

Asia Pacific Civil Forum on Marine Litter

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Preface

Dear readers,

As we inch closer to UNEA 5.2, my colleagues and I have found ourselves participating in many regional and global efforts that not only take stock of the progress made so far, but also of important tasks that must be high on the agenda for next February. The overall consensus on the importance of UNEA 5.2 is louder than ever before. While many of us remain clear-eyed about the formidable challenges that lie ahead, most of us believe that UNEA 5.2 can be a turning point that puts us on the right path. During this pivotal time, I have often thought about what this might mean for us in the Asia-Pacific. The path ahead may not be crystal clear, but it has been apparent that coordinated regional action on marine litter and plastic pollution is indispensable when creating practical and sustainable solutions. Thus, by providing a medium to share our latest activities in the Asia-Pacific region, I, on behalf of the Asia Pacific Civil Forum on Marine Litter (APML), hope that these articles will be informative to those within the Asia-Pacific region and also to those beyond.

In this issue, we've included an article that summarized an online workshop hosted by OSEAN, the Korean government, and the Indonesian government on strengthening and improving Indonesia's efforts on tackling marine litter and also an article on an environmental exhibit hosted by OSEAN, KT&G and the Korea Marine Environment Management Corporation. To further showcase non-governmental cooperation between Republic of Korea and Indonesia, and to underscore the importance of citizen science, an article from the Indonesian Waste Platform is also included. An article provided by Partnerships in Environmental Management for the Seas of East Asia (PEMSEA) introduces innovative evidence-based approaches to preventing plastic pollution and an article by GreenHub introduces plastic reduction measures that were carried out with Da Nang stakeholders. In addition, our Australian member, Tangaroa Blue Foundation wrote an article on the versatility of the Australian Marine Debris Initiative (AMDI) Database, and an article about efforts on combating derelict ghost nets in Penghu, Taiwan was written by IndigoWaters Institute and those at National Kaohsiung University of Science and Technology's Institute of Marine Affairs and Business Management. Lastly, but certainly not least, an article examining Taiwan's seafloor is also included and it is written by a master's student at National Taiwan University.

As an editor-in-chief, I am honored to help share these excellent articles with you and to those who might want to learn more about the activities of our APML members. I hope that you'll enjoy these articles and know that we in the Asia-Pacific region are working tirelessly to save our ocean and all living-beings that depend on it.

With much love and gratitude,

Sunny Hong



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Online Workshop to Help Improve Indonesia's Marine Debris Management

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The Korean Ministry of Oceans and Fisheries, Korea Marine Environment Management Corporation (KOEM), the Indonesian Ministry of Maritime Investment Coordination and Our Sea of East Asia Network (OSEAN) held an online workshop for four days from July 13 to 16 titled “2021 Strengthening and Improvement for Marine Litter Response in Indonesia.”

With 120 Indonesian maritime coordinators and local government officials in attendance, the purpose of this workshop was to strengthen policy capacities and to develop specialized technology as part of the 2019–2021 marine debris management improvement project jointly carried out by the Indonesian government and the Korean government. The main objective of this year’s project was to provide training on marine debris monitoring methodologies to improve Indonesia’s ability to manage marine debris.

The workshop included lectures and discussions on the following topics:

- Day 1** Sharing the current realities of Korea and Indonesia to solve its respective marine debris problem;
- Day 2** Development of marine debris monitoring methods and on marine microplastics;
- Day 3** Utilization of citizen science for marine debris monitoring and developing marine debris management policies; and
- Day 4** Raising public awareness on solving marine debris problems.

During the opening ceremony, Hong Sunwook, Director of OSEAN, a non-profit independent research institute in Korea, said, “we are all well aware of the importance of multinational cooperation when it comes to solving the problem of marine debris. The problem of marine debris is a common problem facing all countries, and each country must share its knowledge and do its best by harnessing its passion and potential.” In addition, Nani Hendiarti, Deputy Minister for Environment and Forestry in Indonesia, said that the problem of marine debris must be solved not only domestically but also through various cooperative international activities. She also noted that various studies have shown that marine debris problems are heightened along borders and underscored the need for working together at the global

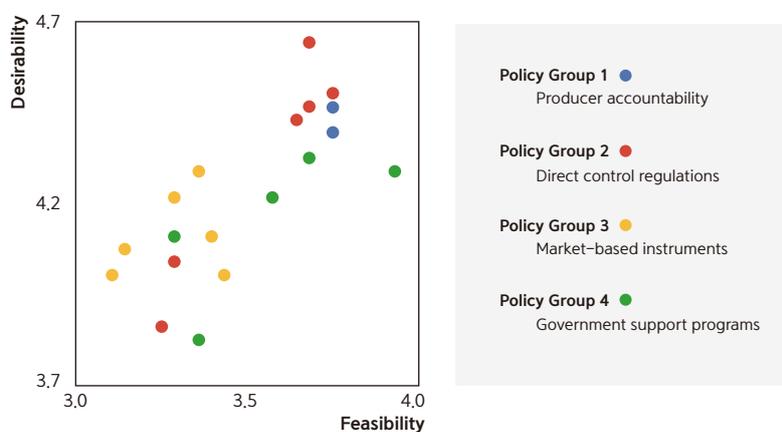
level to create synergies through various forms of cooperation and proper monitoring support systems. During the session on international trends, there was a presentation on examining UN Environment Assembly (UNEA) 5.2 and the anticipated discussions related to the possibility of a new international treaty on marine plastics. Additionally, there was also a presentation introducing efforts in Asia helping to solve problems regarding marine debris.

On the second day of the workshop, marine debris monitoring and microplastic sessions were held. OSEAN introduced the development of Indonesia’s marine debris monitoring methodology that has been conducted since 2019 and the results of a pilot monitoring program that was conducted along the coast of Labuan Bajo. Participants from Indonesia also shared their monitoring methodologies conducted by the Indonesian government and their research institutes, and also shared the results of their surveys. Lastly, during the microplastics session, Dr. Shim Won-Joon and Dr. Hong Sang-Hee of Korea Institute of Ocean Science and Technology (KIOST) announced important research results on international microplastic research trends, sources, and effects.

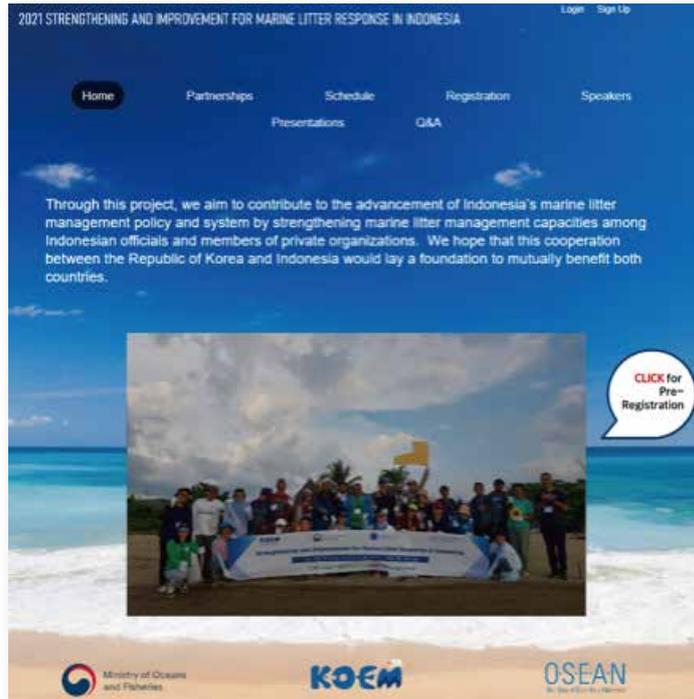
On the third day, sessions on citizen science and marine debris policy were held. Internationally, citizen science is widely used in monitoring marine debris. To showcase the importance of citizen science, details on Ocean Knights and its implementation method were introduced. Ocean Knights is a citizen science program conducted by OSEAN and it implements citizen science efforts to tackle marine debris by using drones, scuba diving, and smartphones. Following the session on citizen science, a session on marine debris policy introduced an evaluation methodology for priority marine debris policies and provided participants with an opportunity to practice a desirability–feasibility evaluation. Furthermore, participants of the workshop were given a chance to develop marine debris policies using conceptual models and causal chains. While practicing policy developments and evaluations, participants also shared the results of their priority policy evaluations and marine debris policy alternatives using Google Forms.

During the fourth day of the workshop, both Korea and Indonesia shared their examples on raising awareness on marine debris. OSEAN shared a video introducing artwork made out of marine debris created by OSEAN’s art director Kim Jung-Ah and Indonesia introduced examples of marine debris education activities for children.

In order to increase the effectiveness of the online workshop, a website was created and was used for providing lecture materials and answering questions. The website’s menu included a workshop introduction, schedule of the workshop, participant registration, lecture materials, lecturer introductions, and a Q&A function. Using the website, workshop participants were able to access the lectures by date and download lecture materials. In addition, in the case of pre-recorded lectures, videos were directly available on the website. The most actively used feature was the Q&A function. Hosting an online workshop posed particular difficulties especially with asking questions and answering them in real time because there were more than 100 participants. However, participants were able to ask questions on the website at any time, and lecturers and other participants were able to answer them. Therefore, having this Q&A function allowed the workshop to proceed smoothly and ensured that all questions asked by participants were answered.



▲ An example of a desirability–feasibility evaluation result on marine plastics policies. These results were produced by workshop participants.



▲ Workshop website

Upon finishing the four-day workshop that consisted of lectures and discussions on improving marine debris management, Indonesian public officials and all the participants of the workshop gave high marks in workshop evaluations and were able to shore up their determination to further cooperate in tackling marine debris. On the last day of the workshop, Woo Dong-Sik, the International Cooperation Policy Officer of the Korean Ministry of Oceans and Fisheries, said, "the results and implications of Indonesia's marine debris management improvement project over the last three years will be a big stepping stone for both Korea and Indonesia's cooperation in the future. By developing this cooperative effort, we hope that the marine debris management improvement system will be successfully implemented and make meaningful contributions to help achieve Indonesia's marine debris management goals and we look forward to the continuous support and cooperation of both government officials from Korea and Indonesia." Following the marine debris management improvement project, the Korean Ministry of Oceans and Fisheries plans to select Indonesia's marine debris management improvement project as an important official development assistance (ODA) project and hopes to promote meaningful support, including support for establishing an integrated waste management system encompassing islands, land and sea. Lastly, the Korean Ministry of Oceans and Fisheries also hopes to promote other forms of cooperation to help Korea and Indonesia to carry out their common goals on reducing marine plastic debris.



▲ Woo Dong-sik, the International Cooperation Policy Officer of the Ministry of Oceans and Fisheries, concluded the workshop.

The Important Role of Citizen Science to Combat Marine Litter and Ways It Can Transform Research

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Citizen science plays a key role in data collection and helps us to understand the presence and pathways of litter in the environment including land, rivers, lakes and the ocean. Citizen science encourages active public involvement in scientific research and it's advancing due to growing stakeholder networks of civil society organisations and marine scientists collaborating on professionalising citizen science.

Citizen science contributes to expanding data collection to a wider geographical area. Based on data analysis, campaigns can be developed to address specific types of litter found in monitored areas, which contribute to advancing applied science.

Citizens engaging in litter clean-ups do not necessarily have the knowledge about scientific methods, monitoring protocols, data analysis and reporting, and are met by skepticism from others. Therefore, collaboration between citizens and scientists is key.

One example of such cross-sector collaboration is the Labuan Bajo monitoring program. Since 2021, the Korean Ministry of Oceans and Fisheries (MOF) and Korea Marine Environment Management Corporation (KOEM) have supported Our Sea of East Asia Network (OSEAN) and the Indonesian Waste Platform (IWP) on developing a comprehensive citizen science program, which includes training on monitoring protocols and data logging.



An initial monitoring workshop was conducted by OSEAN in October 2019 in Labuan Bajo, on Flores Island in East Indonesia. In October 2020, the IWP team conducted a second monitoring survey in the same five locations with guidance from OSEAN. A report will soon be published in December 2021.

▲ Logos of Korean MOF, KOEM and NGOs participating in this project



▲ Field work in Labuan Bajo monitoring

Site Information			
Date	2021-09-11	Organization	IWP
Site	LUWANSA BEACH	GPS	Altitude
Name of team leader	ICHA		Longitude
Number of participants	5		
Start time	9.09 PM	End time	10.35 PM
Temperature	31 C	Wind direction	120 ESE
Wind speed	1,2 M/S	Weather	SUNNY
Latest time of high tide	02.46PM	Others	

▲Transect location

Upon monitoring, campaign materials have been developed to address a particular item, abundantly found, washed ashore on the beaches around Labuan Bajo. This particular item addressed in our campaign is an ice-pack used in subsistence fishing communities across Indonesia. Fishermen use ice packed in single-use transparent plastic to cool their fish that they have caught while out at sea. By the time fishermen return to the harbour, the ice is long melted and the remaining plastic is discarded in the water. The bags are found in different levels of the water column and eventually end up on beaches. In the water column the bags resemble jelly-fish and attract a diverse range of marine predators such as fish, birds, turtles, and various invertebrates including octopus, sea cucumbers, crabs, and amphipods that mistake these bags for jelly-fish and ultimately ingest plastic.



▲ Frozen ice in single-use plastic bags for cooling fish at sea sold in a Labuan Bajo shop, commonly used in subsistence fisheries



▲ Single-use plastic ice bags washed ashore



▲ Campaign leaflets

IWP hopes that this campaign will help mitigate the negligent disposal of ice-packs in the waters of Indonesia. The campaign leaflet and video are currently in circulation in fishing communities and the materials are available for free as an open access that can be downloaded from IWP's website (<http://www.indonesianwaste.org/campaign-materials/>). IWP hopes that this campaign will raise awareness and encourage the participation of other organisations to disseminate the materials in their respective regions.

UN ESCAP, Plymouth Marine Laboratory, and PEMSEA Share Innovative Approaches to Evidence-Based Plastic Pollution Prevention

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Over 60 percent of global plastic pollution in the marine environment have been attributed to come from South East Asia, where cities are expanding, economies are growing, and urban waste management systems are struggling to keep up. The United Nations Economic and Social Commission for Asia and the Pacific (UN ESCAP), is spearheading an initiative towards reducing the environmental impacts in ASEAN cities through “**Closing the Loop (CTL)**,” a project addressing plastic waste pollution and leakage into the marine environment.

The CTL Project is supported by the Government of Japan and works with several Japanese organizations such as the Institute for Global Studies (IGES), to realize the Osaka Blue Ocean Vision—which aims to bring marine plastic litter to zero by 2050.

On August 5, 2021, UNESCAP, Plymouth Marine Laboratory (PML), Partnerships in Environmental Management for the Seas of East Asia (PEMSEA), IGES, University of Wageningen (WUR) in the Netherlands, and Viet Nam National University (VNU) launched “**Measure! Monitor! Manage! Innovative approaches to evidence-based plastic pollution prevention,**” an online learning collab that examined the process of tracking plastic pollution in cities and the ocean with real-world applications, live demonstrations and a roundtable session.

The **Closing the Loop** approach seeks to understand how cities near the ocean can reduce their plastic pollution. It centers around the themes of: **measure** and **monitor** through innovative and smart technologies, and with this information **manage** through policy and investment strategies. In project areas, 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.

To date, this process has been implemented in four countries: Kuala Lumpur (Malaysia), Da Nang (Viet Nam), Surabaya (Indonesia), and Nakhon Si Thammarat (Thailand). A free eLearning course: **Cities and Marine Plastic Pollution: Building a Circular Economy**, has also been developed to help build capacity in local governments.

Measure! Monitor! Manage! to Address Plastic Pollution

To **measure** means creating a baseline assessment. This is an intensive and involved process, and is not intended to be repeated annually. It involves a geographical assessment of the path of plastic and 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 the resulting data can produce a clear picture of local plastic hotspots. This all feeds into a plastic pollution calculator, which finds that in Da Nang, Viet Nam, for example, 1.3% of plastic waste becomes marine debris. Of this amount, 56.9% are plastic bags. The composition of plastic that becomes marine waste is different than the overall plastic composition, due to differences in recyclability and other end-of-life treatments.

To **manage** plastic pollution, developing a city action plan requires identifying appropriate policy intervention priorities, specific action plans, and investment strategies. Not only do physical processes such as waste collection need funding and planning, but should also include capacity building and training for local officials. As part of Closing the Loop, an eLearning course (<https://www.unescap.org/projects/ct/elearning>) has been developed to help build this capacity.

This open-source, eLearning course by UN ESCAP is available for free, requiring only a laptop with internet connection. While targeted for use by local government officials, it is also available for the general public. The seven-module, 15-hour course is designed to facilitate city-level local government capacity building for the measurement and management of plastic pollution from land-based sources.

Through the **Closing the Loop Project**, cities should be able to establish data-driven policy making at the 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 the advanced stage of preparing one. 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.

“**Measure! Monitor! Manage!**” is one of the pre-2021 **East Asian Seas Congress** “collabs” organized by PEMSEA and/or partners, and other organizations. The 2021 East Asian Seas Congress will be held virtually on December 1–2, 2021, and hosted by the Royal Government of Cambodia. For more information, visit the EAS Congress 2021 website at <https://eascongress2021.pemsea.org>.

A recording of the session can be viewed here: <https://www.youtube.com/watch?v=2owz8HT2xhw>



Plastic Reduction Actions in Vietnam: Insightful Learnings in Da Nang City

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Da Nang is the largest coastal city and the leading industrial center in central Vietnam. It lies at one end of the East–West Economic Corridor connecting Vietnam with Laos, Thailand, and Myanmar. According to the Vietnam Government Statistical Office, its urban population is 995,000 of its 1.1 million persons in 2019, making it the city with the highest proportion of the urban population in Vietnam. From 2014 to 2019, Da Nang's total municipal solid waste (MSW) generation climbed from around 770 tons per day to 1100–1150 tons per day.¹ In other words, it has increased by 30% in five years while its population increased by only 10%.² Plastic waste now accounts for 18% of the total MSW. The majority of plastic waste is sourced from residential areas, of which single–use plastic bags are the most common type (accounting for 48%), followed by plastic films (18%) and plastic bottles (7.5%).³



▲ Da Nang, Vietnam

In December 2019, the Government of Vietnam set a clear vision: *“By 2030 to prevent and reduce ocean plastic waste from waste sources on land and activities at sea, to eliminate the use of single-use plastic products and plastic bags from resorts, tourist attractions, accommodations and other tourist service businesses along the coast to ensure no plastic waste in marine protected areas.”*⁴ In 2021, the Da Nang People’s Committee also issued an Action Plan to manage marine plastic litter by 2025, with a vision towards 2030.⁵ However, the city still faces significant challenges to achieve that vision, such as insufficient stakeholder coordination; unsustainable interventions; a shortage of human resources in its Department of Natural Resources and Environmental Management, inadequate supervision; national strategies inconsistent with local guidelines; and limited capacity for waste treatment.

To address these challenges, the Centre for Supporting Green Development (GreenHub), a Vietnamese environmental NGO is facilitating a locally–led, locally–owned systems approach to engage Da Nang stakeholders at a local level in a highly structured collaborative effort. The following five actions through its “Local Solutions for Plastic Pollution” (LSPP) project are in progress to help advance and scale up efforts of stakeholder engagement for plastic waste reduction.

¹ Da Nang URENCO (2019). In–person interview.

² Vietnam Government Statistical Office (2020). Da Nang city statistical yearbook 2020.

³ UNESCAP (2021). Closing The Loop On Plastic Pollution In Da Nang City, Viet Nam. Summary of Baseline Report.

⁴ Decision No. 1746/QĐ–TTg – the National Action Plan for Management of Marine Plastic Litter by 2030 dated December 4, 2019 by Prime Minister of Vietnam.

⁵ Plan 122/KH–UBND. Action Plan to Manage Marine Plastic Litter in Da Nang City by 2025, With A Vision Towards 2030 dated June 24, 2021 by People’s Committee Danang City.

Starting With People: Building Capacity For Change

Greater collaboration, exchanges, and partnerships with the local government, business sector, informal economy micro-enterprises, and Da Nang’s civil society are needed. Health impacts related to plastic pollution may also require wider networking. For that purpose, LSPP engaged LINC, a US-based organization with expertise and thought leadership in systems thinking and locally-led development, to design and deliver a five-week remote training course on “Systems Thinking and Locally-Led Development.” Through this training, local development practitioners build capacity that enables them to directly apply systems thinking methods and tools to their work. Furthermore, the training also helps to enhance capacity for program design, make local leadership more effective, improve cooperation, and increase the sustainability of results.

Designing A Science Approach For Evidence-Based Interventions

To lay the foundation for greater understanding and coordination and to accelerate the progress towards consistent strategies, GreenHub led a baseline analysis of citizens working on plastic issues in Da Nang. The analysis included desk-top research and key informant inputs on objectives, options to explore city-based information, as well as documenting plastic waste and environmental issues. GreenHub also applied specific field approaches such as Focus Group Discussions, KAP (Knowledge-Attitude-Practice) and KSP (Knowledge-Stake-Power) Interviews, and Thematic Group Discussions. These methods led to community and network mapping, and identifying key organizational and individual informants for urban project planning

To introduce stakeholders to network analysis and systems mapping, GreenHub held a workshop that generated an initial list of city-wide stakeholder organizations. The workshop also included interviews with representatives of 42 organizations that included government, development partners, private sector, academic, and NGO actors. Upon conducting the interviews, interviewees subsequently: (1) determined potential roles that their respective organizations can play in relation to the LSPP project; (2) rated and evaluated their level of capacity including financial and human resources; and (3) identified key success factors and barriers to achieving outcomes consistent with national and municipal visions.

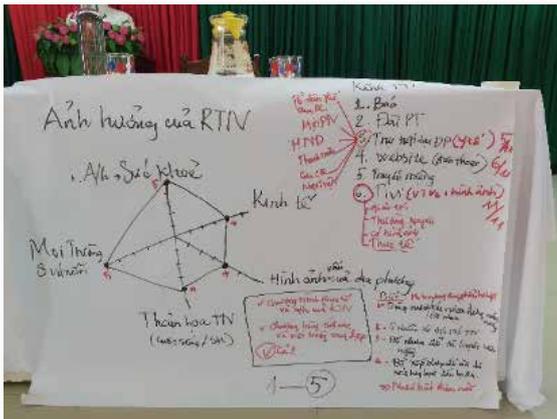


▲ A workshop to introduce stakeholders to network analysis and systems mapping

Specific stakeholder issues, challenges, and roles at the level of organizations and individuals were analyzed. The stakeholder mapping modality was adapted from the Source-to-Sea Framework for Marine Litter Prevention of the Stockholm International Water Institute.⁶ Results showed that the main roles of stakeholders could be defined as either primary, enabling, or supporting, according to their degree of capacity and engagement needs:

⁶ Mathews, R. E., Tengberg, A., Sjödin, J., & Liss-Lymer, B. (2019). Implementing the source-to-sea approach: A guide for practitioners. Stockholm International Water Institute (SIWI), Stockholm.

- Primary stakeholders were identified as individuals, groups, or companies that directly benefit from intervention strategies or those that exacerbate plastic pollution. In Da Nang, the primary stakeholders of the project were residents of Hai Chau districts and Cam Le districts and plastic circular economy start-ups.
- Enabling stakeholders were institutions that provide the necessary conditions for the success of the project and those that are deeply engaged in behavioral changes, local knowledge access and the project's sustainability over time. For instance, local governments in Da Nang such as Da Nang Department of Natural Resources and Environment, Da Nang Environmental Protection Agency are strong enablers in the management of plastic waste. Local mass organizations such as Women's Union, Youth Union, Fatherland Front Committee currently play key roles as well. The private sector is also emerging as an important enabler through its business chains and companies, e.g. Da Nang Urban Environment Limited Company (Da Nang URENCO), and EverGreen Labs. There is now increasing interest and activity of business enterprises in Da Nang to work with government and non-governmental organizations (NGOs) on plastic waste issues.
- Supporting stakeholders were those with strategies and interventions aligned with plastic waste prevention and those who bridge networks and stakeholders working on joint actions. At least 12 large projects are currently active in solid waste and plastic waste management in Da Nang under the support of international organizations, and NGOs/CSOs. In addition, universities and institutions have conducted several awareness-raising activities in plastic waste reduction and sustainable consumption, and have taken initial steps to study the harmful effects of microplastics and plastic pollution on human health in Vietnam as well. All of these are key inputs that define collaborative intervention strategies and also develop collective action.



▲ Specific stakeholder issues, challenges and roles at the level of organizations and individuals were analysed

Developing “Buy-In” Through A Joint Action Plan To Coordinate Commitment

Stakeholder analysis showed a lack of effective coordination, data generation, integration, and exchanges between organizations. Current coordination efforts tend to involve a core group of government, NGOs and mass organizations, without significant engagement from the private sector. The private sector has not yet found it attractive to invest in plastic waste value chains due to the lack of standards, uniformity in waste treatment, technological constraints, especially in recycling and monitoring.

Tailored action planning for plastic waste management for district localities is a priority. A set of realistic targets were established to provide some certainty for decision-makers and implementers to ensure effective action. At the same time, long-term regulatory governance and financial frameworks were put in place to establish confidence as well as to induce practical commitments. This Joint Action Plan envisions a range of government agencies on all levels, NGOs, and private sector stakeholders joining their efforts for the next five years by avoiding duplication and bridging gaps in plastic waste reduction across the city's districts. This development is a clear sign of the government's intention to seek direct partnership with other organizations at the local level. The Joint Action Plan is not only mission-orientated but also requires local authorities to immediately deliver the targets for 2021 and 2022. Such political support at all levels is an important motivation for an effective performance of plastic waste management at the local level. The approach can be considered as an “innovative top-down” plan with more engaging participation among stakeholders and mobilization of further resources for plastic waste management apart from state funds.

Growing A Shared Digital Platform

The Da Nang government's determination to transform the city into a model “Environmental City” and “Smart City” is enabling drivers for plastic waste reduction. Therefore, conditions for digitizing the development of plastic waste management information, and mapping of plastic waste flows and pollution are favorable. Several organizations and NGOs in Da Nang are already providing meaningful support through many projects, but there are still limitations in information-sharing mechanisms among investors and projects to maximize their human and financial resources. The coordination between local authorities and specialized agencies needs future development, including applying information technology as shared databases, cloud, and mobile computing, innovative monitoring, and reducing overlaps and gaps. A shared digital platform plays an increasingly important role when it comes to wider and deeper integration of solutions. In this regard, Da Nang can deliver its potential as it ranked first for application and development of information technology in Vietnam for the 12th consecutive year.

Piloting Business Cases As “Proof Of Concept”

Practical models of plastic waste reduction have been demonstrated in several places in Vietnam. An increasing number of projects have started to illustrate the valid business case of a circular economy along the plastic value chain. However, to build local capacity and to showcase the business case to investors and decision-makers in Da Nang, pilots or demonstration models are needed. These types of models will help raise awareness and the confidence in solutions and technical know-how. These models can also promote learning from a local level to a national level and help establish the right regulatory and operational environment needed for scaling up local solutions that enhance the consensus and support among citizens. The project led by GreenHub with partners in Da Nang will therefore also pilot business solutions as a proof-of-concept for new strategies in plastic waste management.

The LSPP project is funded by United States Agency for International Development (USAID), implemented by GreenHub, Institute of Strategy, Policy on Natural Resources and Environment (ISPONRE), Vietnam One Health University Network (VOHUN), and Gimasys Co., Ltd. Find out more about our project on <https://greenhub.org.vn/>

Australian Marine Debris Initiative Database Now Used by Regional Report Cards

Eleanor Pratt | Database Project Officer, Tangaroa Blue Foundation | eleanor@tangaroablue.org

The Australian Marine Debris Initiative (AMDI) Database

The AMDI Database is an online platform supported by Tangaroa Blue Foundation that allows volunteers and organisations to submit and view data from beach and urban clean ups around Australia. Since 2004, over 19 million pieces of data have been inputted into the AMDI Database which includes community clean-ups and ReefClean monitoring events held throughout the Great Barrier Reef World Heritage Area.

ReefClean launched in 2019 and is a five-year project funded by the Australian Government's Reef Trust. Among other services, this project has been designed to collect scientifically rigorous marine debris survey data to be inputted into the AMDI Database. Paired with community clean-ups, this data gives us a better understanding of the primary sources of marine debris in each region. This can be used to develop litter source reduction plans and influence management practice changes around the country.



Regional Report Cards

Data from the AMDI Database is now being used by the Great Barrier Reef Regional Report Card Network in their annual waterway health Report Cards. Each Partnership in the Network is a consortium of regionally-specific organisations, communities, natural resource management groups and industries, and government representatives.

The Report Cards grade different waterway health indicators, such as coral cover and water quality, from A (very good) to E (very poor), according to their current condition relative to a baseline for that specific site.

Grades for the total amount of litter collected from five sites in the Dry Tropics region and 45 sites in the Mackay-Whitsunday-Isaac (MWI) region were reported in the 2019-20 Report Cards, released in mid-2021. Each site was graded based on the level of pressure that marine debris was putting on the environment at that site as compared to the baseline. The baseline was derived from data collected between 2014 and 2018, representing the period before the Queensland Government introduced restrictions on single-use plastic bags and the “Containers for Change” recycling scheme.

Across the Dry Tropics and MWI regions, most sites were graded from moderate to very good. However, key sites, for example Pioneer Bay in Airlie Beach, was graded as being in poor condition, indicating that marine debris was putting high pressure on the local environment in 2019-20. This site is a popular tourist destination and indicates a need for focused source reduction strategies and improved litter management.

The inclusion of AMDI data in the Regional Report Cards has highlighted areas of particular concern in each region and represents an exciting new opportunity for engagement with local communities, governments, industries and businesses.



▲ Click here to view the marine debris results for the Mackay-Whitsunday-Isaac Healthy Rivers to Reef Report Card(<https://healthyriverstoreef.org.au/our-region/marine-debris/>) and the Dry Tropics for Healthy Waterways Report Card(<https://drytropicshealthywaters.org/2019-2020-report-card/>).

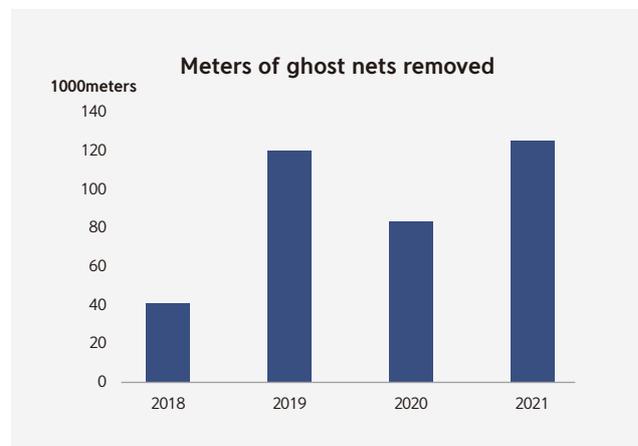
Combating Derelict Ghost Nets in Penghu, Taiwan

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Located in the Taiwan strait, Penghu Islands are composed of 90 islands with an area of 127 km². With a diverse seafloor geography and abundant nutrients, Penghu is famous for its productive fishery resource and rich biodiversity. Among the 100,000 population in Penghu, over one-fifth of the inhabitants are involved in fishing-related industries. Since gillnet fishery is characteristically low in cost and highly efficient, it has become the main fishing method for 404 vessels in Penghu. However, the massive usage of gillnets cause bycatch of marine animals and continue to catch fish while being lost or abandoned at sea. Consequently, the lost gillnets impact the health of habitats and fishery resources.

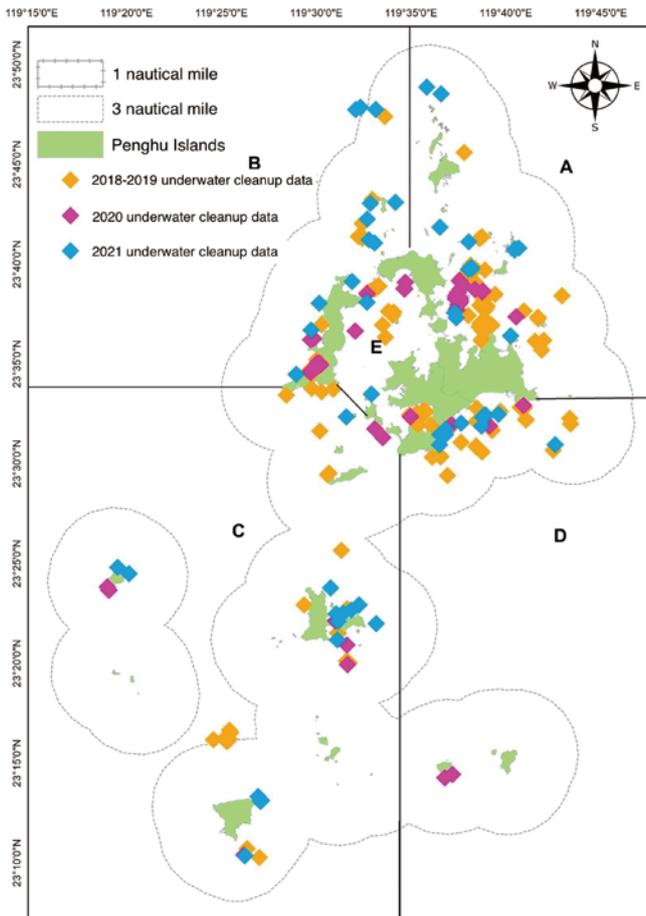
In the past three years, 320,000 meters of ghost nets have been removed in Penghu waters. Starting in 2018, the Penghu government initiated the “Twelve Arrows” policy which aims to remove 240,000 meters of abandoned ghost nets at sea. In cooperation with the Institute of Marine Affairs and Business Management of National Kaohsiung University of Science and Technology (NKUST), the government of Penghu was able to reach its goal earlier than expected. From 2018 to 2019, 161,100 meters of ghost nets weighing 56,385 kg were removed, followed by the removal of 82,467 meters of nets weighing 15,842 kg in 2020, and 125,000 meters weighing over 30,000kg in 2021.



▲ Fig 1. In the past three years, 320,000 meters of ghost nets have been removed in the waters of Penghu

As part of the removal project under the Twelve Arrows policy, NKUST also surveys the health index of coral reefs and records the quantity, net type, and location of removal into the geographic information system (GIS) to better understand the effect of removal work. Although the Penghu City government started the removal work of ghost nets back in 1999, the government didn’t build a clear mechanism and also didn’t understand the tangible benefits. With the scientific data, they can now locate the hotspots, and compare the biota before and after the removal. According to the analysis, the top three types, occupying nearly 60% of the ghost nets, are multilayer bottom gillnets (20.2%), big mesh drifts gillnets (20.1%), and single-layer bottom gillnets (18.5%). This information can be used as education and outreach materials to teach fishermen and residents the consequence of abandoning fishing nets at sea.

¹ Institute of Marine Affairs and Business Management, National Kaohsiung University of Science and Technology



▲ Fig 2. Location of ghost nets removal in 2018–2020

Unlike recreational diving, the removal of ghost nets faces lots of risks and challenges. Even in seemingly clear areas, the underwater visibility will suddenly become muddy when the attachments and sand disperse from the net. Sometimes ghost nets impede divers by entangling their bodies or equipment and occasionally rusty metal components even tear the suits of divers. Such unpredictable conditions often make divers consume more oxygen. Due to these factors, divers removing ghost nets must be not only highly professional and experienced, but also familiar with the area.

To expand the diving team and to ensure the safety of divers when removing ghost nets, NKUST compiled a “Guidebook for Removing Underwater Ghost Nets in the Waters of Penghu”. Moreover, the past two years, 28 volunteers were recruited to complete a training exercise. In the guidebook, questions on professional skills such as planning underwater surveys, identifying gear and habitat type, methods of protecting the underwater environment, and a question on whether or not a diver has experience cooperating with other divers are listed for divers to answer. Therefore, by systematically recording the knowledge and experience of all participating divers, NKUST was able to outline fundamental requirements for divers, create a risk management scheme, and build training plans for future volunteers.



▲ Fig 3 Training for diving volunteers in Penghu

In addition, NKUST continues to assist the government of Penghu to further build on the reporting mechanism of lost gears and ghost nets. To account for lost gears by fishermen at sea, incidents of propeller entanglements, and ghost nets detected by divers, three hotlines are available for people to report. Once reported, information on the coordinates, approximate depth, and the contact information of the reporter get recorded and the government will arrange a cleanup as soon as possible.

Aside from ghost net removal work, NKUST also conducts marine environment education outreach programs. These programs include talks, videos, picture books for kids, and a play called “Ghost Net Mission” to help children understand the importance of the marine environment.



▲ Fig 4 NKUST and the theater team who performed “Ghost Net Mission”

The project of ghost net removal in Penghu includes the principles of prevention, mitigation, and finding solutions in accordance with other countries and organizations who have been actively involved in tackling the issues of derelict fishing gears. Prevention means to avoid derelict fishing gears entering the ocean; mitigation means to decrease the impact of derelict fishing gears on the marine environment, and finding solutions mean to ultimately remove derelict fishing gear. Penghu has been a great case that illustrates the importance of collecting ghost net removal data, creating a reporting mechanism for ghost nets, merging public-private cooperation for ghost net removal, and providing outreach and education for fishermen and children. Furthermore, the local government has also begun to introduce a gillnet marking system and buyback measures for derelict fishing gear.

The practice in Penghu can be taken as an example for other Asian countries that also face a similar problem. We look forward to contributing our experience in Penghu with other stakeholders, organizations such as GGGI, or policymakers in international meetings or working groups in the future. We believe that Taiwan can help create better management of derelict fishing gear in the region and in neighboring regions as well.

Environmental Exhibit, Illustrating the Future of Oceans, Attracts 1,500 Visitors from Busan

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Photo: Kim Hoon, Hyun Jin

KT&G, Korea Marine Environment Management Corporation (KOEM), and Our Sea of East Asia Network (OSEAN) held an environmental exhibit at KT&G Busan SangsangMadang for 16 days from September 3 to 18 as part of KT&G's marine ecosystem protection project. Ten renowned Korean artists participated and exhibited various works such as paintings, sculptures, videos, and installation art under the theme of marine pollution, marine debris and the creatures impacted by such pollution. Approximately 1,500 visitors, mainly from Busan, came to this exhibit.

The exhibit was designed to examine the current state of marine pollution and to visualize a future where humans and oceans can coexist. By bringing art and marine debris together, it provided an informative opportunity for Busan residents to learn of the seriousness of marine environmental problems.



▲ Opening ceremony held on September 3rd at KT&G Busan Sangsangmadang

A total of ten artists: Kim Young-Min; Kim Jung-Ah; Kim Ji-Hwan; Moon Hye-Jung; Seo Yong-Seon; Lee Kyung-Hee; Lee Doo-Seop; Jung Jae-Cheol; Jung Chae-Hee; Jung Ha-Eung; and Team Booster, a marine exploration group, participated in the exhibit. The works displayed in the exhibit consisted of individual and group works that visualized marine debris in artistic ways as well as photos and videos of underwater debris purification activities and entangled marine life taken by Team Booster. Artwork displayed in the exhibit were made from marine debris collected from the coasts of Tongyeong and Busan and artistically incorporated in the artwork by the artists.

More than 80 paintings, sculptures, videos, installation art, and photographic works were exhibited on the 4th and 5th floors of KT&G Busan Sangsangmadang. The work displayed at the entrance of the exhibition hall called Dinner illustrated plastic marine debris in the stomach of a mackerel on a dinner table and as visitors further made their way inside the exhibition hall, a familiar painting depicting ten longevity symbols greeted the visitors. While the well-known "Ten Longevity Symbols" painting usually depicts animals and plants that live forever on a folding screen, the one exhibited at Sangsangmadang looked different upon taking a closer look. In place of animals and plants known for their longevity, plastic garbage decorated the painting and it was titled The New "Ten Longevity Symbols" Painting of Our Generation. On the 5th floor, the cries of a sad whale filled the exhibition hall. The message it seemed to be sending was clear. Also, to add an element of unexpected surprise, there was a motion detector that surprised visitors with trash before they approached a painting of a sea to remind the visitors of our polluted waters.



▲ Dinner
(Kim Jeong-Ah / 63×63×16cm / Casted in Korean paper, watercolor, marine litter / 2007)



▲ Empty seat II
(Kim Jeong-Ah / Variable installation / Acrylic, sea trash / 2017)



▲ A panoramic view of the exhibition hall for Illustrating the Future of Oceans.
The artwork in the middle is Jeong Ha-Eung's "S.O.S."
(270x270x15cm / Driftwood collected in the ocean, trash, speakers, amplifiers, sound (whale sound) / 2021)



▲ Breath II / Port II / Midsummer I
(Jung Jae-Chul / 3min 46sec, 3min 1sec, 6min 10sec / Short channel video, color, sound / 2018)

Photographs displayed during the exhibit were provided by Team Booster, a marine exploration group that dives to observe, record, and to share the current state of the underwater environment. Displayed photos were of the underwater purification activities conducted during the KT&G Marine Environment Conservation Project. A variety of beautiful yet sad underwater images, including pictures of coral reefs and fish and marine life suffering from marine litter such as nets were also part of the exhibit. Team Booster, along with OSEAN, has been engaging in various activities, such as publishing a second photographic casebook documenting the impacts of marine litter on wildlife, and has also been observing changes in the underwater environment to record them for scientific use and knowledge exchange.



▲ Anthropocene Existence
(Collaboration by Seo Yong-Seon, Lee Kyung-Hee, and Jung Chae-Hee / Styrofoam, wood, materials collected from Jangmok Beach / 2021)



▲ Your Amazing Abilities
(Kim Young-Min / Variable Installation / Composite Materials / 2021)



▲ The Marine Environment Conservation Project was carried out off the coast of Tongyeong in August.



▲ Exhibited photograph of marine life being endangered by marine litter (Kwak Tae-Jin, I'm Watching Everything, 2021)

In addition to the exhibition of artworks, an opportunity to learn about marine litter and to experience beachcombing art was also provided. These experimental educational opportunities were led by instructors specializing in marine litter from Dream Ocean Network, a non-profit organization, to enhance children's interest and their understanding of marine litter by using various teaching tools such as puzzles and mazes. Beachcombing art was guided by professional instructors from Jaejudojoa who work in Jeju Island by using discarded glass found along the beach. Instructors from Jaejudojoa melted glass and turned them into materials that look like jewels which visitors then used to make different artistic pieces including brooches. Through these creative activities, children were able to learn about marine litter and upcycling.



▲ "Make a face brooch with sea glass." Experimental activities

The exhibit was also aimed at promoting the upcoming 7th International Marine Debris Conference (IMDC). As the world's largest international conference on marine litter, IMDCs have only been held in the United States so far, but the 7th conference will be hosted in Korea by the Ministry of Oceans and Fisheries for the first time outside the United States. The 7th IMDC is expected to draw considerable international attention and will be held in Busan in September of next year.

Through this exhibit, both visitors and artists underscored the importance of recognizing the seriousness of marine litter. Kim Jung-Ah, the artistic director of OSEAN and a participating artist of the exhibit, said that the exhibition was special because she could see the works of various artists and their artistic languages. She also added that fellow participating artists also wanted to show their deep gratitude for having a chance to seriously think about the marine environment. Furthermore, OSEAN's Director Hong Sunwook reminded everyone of the seriousness of marine litter and that discussions on creating a new international instrument on marine litter is underway at the United Nations. She further stated that she hopes the exhibit will serve as an opportunity for Busan residents to pay close attention to the issues regarding marine litter and to the 7th IMDC. Lastly, a college student who came to see this exhibit from Incheon said that he hopes to see more exhibits showcasing the seriousness of marine pollution through artistic works made of marine litter and said that he was glad that he was able to come see the exhibit.

What's at the Bottom of the Ocean? Assessing Macro-Litter on Taiwan's Seafloor

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The invisible crisis: neglected marine litter below the surface

Compared to floating debris and beach litter, seafloor debris has received little attention due to the big challenges faced during seafloor surveys and also due to its distance from shores, making it not readily observable. Nevertheless, it has been suggested that 99.8% of plastic debris have sunken under the sea and have eventually reached the seabed after vertical transportation, but there have only been 14.7% of all marine debris studies focusing on seafloor debris. Moreover, efforts in studying seafloor debris have been uneven in different areas. Most of these seafloor debris studies have been conducted in the Mediterranean Sea, eastern Pacific Ocean, and the western Atlantic Ocean. The amount, spatial patterns, and types of seafloor debris off Taiwan still remains unclear.

Thus, this study aims to (1) establish a standard monitoring procedure for seafloor debris collected from trawls in Taiwan, and (2) investigate possible transport mechanisms to provide a baseline assessment for the Taiwanese government.

Methods

Between 2019 to 2021, samples were collected from 32 to 3597 m by French beam trawls with 12 mm mesh size and otter trawls with 20 mm mesh size using National Taiwan University's R/V Ocean Researcher 1, National Taiwan University's R/V New Ocean Researcher 1, and the Fisheries Research Institute's R/V Fishery Researcher 2 (Fig. 1). Forty-four trawls were conducted in four geological characteristics (basin, ridge, shelf, slope) and four regions (NE, NW, SE, SW) around Taiwan to examine if the seafloor heterogeneity and human activities in different regions had impacts on the distribution of debris.

After the trawls arrived on the deck, the first step was to separate the debris from creatures and mud. Second, photos were taken to help researchers reconstruct the true conditions of each tow because the samples were frozen until further analysis. Dry weights and numbers of the samples were both documented to allow researchers to make a full comparison with other studies (Fig. 2).

As for classifications of the debris, we followed the handbook NOAA published in 2013. There were seven components, including plastics, metal, glass, rubber, processed lumber, cloths or fabrics, and others. Forty-three detailed categories were used to identify the debris. For practical needs, we add two additional categories: coal (e.g. clinker) and organism (e.g. soybeans). All data were transformed to weight and numbers per square kilometer.



▲ Fig. 1: The French beam trawl in New Ocean Researcher 1



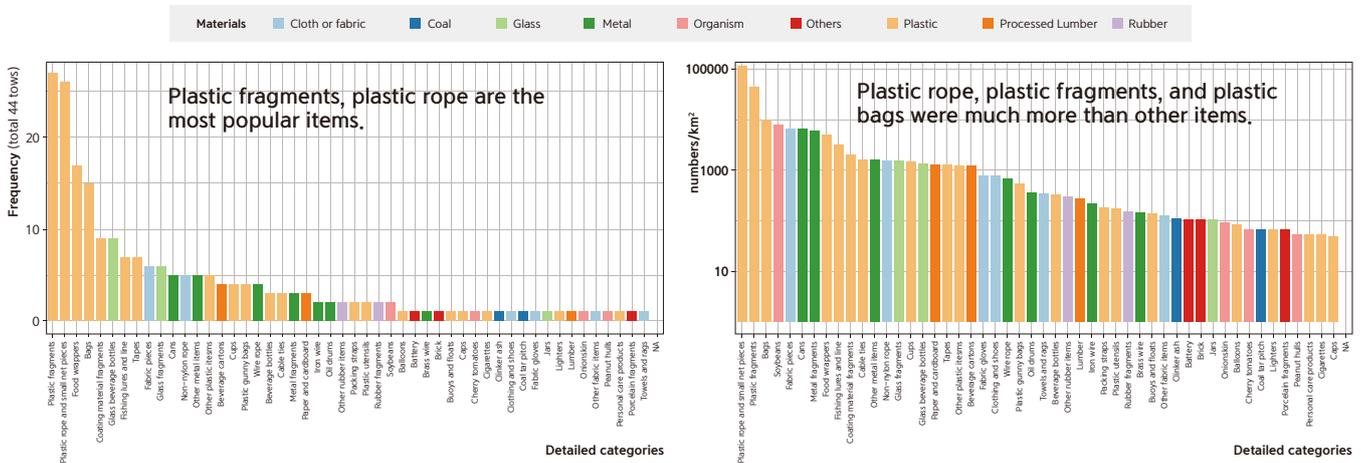
▲ Fig. 2: After removing the dirt, every debris item was arranged and counted.

All is not lost: visible assessment can help

The results indicate that 5,283 debris items and 1,167 kilograms per square kilometer on average were collected during the trawls. Furthermore, plastics were collected in 84% of the trawls and accounted for 95% of debris items. Plastic fragments and plastic ropes were the most popular items in the tows, and these two categories were also often found in over 50% of the trawls (Fig. 3). Moreover, plastic ropes, plastic fragments, and plastic bags were found noticeably more than other items (Fig. 4).

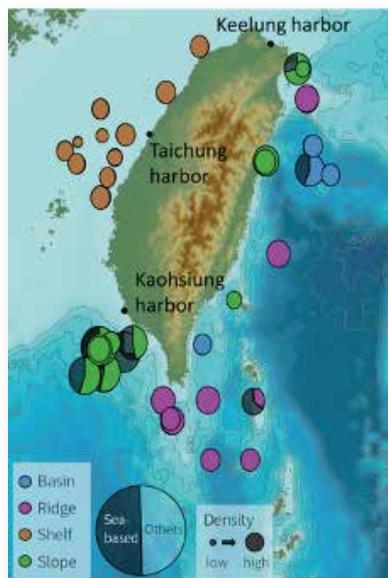
Our study found that southwestern Taiwan tends to accumulate more sea-based debris, such as fishing lines, oil drums, and fabric gloves used for fisheries. In this region, about half of the trawls found sea-based litter, which is significantly higher than in those of other regions. Such results might be due to the shipping and fishing industries near Kaohsiung port, the largest international port in Taiwan (Fig. 5).

The debris in the continental shelf was slightly lighter and less than other habitats. Unlike the debris density in coastal areas around the China Sea, the total density of debris and plastic density in Taiwan was higher, but lower than those in the deep-sea basin beneath the Kuroshio Extension off of Japan.¹ Furthermore, compared to the data from other studies in Taiwan, we found that the amount of seafloor debris in Taiwan is as high as beach debris and sea debris along the coast even though the methods were different. These results shed light on the importance of the litter transport mechanism and the need for further study.



▲ Fig. 3: Plastic fragments were found in 26 tows; plastic ropes were found in 25 tows.

▲ Fig. 4: Each color represented one material. Plastic items are in yellow.



▲ Fig. 5: Different colors represented different geological features. The bigger the circle, the higher the density of seafloor debris. The ratio of the black in each circle represented the ratio of the sea-based debris.



Two-minute video: Investigating seafloor marine litter in Taiwan

¹ Nakajima et al., 2021

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