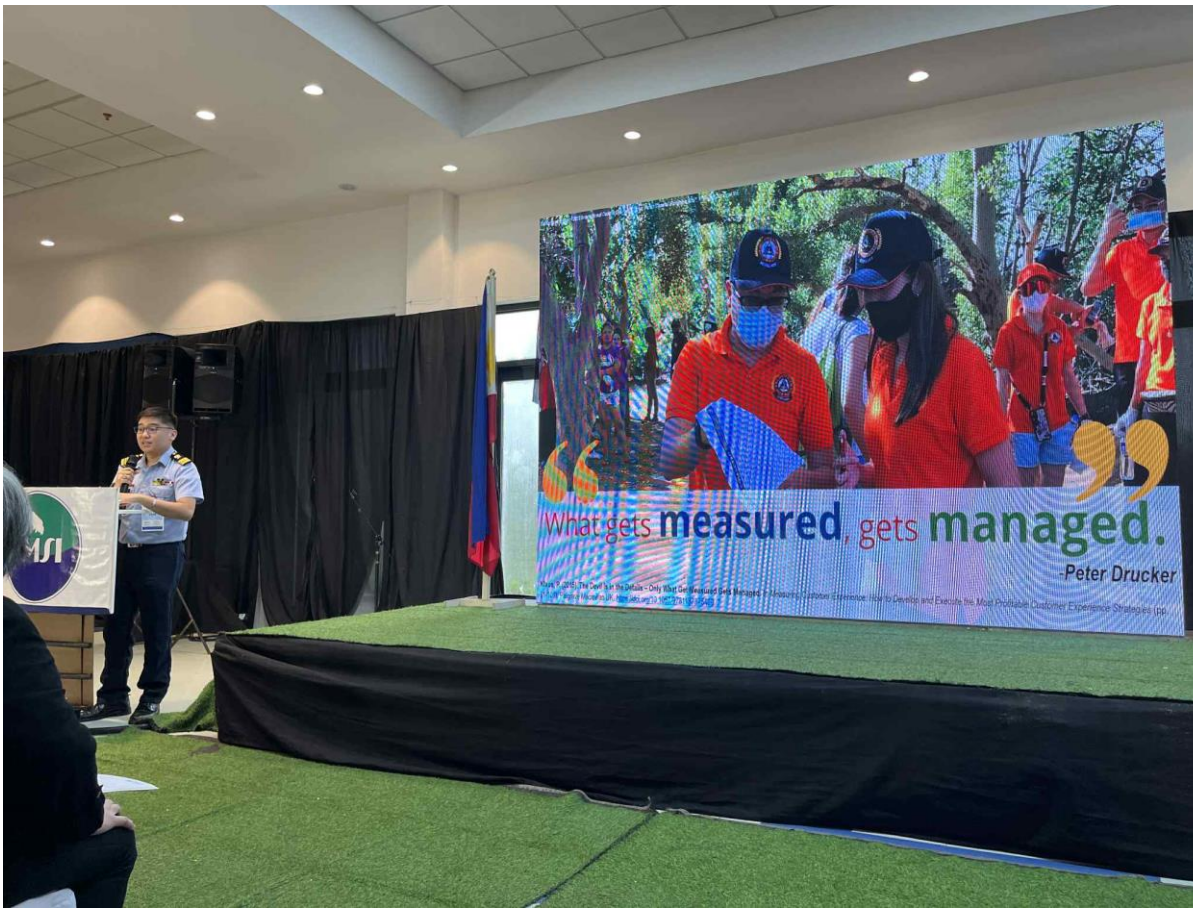


Keynote Message of Sec. Renato Solidum Jr. of DOST. Video Message





Plenary Session 1. Current abundance of ocean microplastics across the world's ocean – an estimate based on microplastic database and numerical model approach by Prof. Dr. Atsuhiko Isobe

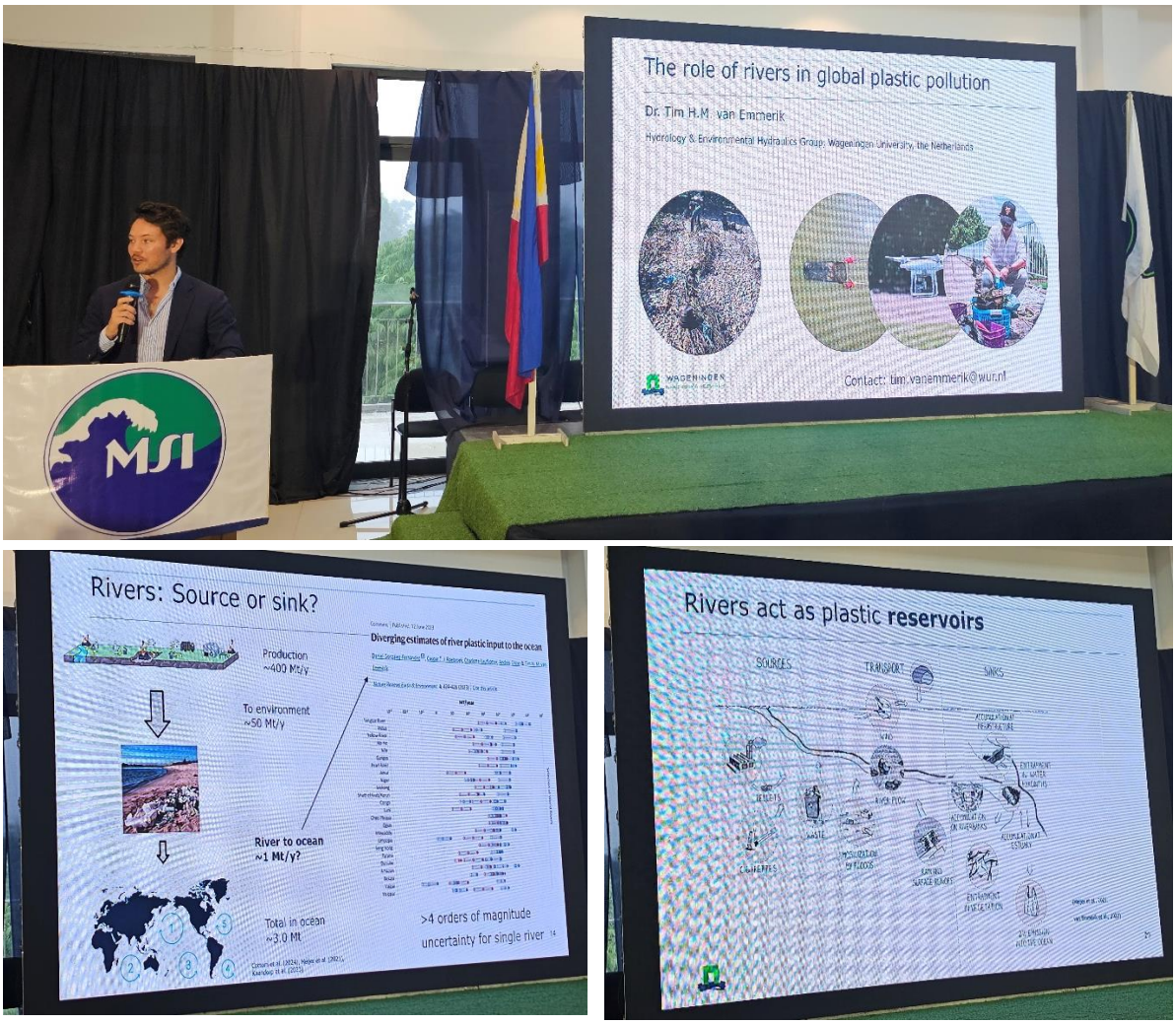


Breakout Session "Baselining and Risk Assessments." Oral Presentation. "Macroplastics Transport Baseline in a Selected Cebu Mangrove Area: A Material Balance Approach" by AUX LCDR IAN DOMINIC F TABAÑAG PCGA.

AUX LT EDEL FLORAMAY Y HAO PCGA *and* AUX LCDR IAN DOMINIC F TABAÑAG PCGA *with Prof. Dr. Tim van Emmerik of Wageningen University and Mr. Neil Ian Lumanlan of Sustainova*

PlastiCon 2025 Day 2 | 25 July 2025

Keynote Speech of Hon. Ray Amador Bargamento on EnviroMintal – A New Culture for Waste Reduction



Plenary Session 2. Role of rivers in global plastic pollution by Prof. Dr. Tim van Emmerik

Dr. Ian Dominic F. Tabañag as Chair in the Breakout Session on "Policies, EPR, and Citizen Science" with Atty. John Menguito of the Philippine Earth Justice Center (PEJC) presenting on the Green Legal Clinics program of the PEJC.

Screening of the "Atom Araullo Specials: Republika ng Plastik" and the Plenary Session on Science Communication.

The Plastics Research Network – Philippines (PlaReNet-Ph) Scientific Committee. (From left to right): Dr. Hernando Bacosa of MSU-IIT; Dr. Ian Dominic Tabañag of DOST, USC, and PCGA; Dr. Marieta Sumagaysay of UP Tacloban; Dr. Ma. Kristina Paler of USC; Dr. Deo Florence Onda of UP-MSI, and Dr. Paul Samuel Ignacio of UP-Baguio

C. Supporting Documents

C1. PlaReNet-Ph Notice of Meeting and Finalized PlastiCon 2025 Concept Note

Outlook

PlastiCon 2025 Scientific Committee Meeting

From Plasticon 2025 <plasticon2025@msi.upd.edu.ph>
Date Wed 2/12/2025 2:18 PM
Cc dfonda <dfonda@msi.upd.edu.ph>

1 attachment (234 KB)
PlastiCon 2025 Concept Note-3.pdf;

You don't often get email from plasticon2025@msi.upd.edu.ph. Learn why this is important

Dear Maam/Sir,

Following up on Dr. Deo Florence Onda's previous communications, we are delighted to invite you to serve again on the Scientific Committee for the Plastic Conference 2025. This conference will be held on July 24-25, 2025, at the MBRIS Building, UP Diliman.

As a valued member of the PlaReNet team, your expertise will be invaluable in reviewing abstracts, chairing panel discussions, and ensuring the conference's success. As always, the organizers will cover all logistics and related expenses to the event.

We would appreciate your availability for a meeting on February 18, 2025 or February 19, 2025, (9:00 AM) to discuss the following:

1. Speaker suggestions
2. Approval of the indicative program

The concept note and draft program are attached for your review. Please let us know which date works for you by voting on the doodle link below. We can then confirm the meeting time and location (or provide a virtual meeting link if preferred).

Doodle link: https://doodle.com/group-poll/participate/aQjlnXqb

Thank you for your continued support. We look forward to working with you again.

Sincerely,

The PlastiCon Secretariat

PlastiCon 2025

"Knowledge to action: Science-based solutions to plastics pollution"

The Philippines is currently facing a critical threat that poses numerous devastating consequences—plastics pollution. It is a complex interdisciplinary issue that involves a multitude of stakeholders across government, private, and non-governmental organizations. There are a lot of ongoing thrusts pioneered by the government, academe, industry, and community. Current studies and frameworks for future research can provide data that can aid other stakeholders in designing monitoring strategies to reduce plastic pollution. The steady rise in publications in the Philippines during the last decade is a confirmation of an increase in the country's capacity to carry out initial steps to address the problem. Given this development, there is a need to provide a venue for the different stakeholders including the academe, government agencies, policymakers, and the private sector to exchange ideas, establish networks, forge partnerships, and continue discussing the plastics issue to effect changes.

The first PlaReNet Conference 2022 was held last December 6 to 7, 2022 hosted by the UP Marine Science Institute and the Plastics Research Network - Philippines (PlaReNet - Philippines) with the support of the United Nations Development Programme (UNDP), the Embassy of Japan and the Department of Environment and Natural Resources (DENR), in partnership with the Department of Science and Technology National Research Council of the Philippines, Philippine Council for Industry, Energy and Emerging Technology Research and Development (PCIEERD), and UK Research and Innovation as the main sponsors. UNDP resident representative Dr. Selva Ramachandran and Japan Economic Minister Daisuke Nihei officially opened the conference, which was attended by 115 participants onsite at the Microtel by Wyndham UP Technohub, Diliman, Quezon City and by more than 130 participants online. The conference served as a reminder that the burden of coming up with solutions does not fall solely in the academic sphere.

Building on the success of this first activity, an expanded and encompassing second iteration will be held in 2025. This time, it will be called **Plastics Conference 2025 (PlastiCon 2025),** happening on **July 24-25, 2025** at the **MBRIS Building, Marine Science Institute, UP Diliman** with the theme "***Knowledge to action: Science-based solutions to plastics pollution."*** The conference will serve as a platform for key players in the plastics sector to collaborate and share developments in their respective research activities to provide actionable and implementable solutions on the ground. The expected participants shall include scholars conducting plastics pollution research, and government agencies and policy makers responsible for monitoring and creating regulations to address the plastics problem. The conference will also feature plastics research experts from around the world to shed light on the global efforts in plastics research and to facilitate the exchange of data and best practices.

The two-day event will consist of plenary sessions, poster presentations, breakout sessions, and panel discussions for speakers and participants to be able to share their findings, best

practices, challenges, and future targets. The first day will highlight recent findings in plastics research and opportunities for early career researchers. The second day will feature initiatives to address the plastics problem from the government and private sector. Technical sessions are designed to highlight current research being done by the academe and initiatives from the government, industry, and community to address local and regional plastic pollution. Updates on ongoing efforts to harmonize plastics methodologies in the Philippines including survey methods for baselining macroplastics and microplastics, and the utilization of artificial intelligence technologies to conduct plastics surveys will also be discussed. The national plan of action for the prevention, reduction, and management of marine litter in the Philippines (NPoA-ML), spearheaded by DENR, will be further presented in a panel to provide a blueprint for enhancing the current efforts of the country in resource and waste management. Collaborative action from the industry and communities will be highlighted as well as efforts towards a circular economy including empowerment of citizen science to facilitate involvement and innovation. The Plastics Research Network (PlaReNet), an organization that facilitates collaboration and information exchange among relevant stakeholders working on the plastics problem, will also be introduced to the participants to expand the network.

Breakout session themes:

1. Baselining and environmental surveys
2. Plastics in biota, ecotoxicology, and public health
3. Solutions and interventions
4. Policy interventions and social aspects
5. Initiatives from and involvement of the private sector (advocacy, EPR, etc.)

Target number of participants: 200-250 pax

Main Sponsors:

Circular Explorer - One Earth One Ocean - Holcim
UPD OVCRD
DOST PCIEERD
DOST-SEI through PlastiZen Project

UNDP
Oceana
WWF
ADB - Korea Hub

DRAFT PROGRAM

Day 1 (July 24, 2025, Thursday)

Time	Activity
8:00 am - 9:00 am	Registration
9:00 am - 9:30 am	Launch and Opening of Art Exhibit and Photography Contest
9:30 am - 9:45 am	**Welcome Remarks** **Opening Remarks**
9:45 am - 10:15 am	**Keynote Speech** Sec. Maria Antonia "Toni" Yulo-Loyzaga, *Department of Environment and Natural Resources*
10:15 am - 10:30 am	Photo Opportunity
10:30 am - 11:00 am	Posters Sessions, Booths, Networking, and Health Break
11:00 am - 12:30 pm	**Plenary Session 1** Prof. Dr. Tim van Emmerik, *Wageningen University, Wageningen, Netherlands* Open Forum
12:30 pm - 1:30 pm	Lunch break and booths
1:30 pm - 2:45 pm	**Breakout Sessions 1: Five Themes** 1 invited (Chair): 15 mins 4 selected: 10 mins each + Q&A
2:45 pm - 3:15 pm	Health break
3:15 pm - 4:30 pm	**Breakout Sessions 2: Five Themes** 1 invited (Chair): 15 mins 4 selected: 10 mins each + Q&A
4:30 pm - 5:00 pm	**Poster Sessions**
5:00 pm - 6:00 pm	**Panel Discussion 1**: Challenges and Opportunities for Early Career Researchers
6:00 pm - 8:00 pm	Socials, Dinner, and Networking

Day 2 (July 25, 2025, Friday)

Time	Activity
8:30 am - 9:00 am	Booths and preliminaries
8:50 am - 9:00 am	Recap of Day 1
9:00 am - 9:20 am	Student lightning presentations *10 students, 2 mins each to pitch their study*
9:30 am - 10:15 am	**Keynote Speech** Sec. Renato Solidum Jr. *Department of Science and Technology*
10:15 am - 10:30 am	Advertisements and Coffee Break
10:30 am - 11:30 am	**Plenary Session 2** Prof. Dr. Atsuhiko Isobe *Kyushu University, Japan* Open Forum
11:30 pm -12:30 pm	**Panel Discussions 2**: Initiatives of the Government and Private Entities for Circular Economy
12:30 pm - 1:30 pm	Lunch break
1:30 pm - 3:00 pm	**Breakout Sessions 3 (5 Themes)** 1 invited (Chair, 15 mins) 4 selected (10 mins each + Q/A)
3:00 pm - 3:30 pm	**Poster Sessions**
3:30 pm - 4:30 pm	**PlaReNet Business Meeting and Assembly**
4:30 pm - 5:00 pm	**Plenary Session 3** Documentary Screening with Atom Araullo The Atom Araullo Specials: *"Republika ng Plastik"*
5:30 pm - 6:00 pm	Awarding and Closing Ceremony

C2. Abstract Submission and Acceptance Notification for Oral Presentation at the PlastiCon 2025

Abstract Submission

CATEGORY: Baselining, ecotoxicology, and environmental surveys

MODE: Oral

TITLE:

Macroplastics Transport Baseline in a Selected Cebu Mangrove Area: A Material Balance Approach

AUTHORS:

1. Tabañag, Ian Dominic
   idftabanag@gmail.com
   219th Auxiliary Squadron, Auxiliary District Central Visayas, Philippine Coast Guard Auxiliary, Cebu City, Philippines
   School of Engineering, University of San Carlos, Cebu City, Philippines
   Engineering and Industrial Research Division, National Research Council of the Philippines, Taguig City, Philippines
   Philippine Council for Industry, Energy, and Emerging Technology Research and Development, Taguig City, Philippines
   Philippine Institute of Chemical Engineers – Cebu Chapter (PIChE-Cebu), Cebu City, Philippines

ABSTRACT:

Marine plastic pollution remains a significant environmental issue in the Philippines, with recent studies identifying the country's 4,820 rivers as major contributors to ocean-bound plastic waste. In response, the national government launched the National Plan of Action for Marine Litter (NPOA-ML), emphasizing marine litter baselining and direct reduction strategies. This study supports those goals by establishing baseline data on the fate and transport of marine plastics in a riverine mangrove area in Cogon, Pardo, Cebu, using data from the 2022 International Coastal Cleanup (ICC). Macroplastic litter was characterized using the ICC Ocean Trash Data Form and uploaded to the TIDES (Trash Information and Data for Education Solutions) Database. Cleanup data from various local organizations were integrated with local waste generation data and input into a pseudo-first-order, steady-state, two-compartment process model. Parameter estimation and data reconciliation techniques were applied via spreadsheet programming. Results show that the beach compartment releases plastics approximately 7.8 times faster than the riverine mangrove, discharging an estimated 610 kg/day into the sea. Residence times were calculated at ~28 days for the mangrove and ~4 days for the beach, suggesting that more frequent beach cleanups are necessary. Additionally, extended modeling incorporating 2023 and 2024 data offers further insights into plastic transport dynamics in the study area.

KEYWORDS:

Marine Litter, Macroplastics Transport, Baselining

Gmail Ian Dominic Tabañag <idftabanag@gmail.com>

PlastiCon | Results of Abstract Submission

Plasticon 2025 <plasticon2025@msi.upd.edu.ph> 19 June 2025 at 17:47
To: "Dominic Ian F. Tabañag" <idftabanag@gmail.com>

Dear Scientist,

We are pleased to inform you that your abstract has been accepted for an **ORAL Presentation** at the **Plastics Conference (PlastiCon) 2025**, held under the theme **"Knowledge to action: Science-based solutions to plastics pollution"**.

Oral Presentation Details:

Each oral presenter will be allotted **15 minutes**, inclusive of Q&A. The full presentation schedule and detailed guidelines will be posted on the conference website (PlastiCount.ph) in the coming weeks. We also encourage you to follow the **Microbial Oceanography Laboratory Facebook page** for the latest updates and announcements.

Important Registration Information:

Please note that abstract acceptance is conditional upon registration. Either you or a co-author must complete conference registration by the deadline (**June 30, 2025**) to confirm your participation. Please visit the PlastiCount website to see the registration guidelines: https://www.plasticount.ph/index.php/c_home/guidelines.

We look forward to welcoming you!

We are excited to see your presentation at the conference, which will be held at the **New MSI Building (MBRIS), Marine Science Institute, UP Diliman, Quezon City** from **July 24–25, 2025**!

Please see your acceptance letter on the attachment.

Warm regards,

The PlastiCon 2025 Organizing Committee

Ian Dominic Tabañag .pdf
296K

June 18, 2025

Ian Dominic Tabañag

Dear Mx. Tabañag, Ian Dominic,

We are pleased to inform you that your abstract, titled *"Macroplastics Transport Baseline in a Selected Cebu Mangrove Area: A Material Balance Approach"*, has been accepted for an **ORAL Presentation** at the **Plastics Conference (PlastiCon) 2025**, held under the theme ***"Knowledge to action: Science-based solutions to plastics pollution"***.

Presentation Details:

Title	Macroplastics Transport Baseline in a Selected Cebu Mangrove Area: A Material Balance Approach
Authors	Tabañag, Ian Dominic
Presentation Type	Oral

For **oral presentations**, each presenter will be allotted **15 minutes**, inclusive of Q&A. The full presentation schedule and detailed guidelines will be posted on the conference website (PlastiCount.ph) in the coming weeks. We also encourage you to follow the **Microbial Oceanography Laboratory Facebook page** for the latest updates and announcements.

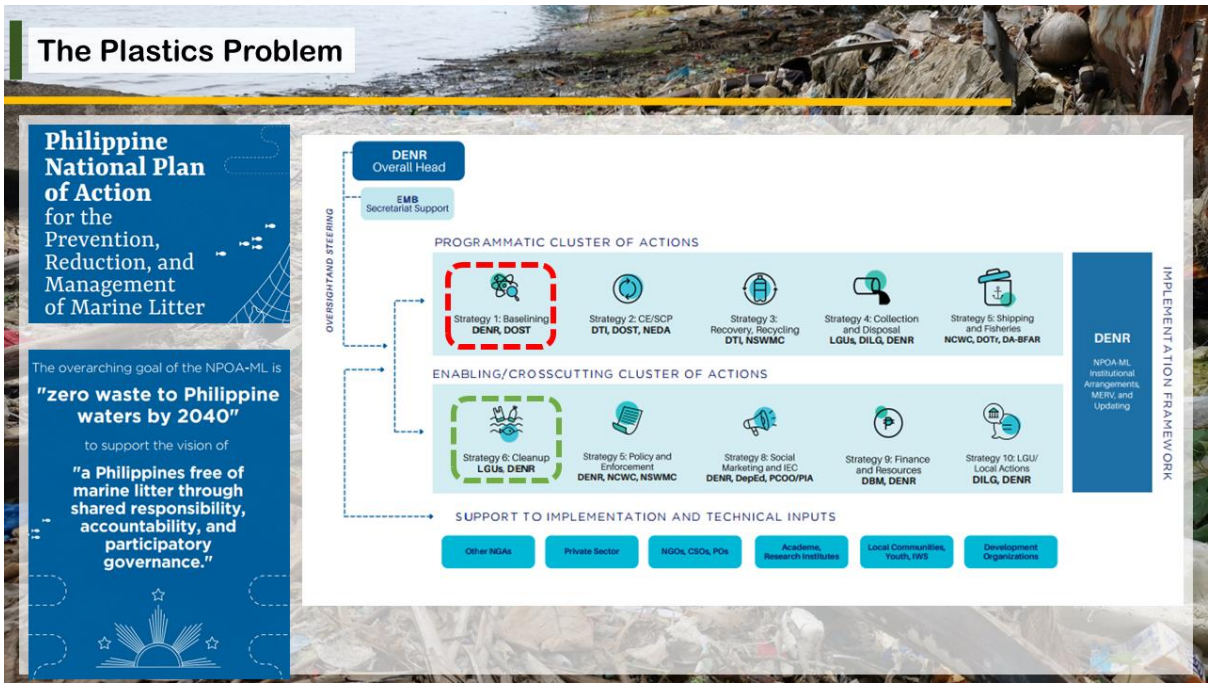
Please note that **abstract acceptance is conditional upon registration**. Either you or a co-author must complete conference registration by the deadline (July 30, 2025) to confirm your participation. Please visit the PlastiCount website to see the registration guidelines (https://www.plasticount.ph/index.php/c_home/guidelines).

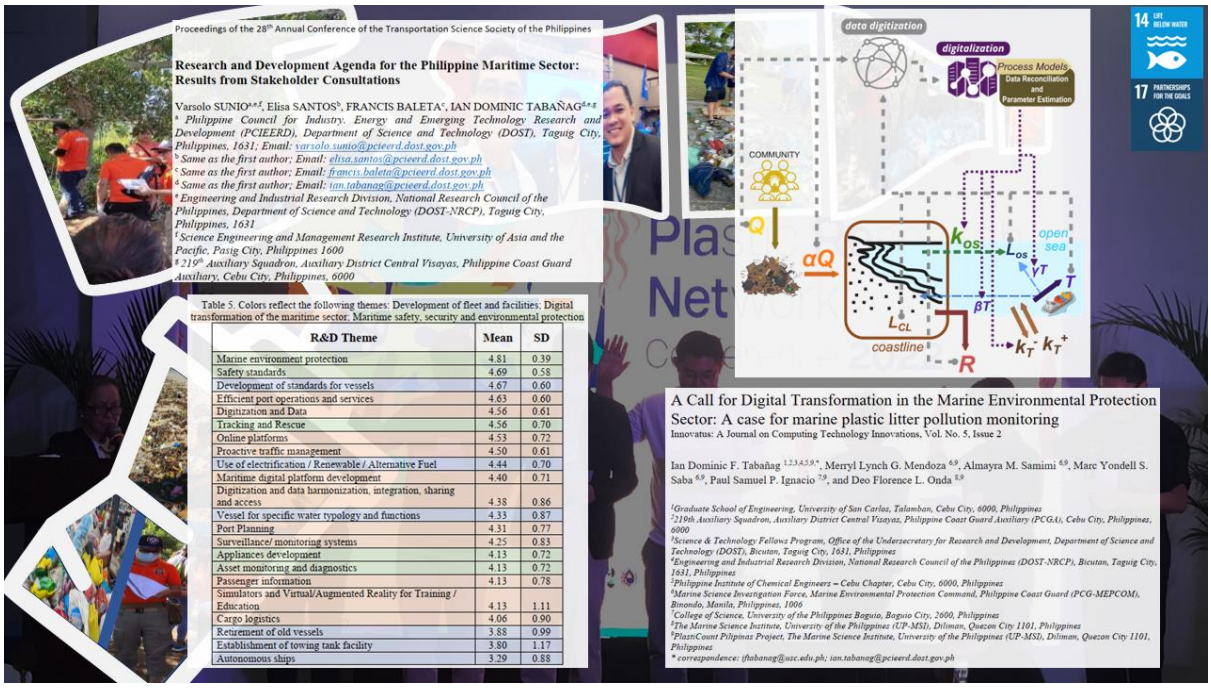
We look forward to welcoming you to the **New MSI Building (MBRIS), Marine Science Institute, UP Diliman, Quezon City** from **July 24–25, 2025**!

Warm regards,

Deo Florence L. Onda, Ph.D.
PlastiCon 2025 Conference Chair
Associate Professor, Marine Science Institute
Associate Dean for Research, Innovation, Development, and Enterprise
College of Science, University of the Philippines Diliman

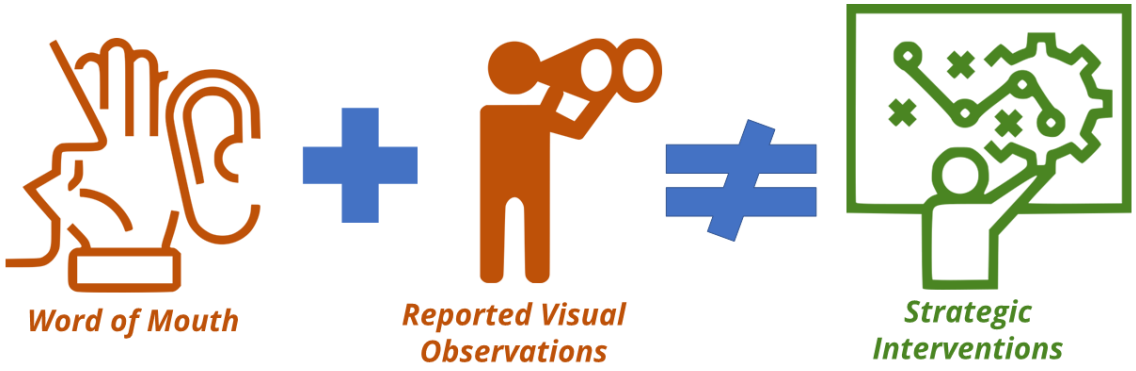
C3. Slide Deck of the Oral Presentation Entitled "Macroplastics Transport Baseline in a Selected Cebu Mangrove Area: A Material Balance Approach"




Proceedings of the 28th Annual Conference of the Transportation Science Society of the Philippines
Research and Development Agenda for the Philippine Maritime Sector: Results from Stakeholder Consultations
Varsolo SUNIO[a,e,f], Elisa SANTOS[b], FRANCIS BALETA[c], IAN DOMINIC TABAÑAG[d,e,g]
[a] Philippine Council for Industry, Energy and Emerging Technology Research and Development (PCIEERD), Department of Science and Technology (DOST), Taguig City, Philippines, 1631; Email: varsolo.sunio@pcieerd.dost.gov.ph
[b] Same as the first author; Email: elisa.santos@pcieerd.dost.gov.ph
[c] Same as the first author; Email: francis.baleta@pcieerd.dost.gov.ph
[d] Same as the first author; Email: ian.tabanag@pcieerd.dost.gov.ph
[e] Engineering and Industrial Research Division, National Research Council of the Philippines, Department of Science and Technology (DOST-NRCP), Taguig City, Philippines, 1631
[f] Science Engineering and Management Research Institute, University of Asia and the Pacific, Pasig City, Philippines 1600
[g] 219th Auxiliary Squadron, Auxiliary District Central Visayas, Philippine Coast Guard Auxiliary, Cebu City, Philippines, 6000
Table 5. Colors reflect the following themes: Development of fleet and facilities, Digital transformation of the maritime sector, Maritime safety, security and environmental protection
R&D Theme | Mean | SD
Marine environment protection | 4.81 | 0.39
Safety standards | 4.69 | 0.58
Development of standards for vessels | 4.67 | 0.60
Efficient port operations and services | 4.63 | 0.60
Digitization and Data | 4.56 | 0.61
Tracking and Rescue | 4.56 | 0.70
Online platforms | 4.53 | 0.72
Proactive traffic management | 4.50 | 0.61
Use of electrification / Renewable / Alternative Fuel | 4.44 | 0.70
Maritime digital platform development | 4.40 | 0.71
Digitization and data harmonization, integration, sharing and access | 4.38 | 0.86
Vessel for specific water typology and functions | 4.33 | 0.87
Port Planning | 4.31 | 0.77
Surveillance/ monitoring systems | 4.25 | 0.83
Appliances development | 4.13 | 0.72
Asset monitoring and diagnostics | 4.13 | 0.72
Passenger information | 4.13 | 0.78
Simulators and Virtual/Augmented Reality for Training / Education | 4.13 | 1.11
Cargo logistics | 4.06 | 0.90
Retirement of old vessels | 3.88 | 0.99
Establishment of towing tank facility | 3.80 | 1.17
Autonomous ships | 3.29 | 0.88
data digitization
digitalization
Process Models
Data Reconciliation and Parameter Estimation
COMMUNITY
Q
αQ
k_{OS}
L_{OS}
open sea
γT
T
βT
L_{CL}
coastline
R
k_T^- k_T^+
14 LIFE BELOW WATER
17 PARTNERSHIPS FOR THE GOALS
A Call for Digital Transformation in the Marine Environmental Protection Sector: A case for marine plastic litter pollution monitoring
Innovatus: A Journal on Computing Technology Innovations, Vol. No. 5, Issue 2
Ian Dominic F. Tabañag [1,2,3,4,5,9,*], Merryl Lynch G. Mendoza [6,9], Almayra M. Samimi [6,9], Marc Yondell S. Saba [6,9], Paul Samuel P. Ignacio [7,9], and Deo Florence L. Onda [8,9]
[1]Graduate School of Engineering, University of San Carlos, Talamban, Cebu City, 6000, Philippines
[2]219th Auxiliary Squadron, Auxiliary District Central Visayas, Philippine Coast Guard Auxiliary (PCGA), Cebu City, Philippines, 6000
[3]Science & Technology Fellows Program, Office of the Undersecretary for Research and Development, Department of Science and Technology (DOST), Bicutan, Taguig City, 1631, Philippines
[4]Engineering and Industrial Research Division, National Research Council of the Philippines (DOST-NRCP), Bicutan, Taguig City, 1631, Philippines
[5]Philippine Institute of Chemical Engineers – Cebu Chapter, Cebu City, 6000, Philippines
[6]Marine Science Investigation Force, Marine Environmental Protection Command, Philippine Coast Guard (PCG-MEPCOM), Binondo, Manila, Philippines, 1006
[7]College of Science, University of the Philippines Baguio, Baguio City, 2600, Philippines
[8]The Marine Science Institute, University of the Philippines (UP-MSI), Diliman, Quezon City 1101, Philippines
[9]PlastiCount Pilipinas Project, The Marine Science Institute, University of the Philippines (UP-MSI), Diliman, Quezon City 1101, Philippines
* correspondence: ifbabanag@usc.edu.ph; ian.tabanag@pcieerd.dost.gov.ph


Background Image: "Plastic Litter at Bojo, Cebu Mangrove Site", Ebolowa, personal file
How Frequently Cleanups are Done?
A Case for Process Modeling of Plastics in a Riverine Mangrove Area in Cebu City

The reduction of marine plastic litter is a direct and effective mitigation measure for the marine plastic pollution in mangrove areas. This has been demonstrated in regular beach or coastal cleanup activities where the removal of coastal plastic litter not only reduced the plastic pollution in the beach but also includes the litter that would be returned to the marine environment.



#Marites

Haarr, M. L., Westerveld, L., Fabres, J., Iversen, K. R. and Busch, K. E. T. (2019). "A novel GIS-based tool for predicting coastal litter accumulation and optimising coastal cleanup actions." Marine Pollution Bulletin **139**: 117-126.

On Direct Plastic Reduction Measures

On Generic Cleanup Activity Roles…

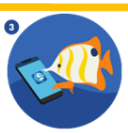
Cleanups can be done by groups of **two (2)** or **three (3)** volunteers with at least one person assigned for data collection (Clean Swelling)

PCGA Volunteers
- Marine Environmental Protection (**MAREP**)
- Maritime Safety (**MARSAF**)
- Maritime Community Relations (**MARCOMREL**)

ICC Clean-Up Drive Guidelines *(How to Safely Conduct a Cleanup)*

Pick a Location
Identify a safe location to clean where social distancing is easily achievable. Obtain permit from the local government or barangay for the cleanup activity. Think ahead about where you will properly dispose of trash at the location you choose. Monitor your health and the health of your family members before considering a cleanup of any size

Gather Materials
Gather materials needed. These include ***proper PPE (masks and gloves), hand sanitizer, tongs or grabbers, small sacks or net bags, closed toed shoes and a reusable water bottle.*** Bring your own data form and pens if you do not have the Clean Swell app.



Download Clean Swell
Get the app at Google Play or App Store for free. If you are able, please help us collect important data on the types and amount of trash you remove. Download the Clean Swell application on your phone or other smart device. Be sure to "Allow" location services while using the app.

Clean Up
Safely collect trash using gloves, tongs or grabbers. Never pick up any trash items that you are not comfortable with. ***Take pictures (before, during and after cleanup) to document your efforts.***

Carefully Remove Gloves
After you finish collecting items, carefully remove gloves and wash hands and arms with soap and water for at least 20 seconds.

Record Data
Follow steps on the Clean Swell app to review and submit your data. Data automatically goes to Ocean Conservancy's database when you see a "Thank You!" screen. (If you're using the data form, you can email data results to ICC Philippines.

Properly Dispose Waste
Properly dispose trash/debris collected. Do not place trash bags in overflowing bins. This may cause items to fly away and end up back in the water. For medical trash items, like gloves, masks, syringes and IV lines, place in a separate bag (preferably red and labelled as hazardous waste). Tie the bag securely.

Sanitize
Sanitize or wash hands with soap Immediately and thoroughly. Sanitize any gear used during the cleanup including tongs/ grabbers, gloves and buckets.

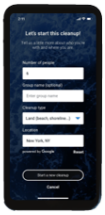
DOWNLOAD & SIGN IN

- Download Clean Swell for free on any mobile device
- Create an account with your email or existing social media account
- You are ready to go!

APP STORE GOOGLE PLAY

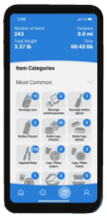
CONFIRM THE BASICS

- On the home page, click "Start a new cleanup"
- Make sure the details such as date and number of people are correct
- Add a group name. Check with your cleanup leader for details
- Tap "Start Cleanup!" to begin recording trash items



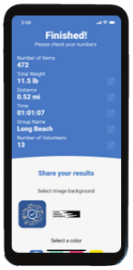
COLLECT & RECORD

- Tap the icons to record what you are finding
- Press and hold on an icon to enter larger amounts or edit your totals
- Snap photos of your cleanup using the camera icon
- Click "Finish this Cleanup" when you are done

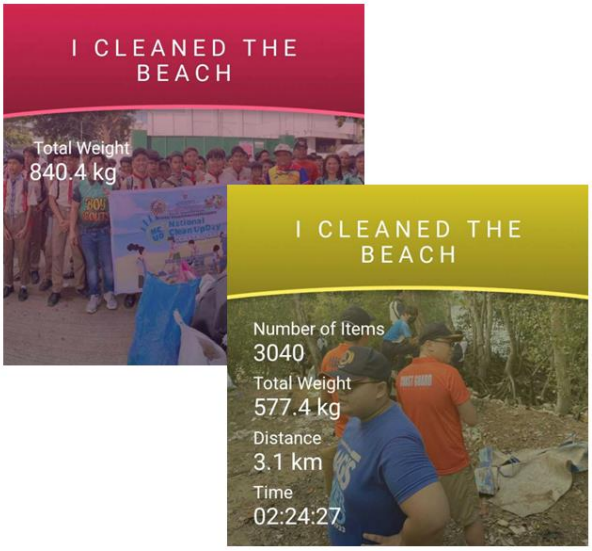


CELEBRATE & SHARE

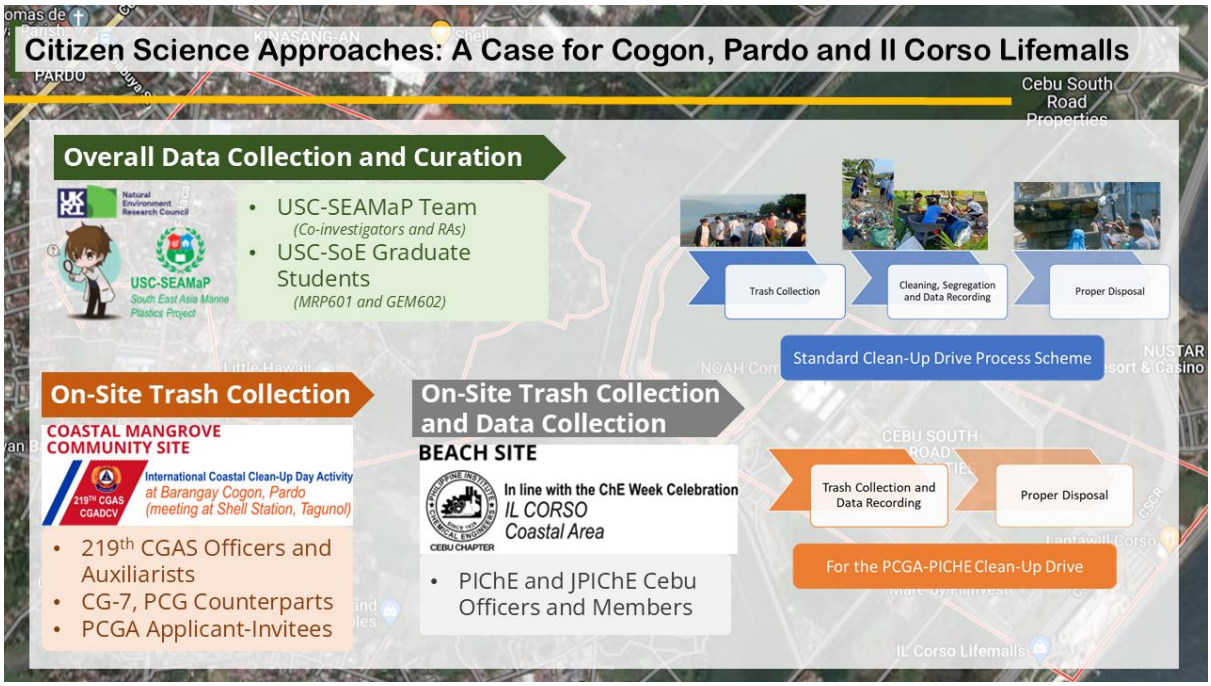
- Congratulations on a job well done!
- Thank you for your hard work, now go ahead and brag about it on social media
- Did you earn a badge? Excellent, the more you collect, the more you earn!



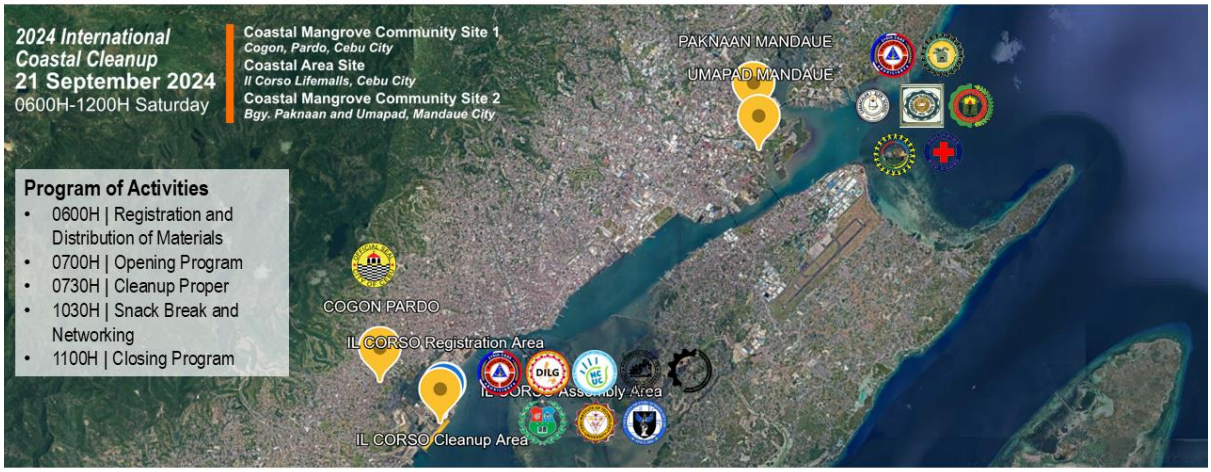
ICC Data Collection Methodology: Clean Swell ® App



Don’t Forget to Post on SocMed the Proof of Clean Swelling!



CGADCV Simultaneous Cleanup Drives for the ICC 2024



On the utilization of ICC Data for Modeling Approaches in Plastics Transport

Cebu City Waste Data

- City Trash Generation Rate – 450 tons/day
- Plastic Trash Generation Rate – 67.5 tons/day
- Plastic Gen Rate per Capita – 7.31×10^{-3} kg/day per person

Cogon Pardo Waste Data

Based on the per capita plastic generation rate of Cebu City and adjusted to the population of Cogon Pardo

- 1,743 kg/day

Mangrove Site Data

219th CGAS CGADCV (09/17/22)

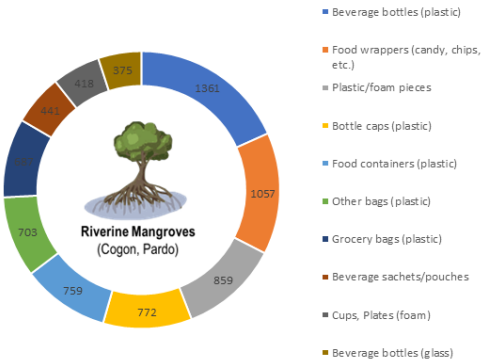
- Volunteers – 70
- Plastic Trash – 626.97 kg (11453 pcs)
- Cleanup Area – 6573 m^2
- Total Mangrove Area – 252,010 m^2

Beach Site Data

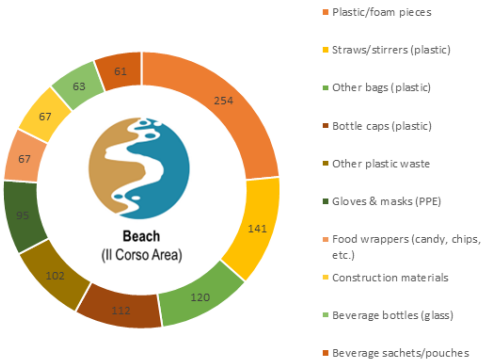
Lexmark R&D (09/16/22)
Theanatics (09/16/22)
Poseidon Peddlers (09/16/22)
PICHE-Cebu (09/17/22)
201st CGAS CGADCV (09/23/22)

- Volunteers – 75
- Plastic Trash – 132kg (1680 pcs)
- Cleanup Area – 2795 m^2
- Total Beach Area – 45,620 m^2

Based on the TIDES Data for the 2022 International Coastal Cleanup Sites for Bgy. Cogon Pardo and II Corso Lifemalls



A total of 11,453 items were collected in the riverine mangrove area

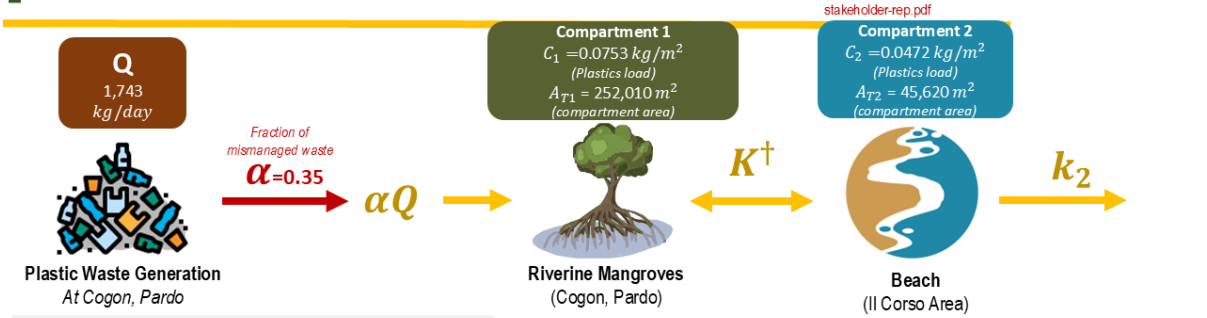


A total of 1,680 items were collected in the coastal/beach area

On the types of Litter Found (based on the number of items)

Macroplastics Transport from Riverinel Mangroves (Cogon, Pardo) to Beach (Il Corso Shoreline) 2022 ICC Data | Pseudo Steady State Approach

**EPR Scheme Assessment for Plastic Packaging Waste in the Philippines, 2020. Published by WWF-Philippines. https://wwfph.awsassets.panda.org/downloads/epr-scheme-assessment-for-plastic-packaging-waste-in-the-philippines--stakeholder-rep.pdf



Material Balances at Compartment 1:

$$\frac{dM_1}{dt} = 0 = \alpha \cdot Q + K^\dagger [M_2 - M_1]$$

$$0 = \alpha \cdot Q + K^\dagger [C_2 \cdot A_{T2} - C_1 \cdot A_{T1}]$$

Material Balance at Compartment 2:

$$\frac{dM_2}{dt} = 0 = K^\dagger [M_1 - M_2] - k_2 M_2$$

$$0 = K^\dagger [C_1 \cdot A_{T1} - C_2 \cdot A_{T2}] - k_2 C_2 A_{T2}$$

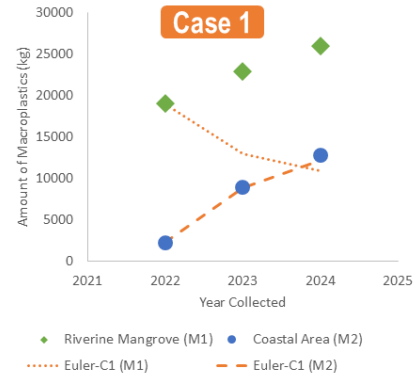
$$\phi = \frac{K^\dagger}{k_2} = \frac{C_2 A_{T2}}{C_1 A_{T1} - C_2 A_{T2}}$$

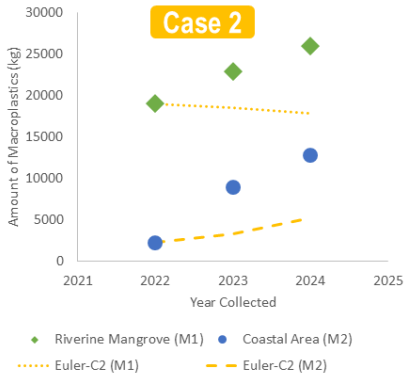
$K^\dagger$ [day^{-1}]	k_2 [day^{-1}]	ϕ
0.0362	**0.2833**	**0.13**
(~28 days)	***(~4 days)***	

Plastics to Open Sea [kg/day]
610

Macroplastics Transport from Riverine Mangroves (Cogon, Pardo) to Beach (Il Corso Shoreline) 2022-2024 ICC Data | Euler Method

$$y_{i+1} = y_i + f(x_i, y_i)h$$





Case 1	Model Fit for Coastal Area Data Set
$K^\dagger$	0.3969 day^{-1} **(2.5 days)**
k_2	0 **(No Open Sea Transport)**

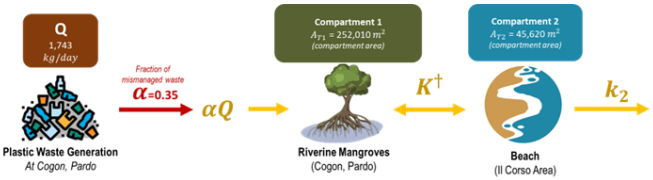
Case 2	Global Regression
$K^\dagger$	0.0634 day^{-1} **(15.8 days)**
k_2	0 **(No Open Sea Transport)**

Material Balances at Compartment 1:

$$\frac{dM_1}{dt} = \alpha \cdot Q + K^\dagger [M_2(t) - M_1(t)]$$

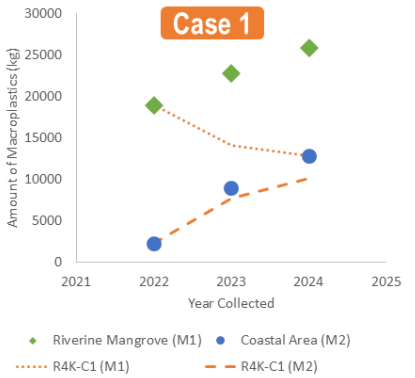
Material Balance at Compartment 2:

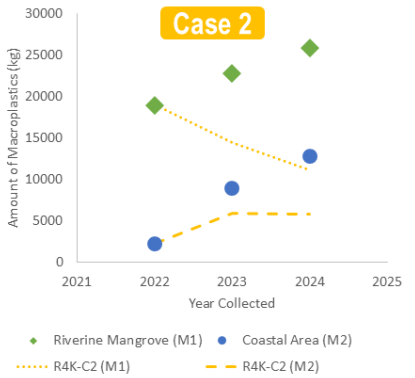
$$\frac{dM_2}{dt} = K^\dagger [M_1(t) - M_2(t)] - k_2 M_2(t)$$



Macroplastics Transport from Riverine Mangroves (Cogon, Pardo) to Beach (II Corso Shoreline) 2022-2024 ICC Data | 4° Runge-Kutta Method

$$y_{i+1} = y_i + \frac{1}{6}(k_1 + 2k_2 + 2k_3 + k_4)h$$





Case 1	Model Fit for Coastal Area Data Set
$K^{\dagger}$	$0.5207\ day^{-1}$ **(1.9 days)**
k_2	0 **(No Open Sea Transport)**

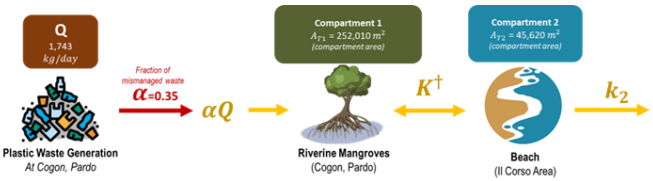
Case 2	Global Regression with the constraints: $0 < K^{\dagger} < 1$, $0 < k_2 < 1$
$K^{\dagger}$	$0.4435\ day^{-1}$ **(2.25 days)**
k_2	$0.3347\ day^{-1}$ **(2.98 days)**

Material Balances at Compartment 1:

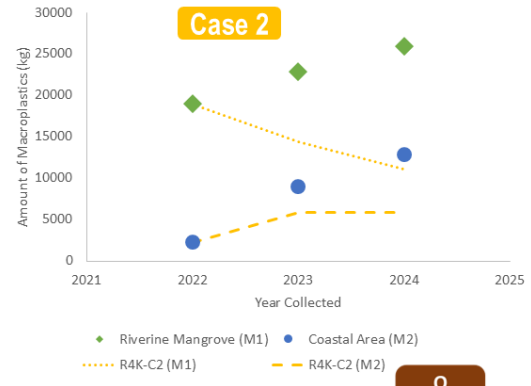
$$\frac{dM_1}{dt} = \boldsymbol{\alpha} \cdot Q + \boldsymbol{K^{\dagger}}\,[\boldsymbol{M_2}(t) - \boldsymbol{M_1}(t)]$$

Material Balance at Compartment 2:

$$\frac{dM_2}{dt} = \boldsymbol{K^{\dagger}}[M_1(t) - M_2(t)] - \boldsymbol{k_2} M_2(t)$$



Macroplastics Transport from Riverine Mangroves (Cogon, Pardo) to Beach (II Corso Shoreline) 2022-2024 ICC Data | Macroplastics Transport Profile



Case 2	Global Regression with the constraints: $0 < K^{\dagger} < 1$, $0 < k_2 < 1$
$K^{\dagger}$	$0.4435\ day^{-1}$ **(2.25 days)**
k_2	$0.3347\ day^{-1}$ **(2.98 days)**

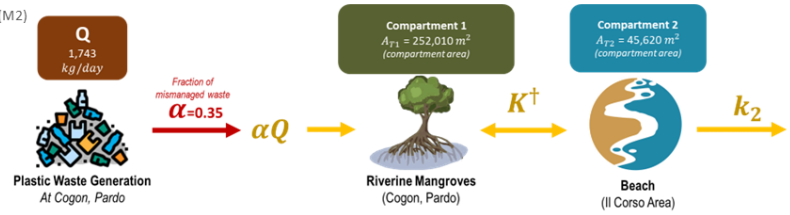
Preliminary modeling analysis reveals that **macroplastics** transported **in the riverine mangrove areas** are **transported into the open sea** ***in a span of <5 days***

Material Balances at Compartment 1:

$$\frac{dM_1}{dt} = \boldsymbol{\alpha} \cdot Q + \boldsymbol{K^{\dagger}}\,[\boldsymbol{M_2}(t) - \boldsymbol{M_1}(t)]$$

Material Balance at Compartment 2:

$$\frac{dM_2}{dt} = \boldsymbol{K^{\dagger}}[M_1(t) - M_2(t)] - \boldsymbol{k_2} M_2(t)$$



Ways Forward…

Comprehensive Data Collection
Land and Sea-based sources of plastics data

Enhanced Model-Resolution
From zero-D mass balance approaches to spatiotemporally explicit models

Tiered Risk Assessment Tool for Fate and Transport of Plastics in the Environment
Coupling of robust baseline data collection and high-resolution models with multi-criteria decision analysis will lead to the development of holistic risk assessment tools for reduction, control, and mitigation of the plastics problem

Promote Cross-Cutting Institutional Collaborations
Fostering collaborations between scientists and government agencies to integrate science-based plastic monitoring into national policies and enable data-driven decision-making for effective plastic pollution management.

Klaus, P. (2015). **The Devil Is in the Details – Only What Get Measured Gets Managed.** In *Measuring Customer Experience: How to Develop and Execute the Most Profitable Customer Experience Strategies* (pp. 81-101). Palgrave Macmillan UK. https://doi.org/10.1057/9781137375469_7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