ISSN 2287-8971

Asia Pacific Civil Forum on Marine Litter

Marine Litter News

Volume 14 · Issue 1 · May 2022

Recommended Citation for the whole volume:
Hong, Sunwook.(ed.) (May 2022). Marine Litter News from Asia Pacific Civil Forum on Marine Litter, Our Sea of East Asia Network, Vol. 14(1): 28p, Tongyeong, South Korea.

ISSN 2287-8971
Marine Litter News Vol. 14(1): 28p. May 2022.

The newsletter is biannually published by APML.

Preface

Dear readers,

On March 2nd, we at OSEAN, along with the rest of the world, witnessed an unforgettable moment at UNEA 5.2 when UN Member States unanimously agreed to develop a legally binding treaty to end plastic pollution. The jubilant cheers that subsequently erupted with long standing ovations were deeply moving because we knew of all the hard work that went on behind the scenes to pass the resolution. Since then, many of us have further dedicated ourselves to ensure that the momentum to end the scourge of plastics is not lost. Members of Asia-Pacific Civil Forum on Marine Litter (APML), including OSEAN, have become more active in raising awareness on the devastating impacts of plastic pollution and have increased outreach efforts and community engagement activities that include a variety of cleanup events and educational workshops.

As evident in the articles showcased in this issue, many around the world have also continued to forge on addressing the negative impacts that plastics have on human life, the environment, and on animals. A study identifying the gaps in public awareness on plastic pollution was conducted in Vietnam and a careful examination of well-intended repurposing of tires in Australia revealed that innovative and sustainable solutions are hard to achieve. Results of South Korea and Indonesia's bi-lateral cooperation on tackling marine litter highlighted the importance of strengthening regional ties and studying the movement of floating litter helped understand the distribution and dynamics of riverine litter. Furthermore, an analysis on plastic eel trap entrances threatening the lives of endangered Hawaiian monk seals reminded us that combating marine litter requires international cooperation and a citizen science report in Taiwan once again revealed the harmful effects of derelict fishing gear.

Lastly, on behalf of APML, I would like to sincerely welcome IndigoWaters as a new member of APML. To learn more about IndigoWaters please read their brief introduction on page 25. With Taiwan Ocean Cleanup Alliance (TOCA), a Taiwanese coalition, leaving APML, IndigoWaters will be taking its place. I hope that the readers of Marine Litter News will be inspired and encouraged by IndigoWaters' activities and learn more about their wonderful work. As always, I would like to thank all those who have contributed to Marine Litter News and I would also like to thank Eliya Baron Lopez for being our Guest Editor.

With gratitude,

Sunny Hong

Editor in Chief, Sunwook Hong

Ph.D.,
President of OSEAN

Co-Editor, Semee Rhee

Manager, International Cooperation Division of OSEAN

Co-Editor, Ning Yen

CEO and Co-Founder, IndigoWaters Institute

A Treaty to End Plastic Pollution: Prioritising Prevention

Tom Gammage | Ocean Campaigner, Environmental Investigation Agency | tomgammage@eia-international.org

There has been a seismic shift in recognition of the plastics problem since the first instances of plastic pollution were reported in the early 1970s.[1] While once seen as just irresponsible consumers 'littering' indiscriminately, plastic pollution is now widely understood as 'all emissions and risks resulting from plastics production, use, waste management, and leakage.'[2] Far from being simply an 'eye sore' causing physical entanglement and death in charismatic wildlife such as whales and seabirds, plastic pollution is directly undermining our health, driving biodiversity loss, and exacerbating climate change. It also risks exceeding 'planetary boundaries' – the thresholds which, if surpassed, risk generating large-scale harmful and irreversible environmental changes.

No development in global policy reflects this broader and rejuvenated understanding better than the recently adopted United Nations Environment Assembly (UNEA) resolution 5/14, which recognises the unacceptable hazards and risks of business-as-usual and calls for a global legally binding instrument to 'end plastic pollution.'[3] This is a monumental achievement that the UN Environment Programme has called "historic" and the most significant green deal since the 2015 Paris climate accord. While it should be celebrated as such, there is a strong possibility that if the treaty is not designed effectively, it will not be capable of tackling the source of the plastic pollution problem – overproduction of virgin (new) plastics and the unsustainable design of plastic products. These stages dictate what flows through the consumer economy before it becomes waste.

Many countries are overwhelmed by a severe overabundance of cheap virgin plastic, undermining secondary markets for recycled materials and investments in collection and recycling infrastructure. We already produce nearly half a billion tonnes of plastics, and following current trends, this will double by 2040.[4,5] This has partly been driven by the oil and gas industry turning to plastics (particularly single-use plastics) as an alternative growth market, and the Asia-Pacific region is by no means an exception. Asia currently produces almost half of all virgin plastic and will continue to dominate the global petrochemicals market by expanding capacity to 477 million tonnes by 2030, driven by China, India, and other countries' economic growth.[6] The impacts of this overproduction are increasingly apparent. Wealthier countries such as Japan export around 11% of the ~10 million tonnes of plastic waste they generate annually to developing countries with high leakage, low enforcement, and insufficient waste management.[7,8] Meanwhile, they incinerate around 5.76 million tonnes,[9] polluting water bodies and local communities with toxic chemicals and, because plastics are carbon-based fossil fuel derivatives,

[1] Rothstein, S. I. (1973). Plastic Particle Pollution of the Surface of the Atlantic Ocean: Evidence from a Seabird. The Condor, 75(3), 344–345. https://doi.org/10.2307/1366176

[2] OECD (2022). Global Plastics Outlook: Economic Drivers, Environmental Impacts and Policy Options.

[3] United Nations Environment Assembly (2022). Resolution 5/14, End plastic pollution: towards an international legally binding instrument. March 2, 2022, UNEP/EA.5/Res.14. Retrieved from: https://wedocs.unep.org/bitstream/handle/20.500.11822/38522/k2200647_-_unep-ea-5-l-23-rev-1_-_advance.pdf?sequence=1&isAllowed=y

[4] OECD (2022). Global Plastics Outlook: Economic Drivers, Environmental Impacts and Policy Options.

[5] Lau, W. W. Y., Shiran, Y., Bailey, R. M., Cook, E., Stuchtey, M. R., Koskella, J., Velis, C. A., Godfrey, L., Boucher, J., Murphy, M. B., Thompson, R. C., Jankowska, E., Castillo Castillo, A., Pilditch, T. D., Dixon, B., Koerselman, L., Kosior, E., Favoino, E., Gutberlet, J., … Palardy, J. E. (2020). Evaluating scenarios toward zero plastic pollution. Science, 369(6510), 1455–1461. https://doi.org/10.1126/science.aba9475

[6] Plastics Europe (2021). Plastic: the facts – 2021. Retrieved from: https://plasticseurope.org/knowledge-hub/plastics-the-facts-2021/

[7] Independent Commodity Intelligence Services [ICIS] (2021). Recycling Supply Tracker – Global.

[8] United Nations ComTrade (2021). HS 3915.

[9] Statstica (2019). Number of waste incineration facilities Japan. Retrieved from: https://www.statista.com/statistics/689599/japan-number-of-waste-incineration-facilities/

contribute significantly to climate change. However, all these disastrous impacts are avoidable, but only if the correct global measures are in place.

Other multilateral agreements, such as the Basel Convention, primarily deal with plastics once they have already become waste. Despite their pivotal role in ending plastic pollution, they hold little scope to look at the 'upstream' (production) and 'midstream' (design) stages. This clearly illustrates acritical and unique opportunity the new treaty has to enact control measures on these lifecycle stages.

UNEA resolution 5/14 is unique because it recognises the need and lays the foundation for several critical upstream and midstream measures. The most important is its reference to 'sustainable production and consumption' of plastics, aligned with Sustainable Development Goal (SDG) 12, and the need to address product design, including hazardous chemicals present in plastic products. The transition towards a safe and non-toxic circular economy, with minimal leakage and waste generation, requires urgent efforts to focus on upstream and midstream measures to progressively phase down virgin plastics and eliminate toxic chemicals from plastic products.

Many Asia-Pacific states were pivotal in ensuring the UNEA resolution was adopted in the first place. Pacific island countries issued a compelling call in September 2021(www.sprep.org/circular/cir2181-pacific-declaration-on-plastics) to establish a new legally binding instrument. The Philippines, Thailand, and Vietnam were also outspoken during the UN's Ad-Hoc Open-Ended Expert Group on Marine Litter and Microplastics – a group convened in advance of UNEA-5 to explore policy options. However, unless these countries and others in the Asia-Pacific region take ambitious stances in the negotiations, including supporting strong up-and midstream controls on virgin plastics, there is a strong possibility that the treaty will fall short of what is required of it.

The role of civil society organisations, academic institutions, and scientists will also be more critical than ever. To realise the vision of UNEA resolution 5/14, they must sway governments in the right direction through providing insight, technical guidance, targeted research, and accountability on what will be required upstream and midstream, as well as downstream (waste management).

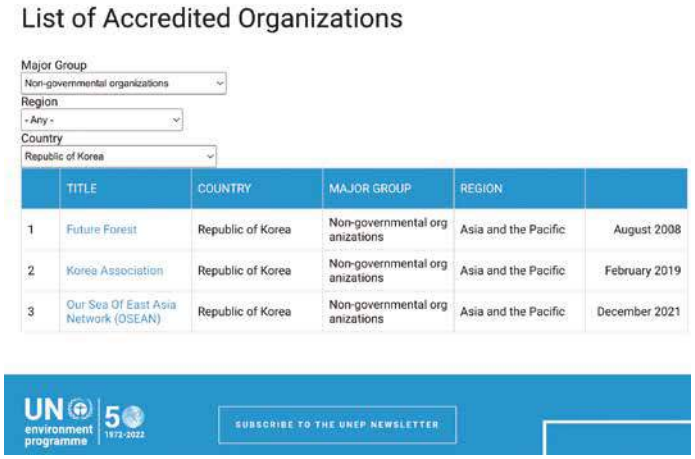
We are now at a fork in the road – and the potential consequences of following the wrong path are incomprehensible. Without stringent control measures on virgin plastics, sustainable production and consumption of plastics will remain a fantasy, and the disastrous impacts of the pollution it causes will continue to worsen unabated.

▲ © Manman Dejeto / Greenpeace
Verde Soko, Sitio, Phillippines. Children search among piles of plastic waste exported for 'recycling' for the few valuable items they can sell to junk shops. They are 'waste pickers' – a marginalised group that forms part of informal waste management in key importing countries.

UN Environment Programme Grants OSEAN as an Accredited Non-Governmental Organization

C. Semee Rhee (Author) | Manager of International Cooperation, OSEAN | crhee@osean.net
Alicia Loh (Translator) | Intern, OSEAN | intern@osean.net

Our Sea of East Asia Network (OSEAN) became an accredited non-governmental organization (NGO) by the United Nations Environment Programme (UNEP) in December 2021. Under UNEP, there are nine major groups and stakeholders to ensure transparency and inclusiveness in the decision-making process between governments and to enhance the participation of civil society organizations. Out of the nine major groups and stakeholders comprising business and industry, children and youth, farmers, indigenous peoples and their communities, local authorities, non-governmental organizations, scientific and technological community, women, and workers and trade unions,[1] OSEAN received its accreditation as an NGO.


List of Accredited Organizations

Major Group: Non-governmental organizations
Region: - Any -
Country: Republic of Korea

	TITLE	COUNTRY	MAJOR GROUP	REGION	
1	Future Forest	Republic of Korea	Non-governmental organizations	Asia and the Pacific	August 2008
2	Korea Association	Republic of Korea	Non-governmental organizations	Asia and the Pacific	February 2019
3	Our Sea Of East Asia Network (OSEAN)	Republic of Korea	Non-governmental organizations	Asia and the Pacific	December 2021

UN environment programme 50 1972-2022 SUBSCRIBE TO THE UNEP NEWSLETTER

▲ List of South Korean non-governmental organizations accredited by UNEP
https://www.unep.org/civil-society-engagement/accreditation/list-accredited-organizations

Organizations accredited by the UNEP will have more opportunities to participate in UNEP sessions and other related meetings. The privilege to observe and participate in the UN Environment Assembly (UNEA) will be extended to accredited organizations and a chance to attend and make interventions during ministerial meetings will also be granted. Additionally, accredited organizations can contribute to regional civil society statements, which in turn will allow for a wider range of international cooperation and receive working documents at the same time as the Committee of the Permanent Representatives (CPR).[2]

OSEAN is the third NGO in South Korea to be accredited by UNEP. Through this valuable accreditation, OSEAN intends to strengthen international solidarity and regional activities in the future. Moreover, OSEAN hopes that this opportunity will serve as a stepping stone to expand its international activities and further strengthen solidarity with domestic and international NGOs.

[1] UN Environment Programme. (n.d.). UNEP Major Group Categories. UNEP. Retrieved May 2022, from https://www.unep.org/civil-society-engagement/major-groups-modalities/major-group-categories

[2] UN Environment Programme. (n.d.). UNEP Accreditation. UNEP. Retrieved May 2022, from https://www.unep.org/civil-society-engagement/accreditation

Knowledge, Attitudes, and Behaviors Toward Single-Use Plastic Products and Their Health Impacts: Sharing Research Results From Vietnam

Chi L. Ta | Program Coordinator, Centre for Supporting Green Development (GreenHub) | Chi.ta@greenhub.org.vn
Trang T.T. Nguyen | Co-Founder and Vice Director, GreenHub | trang.nguyen@greenhub.org.vn
Nga H. Nguyen | PDirector, Center for Health Environment Research and Development (CHERAD) | huynga2000@gmail.com
Tuan - Anh Tran | Research Officer, CHERAD | Tuananh96.vmu@gmail.com

Single-use plastic products (SUPPs) such as food containers, cups, and eating utensils are designed and marketed with the intention to be used once, if not mere minutes, before being discharged into the environment.

SUPPs are widely used today and are considered a major threat to environmental and human health. In Vietnam, the average amount of plastic waste discharged into the environment every day is about 2,500 tons, of which the volume of plastic waste discharged into the sea fluctuates between 0.28–0.73 million tons/year.[1] In 2018 alone, it is estimated that Vietnam generated over 31 million tons of household waste and nearly 5 million tons of plastic waste. Plastic accounts for 64% of materials used in the packaging industry and this number is expected to grow. Meanwhile, only about 14% of plastic waste is collected and recycled by some small businesses.[2]

The use of SUPPs in daily life can expose people directly or indirectly to certain chemicals, such as Styrene, Phthalates, and Bisphenol A, which have been shown to cause adversenegative health effects. Despite these risks, few people are well-informed about the impact of SUPPs on human health.

To get a clearer understanding of the situation in Vietnam, the Centre for Supporting Green Development (GreenHub) collaborated with the Center for Health Environment Research and Development (CHERAD) to conduct a study to identify the gaps in people's awareness and to suggest suitable measures to help solve the problem of plastic pollution.

Within the framework of "Local Solutions for Plastic Pollution (LSPP)," a project funded by the United States Agency for International Development (USAID), a cross-sectional descriptive study named "Knowledge, Attitudes, and Behaviors Toward Single-Use Plastics and Their Health-Impact" was conducted with the aim to: (1) assess people's knowledge, attitudes, and behaviors toward the use of SUPPs and the impact on health and (2) propose communication activities to raise awareness and develop single-use plastics-related policies.

[1] Jambeck, J. R., Geyer, R., Wilcox, C., Siegler, T. R., Perryman, M., Andrady, A., Narayan, R., & Law, K. L. (2015). Plastic waste inputs from land into the ocean. Science, 347(6223), 768-771. https://doi.org/10.1126/science.1260352

[2] MONRE (2019). National Environmental Status Report 2019. Retrieved April 2022 from: http://dwrm.gov.vn/uploads/news/2020_11/bao-cao-hien-trang-moi-truong-2019.pdf

The study collected quantitative data through a set of survey questions with 525 respondents from 51 provinces and cities across Vietnam and qualitative data through group discussion sessions (n=12) and in-depth interviews (n=6).

Key Results and Implications

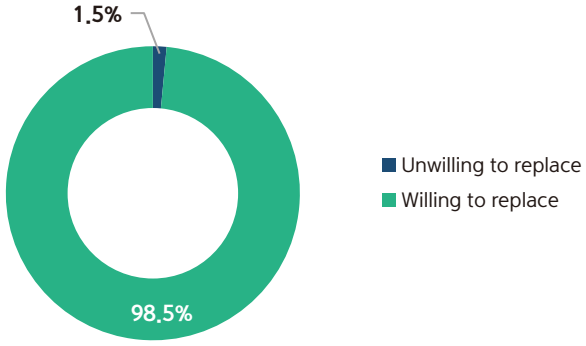
Gaps in People's Knowledge of SUPPS

According to the survey results, of 525 people surveyed, most participants (87.6%) answered that plastics take a long time to decompose. A vast majority of survey takers said that humans, as well as other species like terrestrial animals, sea animals, and birds, are all affected by disposable products. These results show that most people are quite informed of the environmental impact of SUPPs. This can probably be due to the series of communications programs that have been implemented so far.

However, questions regarding the health impacts of SUPPs see markedly less correct answers. Almost half of the respondents had insufficient knowledge about how plastics may pose certain health risks to human organ systems like cardiovascular, reproductive health, and nervous systems. This can be explained by the fact that today's communications campaigns and programs mainly focus on environmental issues caused by plastic waste. The results of qualitative research show that people do not have full access to information about the effects of SUPPs on human health.

People's Willingness to Change and the Challenges Faced

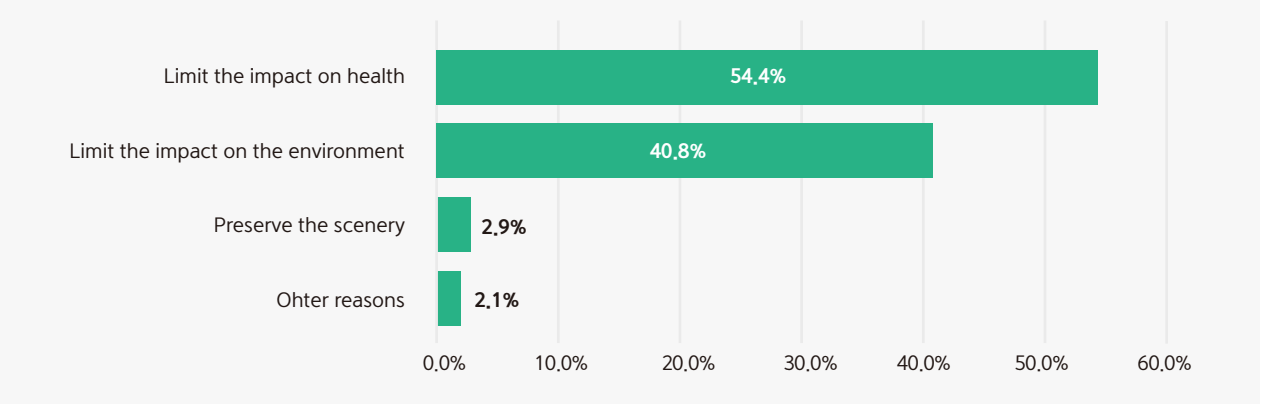
Despite lacking the necessary knowledge on the health impacts of disposable products, almost all of the people surveyed were, surprisingly, willing to change their consumption habits by replacing SUPPs with environmentally friendly products. In other words, 98.5% of respondents in the survey said that they are open to doing so.



▲ Figure 1: Percentage of people willing to replace single-use plastic products (n=525)

This is generally a positive trend implying people's open-mindedness to changes. When asked the reasons why they were willing to change, 54.4% of participants stated that they are concerned about the health risks they may face when using SUPPs, and this was followed by 40.8% of participants saying that they are concerned about the environmental effects of SUPPs (40.8%).

The in-depth interview showed that respondents had a view in favor of alternative products but still doubted the quality and convenience of such products.

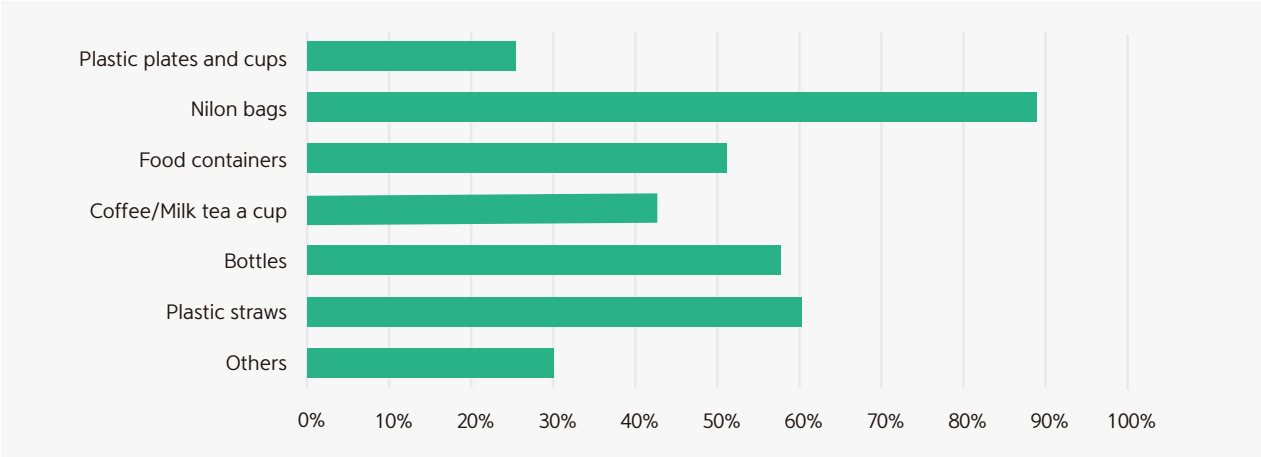


▲ Figure 2: Reasons for willingness to replace disposable plastic products (n =525)

Unsafe Habits of Using SUPPs

Nearly all respondents said they frequently or occasionally use single-use plastics (47.5% and 52.3%, respectively). These results are quite predictable, considering SUPPs' role in the lives of modern citizens, especially during the COVID-19 pandemic. Out of all surveyed single-use plastics, nylon bags were the most commonly used products by respondents (88.8%).

Moreover, people's unsafe habits of using disposable products are also prevalent, namely storing cold food and drinks, storing food in the fridge, and using colored plastic bags to store food (81.1%; 78.2% and 60.6%, respectively). This shows that people may associate low temperature with safe usage of SUPPs, while the fact is that this action may probably be as dangerous as storing hot food.



▲ Figure 3: Single-use plastic products commonly used (n=525)

Proposed Communications Programs and Activities

In order to develop effective education and communications programs, people's knowledge, attitudes, and behaviors should all be taken into consideration. From the survey results, it is highlighted that more communications programs focusing on the health risks of SUPPs should be implemented. Educating the public on the meaning of symbols on single-use plastics, teaching safe ways to use SUPPs, and training how to classify and recycle waste appropriately are projects that would be good for communications programs. In addition, the information provided should be retrieved from a legitimate and reliable source, and suitable communications channels and tools should also be tailored for each group of audience.

Policy Advocacy and Recommendations

The increasing use of SSUPs nowadays poses greater challenges and requires the development of systematic policies to minimize them. In recent years, the Extended Producer Responsibility (EPR) policy has been implemented in several countries and has effectively improved collection, emission reduction, and increased recycling programs. It has also helped reduce the burden on the government budget for these processes and has helped contribute to higher-quality secondary raw materials and market development. Lastly, it has ensured resource security and developed a circular and sustainable economy.

As for Vietnam's case, policies on SUPPs should be imposed as soon as possible and should pay attention to consumer preferences, availability and environmental impact of plastic alternatives, competitiveness and features of alternative products.

Further studies and policies to control the quality of SUPPs as well as to promote alternative products should also be encouraged. In Vietnam, the EPR policy has been issued and has been in effect since January 2022. It is hoped that with the issuance of the policy, plastic waste, especially single-use plastic waste, will be collected and recycled and therefore reduce the plastic leakage into the environment.

Recycled Tyres for Community Spaces: An Area of Concern for the Australian Marine Debris Initiative

Jessica McShane | Reporting Project Officer, Tangaroa Blue Foundation | jessica@tangaroablue.org

The Tangaroa Blue Foundation (TBF) coordinates the Australian Marine Debris Initiative (AMDI), a national program focused on removing and preventing marine debris. In recent months, TBF and its network have been investigating a potentially harmful source of marine debris known as rubber crumb. Rubber crumb is made by shredding car tyres into smaller granules (<5 mm) and has become a popular choice for creating soft-fall surfaces such as playground bases and synthetic sports fields. Over time, the rubber crumb matting degrades and breaks up into smaller pieces. Initially deemed an innovative solution to a tiresome waste issue, new insights prove that a more thorough examination is needed to assess the environmental impact of these products.

▲ Image 1. Playground using rubber crumb matting at Palm Point, Gladstone Queensland (QLD)
(Source: ReefClean Australian Microplastic Assessment Project (AUSMAP) Rubber Crumb Assessment Report 2021).

With approximately 48 million waste tyres generated in Australia annually and 1.5 billion worldwide, it is no wonder that the Australian government is investing in solutions to try and repurpose these materials to reduce the number of tyres ending up in landfills. The issue with rubber crumb is that the associated toxic chemicals, such as heavy metals, stabilisers, resins, and other organic compounds, have been discovered to leach into waterways and cause harm to aquatic life.[1] Furthermore, the effects on human health warrant more in-depth research and formal testing. The chemicals in rubber crumb include polycyclic aromatic hydrocarbons (PAHs), which are documented cancer-causing substances and phthalates.[2] The pollution burden from rubber crumb is only just starting to be documented.

[1] Halsband, C., Sørensen, L., Booth, A. M., & Herzke, D. (2020). Car Tire Crumb Rubber: Does Leaching Produce a Toxic Chemical Cocktail in Coastal Marine Systems? *Frontiers in Environmental Science, 8,* 125. https://doi.org/10.3389/fenvs.2020.00125

[2] Watterson, A. (2017). Artificial Turf: Contested Terrains for Precautionary Public Health with Particular Reference to Europe? *International Journal of Environmental Research and Public Health, 14* (9), 1050. https://doi.org/10.3390/ijerph14091050.

▲ Image 2. A sampling of rubber crumb at the Coral Sea Park playground, Cardwell QLD (Source: ReefClean AUSMAP Rubber Crumb Assessment Report 2021).

As part of the ReefClean project, TBF and AUSMAP recently developed a source reduction plan to quantify the level of rubber crumb granules being dispersed away from playground surfaces, analysing sites adjacent to the Great Barrier Reef catchment.

This study revealed that for each rubber crumb playground with a 40 m circumference, an estimated 1.2 million crumbs might be released into the immediate environment within four metres of these sites.

Alarmingly, University of Queensland scientists have just published a study identifying the toxicant 6PPD–quinone in Brisbane waterways, a chemical found globally in tyres.[3] In parts, the concentration of the compound 6PPD–quinone detected was comparable to the amounts linked to the death of salmon in Seattle[4] and trout in Canada.[5]

[3] Rauert, C., Charlton, N., Okoffo, E. D., Stanton, R. S., Agua, A. R., Pirrung, M. C., & Thomas, K. V. (2022). Concentrations of Tire Additive Chemicals and Tire Road Wear Particles in an Australian Urban Tributary. Environmental Science & Technology, 56(4), 2421–2431. https://doi.org/10.1021/acs.est.1c07451

[4] Tian, Z., Zhao, H., Peter, K. T., Gonzalez, M., Wetzel, J., Wu, C., Hu, X., Prat, J., Mudrock, E., Hettinger, R., Cortina, A. E., Biswas, R. G., Kock, F. V. C., Soong, R., Jenne, A., Du, B., Hou, F., He, H., Lundeen, R., … Kolodziej, E. P. (2021). A ubiquitous tire rubber–derived chemical induces acute mortality in coho salmon. Science, 371(6525), 185–189. https://doi.org/10.1126/science.abd6951

[5] Brinkmann, M., Montgomery, D., Selinger, S., Miller, J. G. P., Stock, E., Alcaraz, A. J., Challis, J. K., Weber, L., Janz, D., Hecker, M., & Wiseman, S.(2022). Acute Toxicity of the Tire Rubber–Derived Chemical 6PPD-quinone to Four Fishes of Commercial, Cultural, and Ecological Importance. Environmental Science & Technology Letters, 9(4), 333–338. https://doi.org/10.1021/acs.estlett.2c00050

▲ Image 3. The Coral Sea Park playground is near the beach
(Source: ReefClean AUSMAP Rubber Crumb Assessment Report 2021).

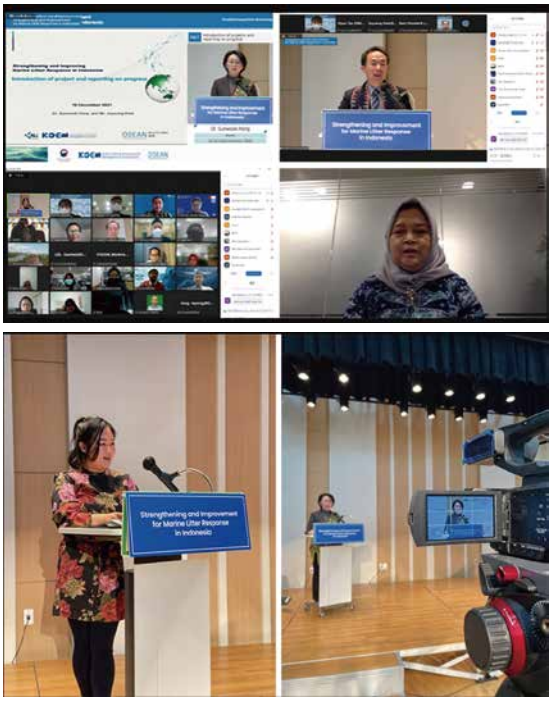
Experts warn that immediate steps are needed to ensure government-endorsed recycling programs do not solve a problem while quietly causing another. Knowledge gaps still exist regarding microplastic and tyre particle pollution, and these need to be addressed before deeming rubber crumb products as fit for purpose. Governments and industries need to ensure greater oversight in the production and use of rubber crumb and other recycled tyre products and support research into safer alternatives.

▲ Image 4. Rubber crumb playground matting (Source: ReefClean AUSMAP Rubber Crumb Assessment Report).

Click here to view the Tangaroa Blue Foundation Rubber Crumb Impact Report 2021 and the ReefClean AUSMAP Rubber Crumb Loss Assessment Report
(www.tangaroablue.org/tyre-recycling-program-risks-becoming-a-micro-pollution-disaster/)

‘Strengthening and Improving Marine Litter Response in Indonesia’: Sharing Achievements Made Over the Past 3 Years (2019–2021)

Yoonie Jang (Author) | Researcher, OSEAN | yoonie.jang@osean.net
Alicia Loh (Translator) | Intern, OSEAN | intern@osean.net



▲‘Strengthening and Improving Marine Litter Response in Indonesia’ Workshop

Cooperation between South Korea and Indonesia to Tackle Marine Debris Pollution

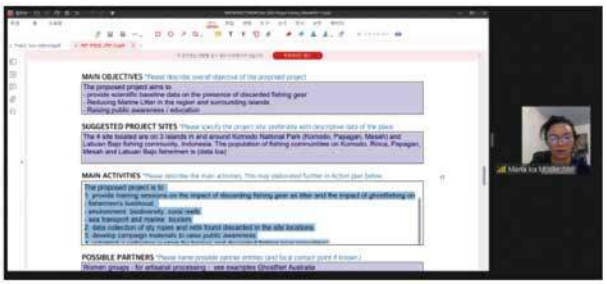
South Korea and Indonesia held a workshop together to reduce marine debris pollution in December 2021. The goal was to share achievements and to plan for future cooperative projects. The online workshop was attended by more than 40 marine debris experts from South Korea and Indonesia, including the South Korean Ministry of Oceans and Fisheries, Indonesian Coordinating Ministry for Maritime Affairs and Investment, Korea Marine Environment Management Corporation (KOEM), and Our Sea of East Asia Network (OSEAN). With this last workshop, the cooperative marine debris management project conducted over the past three years (2019–2021) came to an end.

The aim of the Indonesian marine debris management project was to attain UN Sustainable Development Goal 14.1 through the cooperation of South Korea and Indonesia. Since marine debris continues to be a global problem, the goal of the project was to accomplish a significant reduction of pollutants that originate from land. The objectives included strengthening marine debris management capabilities, developing coastal debris monitoring, and developing public awareness programs. The workshop was held in the following order; on day one, an opening ceremony and discussions on future cooperative projects were held, and on day two, project results were shared and future development directions were proposed.

▲ Opening remarks by Kim Hyun-Tae, Director of International Cooperation Policy, Ministry of Oceans and Fisheries of South Korea

Opening Ceremony and Discussions on Future Cooperative Projects

During the opening ceremony, Kim Hyun-Tae, Director of International Cooperation Policy at the Ministry of Oceans and Fisheries of South Korea, said, "I would like to express my gratitude to those involved in the Indonesian marine debris management project that was carried out during the past three years. Through in-depth discussions between South Korea and Indonesia, an effective marine debris management system was established. An Indonesian marine litter monitoring manual was produced, and we were able to understand the current realities of Indonesia's marine litter management policy. Through this project, we were able to strengthen cooperation in dealing with marine debris in the Asia-Pacific region. I would like to thank the Indonesian government for their cooperation, and I look forward to the continuous cooperation and activities between South Korea and Indonesia in the future."



▲ Discussion on future cooperative projects

Next, Dr. Nani Hendiarti, Deputy Minister of Environment and Forestry in Indonesia, said, "I would like to thank South Korea for its cooperation in improving the management of marine debris in Indonesia. It was a pleasure working together with South Korea on the issue of marine debris and it was a good opportunity to broaden relations and cooperation between the two governments. Specifically, like the monitoring activities conducted in Labuan Bajo, we look forward to continuing various cooperative activities together and further achieving the goal of resolving the marine debris problem."

During the discussions on future cooperative projects, a survey was conducted to discern future cooperative projects for South Korea and Indonesia. The survey asked respondents to think of project titles, purpose, activities, partner organizations, and budget. Since the purpose of the survey was to gather project ideas that can be executed in Indonesia, an active exchange of opinions between Indonesia and South Korea took place.

Results of the Three-Year Project and Discussion on Cooperative Projects

On the second day of the workshop, project results were shared via a short video clip illustrating how the project progressed over the past three years. Beginning in 2019, the first step of the project was to conduct a local workshop in Labuan Bajo for capacity development and pilot monitoring. Here, monitoring guide booklets and videos were provided so that local residents can easily understand and practice marine debris monitoring. An on-site workshop for 2020 was also planned, but because of COVID-19, it was replaced with an online workshop. During the 2020 workshop, results of pilot surveys on coastal debris, methods of estimating the amount of marine debris, and the results of the 2019 workshop were shared with participants. Also, in 2020, the issue of microplastics was stressed and lectures on global microplastic pollution and research trends were also provided online. In 2021, lectures covering various topics such as marine debris monitoring, microplastics, citizen science, and policy development were given through the 'Strengthening and Improving Marine Litter Response in Indonesia' Workshop. In particular, the importance of repeated monitoring was underscored through the marine debris monitoring guide video, provided in both English and Bahasa Indonesia, and the monitoring results of Labuan Bajo conducted in 2019 and 2021 were also delivered.

▲ Screenshots from the project performance video of 'Strengthening and Improving Marine Litter Response in Indonesia'

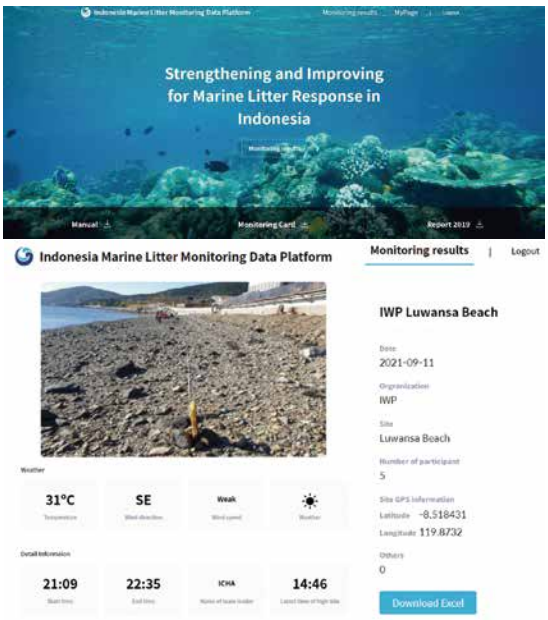
The Results of Closely Cooperating with IWP

IWP (Indonesian Waste Platform), a local non-profit organization based in Indonesia, played an essential role in this project. After monitoring coastal debris with OSEAN during a local workshop in 2019, IWP conducted its monitoring in 2021 by adding additional monitoring sites to existing sites. IWP not only compared trends in marine debris in 2019 and 2021 but also provided monitoring data for a wider region. In addition, in 2021, IWP produced promotional materials for ice bags that Indonesian fishers often use and throw away when fishing. Once the ice in the bags was melted, fishers discarded these plastic bags at sea, which then turned into marine debris. Production and distribution of videos and leaflets to raise public awareness were one of the most significant achievements of this project.

▲ (Left) Marine debris awareness-raising video and (right) leaflet developed by IWP

Indonesia Marine Litter Data Platform: Solutions for Data Collection and Utilization

To help easily collect, manage, and distribute monitoring surveys, OSEAN created a website called 'Indonesia Marine Litter Monitoring Data Platform.' Surveyors taking part in the monitoring survey can easily access and input data regardless of location or time, and managers can also manage the collected data all at once on this platform.



▲ Screenshots of 'Indonesia Marine Litter Monitoring Data Platform'

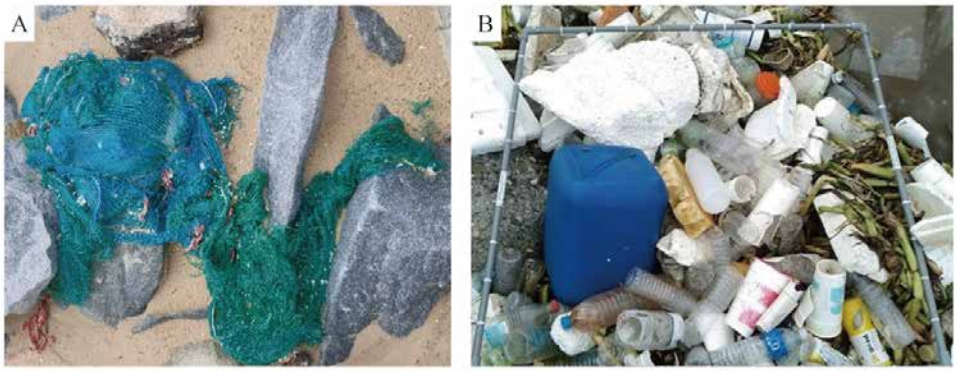
Indonesian Government Officials Anticipate Future Projects with South Korea Using Results From the Project

During discussions regarding future projects, various officials in Indonesia, including public officials, research institutes, and others, gave high evaluation marks on the effectiveness and the outcome of the project. They also expressed their will to develop this project and promote more specific cooperative projects in the near future. OSEAN's Director Sunwook Hong said, "I'm glad that this project was completed successfully. It was a good opportunity for close cooperation between South Korea and Indonesia to carry out this project together for three years. I look forward to overcoming the pandemic and meeting everyone in good health at the upcoming events such as the 7th International Conference on Marine Debris, which will be held in South Korea in September, and the G20 meeting in Indonesia."

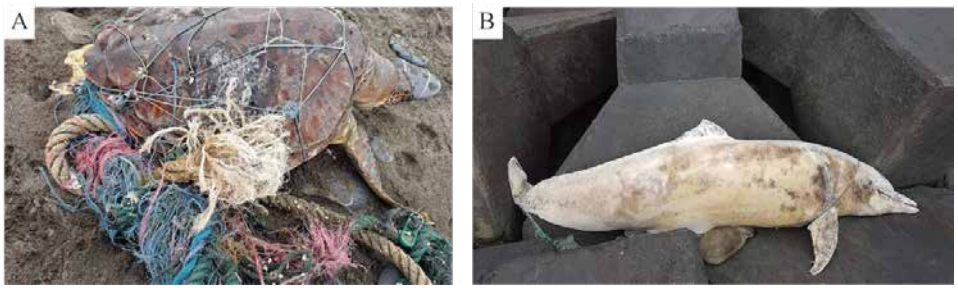
Citizen Science Reports on Plastics' Impact on Wildlife Through the Use of Social Media

Chihsuan Hsu | Research Assistant, IndigoWaters Institute | chihsuan0530@indigowaters.org

In recent years, anthropogenic debris has become a significant threat to the ocean. Previous research indicates that 4.8 million to 12.7 million tons of plastic debris flow into the ocean from land every year, and the damage to marine life is mainly caused by entanglement and ingestion (Kühn et al., 2015). Plastic waste broadly falls into two categories: abandoned, lost, or otherwise discarded fishing gear (ALDFG) and consumer products (Schuyler et al., 2016)(Figure 1). In Taiwan, many marine species have been impacted by marine debris (Figure 2). Even in the stomach of dead cetaceans, ALDFG and consumer products were found. According to the statistics by Ocean Park Conservation Foundation Hong Kong (OPCFHK), shipping and ALDFG were among the most influencing factors affecting wildlife. There are 31 species of cetaceans recorded in Taiwanese waters, accounting for one–third of the global species; meanwhile, five out of seven species of sea turtles can be seen. In addition, Taiwan is under the flight path for many migratory birds that include 674 bird species, of which 30 are endemic species to Taiwan and 54 are endemic subspecies. The vast number of marine life and the status of their health still requires more research for proper evaluation. Therefore, establishing basic information on ALDFG will help expand the work on marine life conservation and help understand the impact on marine life by marine debris.



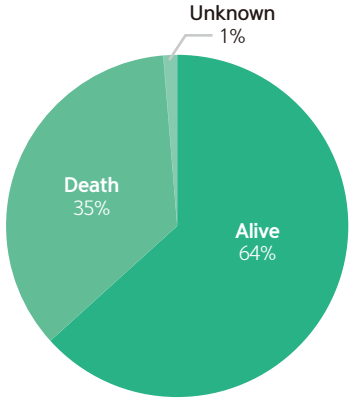
▲ Figure 1. ALDFG (A) and Consumer product (B).



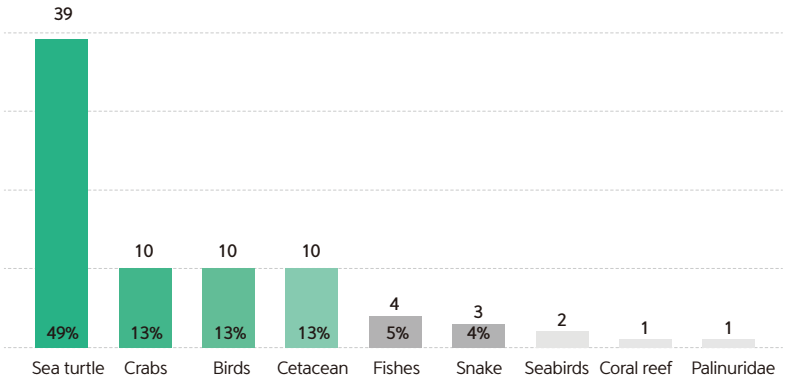
▲ Figure 2. Sea turtle (A) and Dolphin (B) impacted by marine debris.

To promote knowledge of marine debris and to create a citizen science report, we used Google Forms to collect cases on wild animals affected by anthropogenic debris and to investigate the types of species affected by anthropogenic debris. The study used online data and citizen science participation to collect data from 2018 to December 2021. Online data included news and reports from the public sector, Facebook group posts, and Google Form reports. Cases collected from Taiwan amounted to 81 cases so far; 75 foreign cases reported by international students in the Facebook group, were not analyzed in this study. Power BI software was used to analyze the data, including the effects on wildlife, the type of debris, and species.

The results showed that 34% of wildlife that have encountered anthropogenic debris would die (Figure 3). In addition, sea turtles (49%) and cetaceans (13%) were species that were mainly entangled by marine debris. (Figure 4). Cases of entanglement were 84%, followed by cases of ingestion (9%). Inhabitation (4%) and cases of interaction (3%) were relatively few (Figure 5). The most abundant types of debris were ALDFG (80%), and only 16% were consumer products (Figures 6). Among them, the damage caused by ALDFG was mostly entanglement (92%) (Figure 7). In addition, entanglement primarily affected sea turtles (87%), followed by ingestion (13%). In a small number of cases, birds were observed inhabiting (20%), and cetaceans were observed interacting (10%) with marine debris (Figure 8). On the other hand, the reported hotspots were significantly concentrated in areas where there was active fishing, coastal farming, and scuba diving (Figure 9).

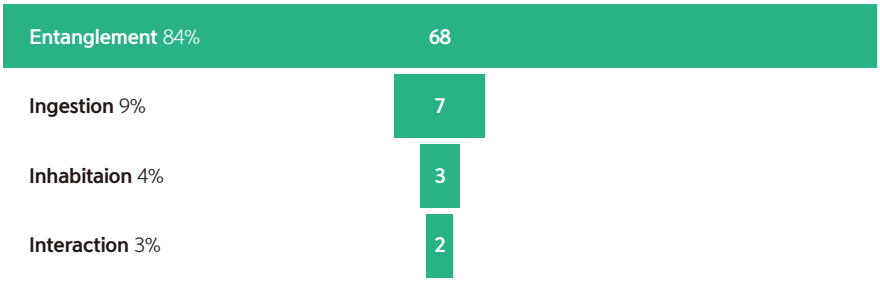


▲ Figure 3. Alive and death proportion

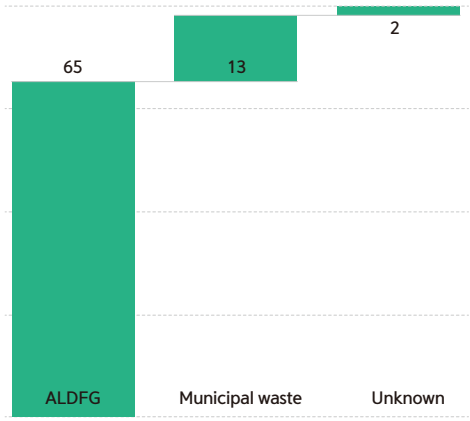


▲ Figure 4. The proportion of affected species

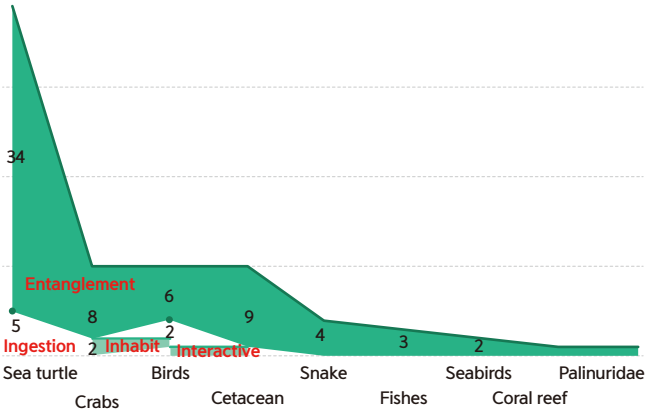
Preliminary results provided the following conclusions: 1) entanglement was the primary cause of harm to wildlife; 2) the observed types of debris were ALDFG, and most of them caused entanglement; 3) this study also relied on long-term data collection to obtain more accurate indicators. Therefore, this study found that anthropogenic debris, especially ALDFG, has a significant impact on marine creatures. It is hoped that the government and industry will implement source control on the types of debris in the future. Non-government organizations, communities, and schools can also use the results for marine citizen science and environmental education.



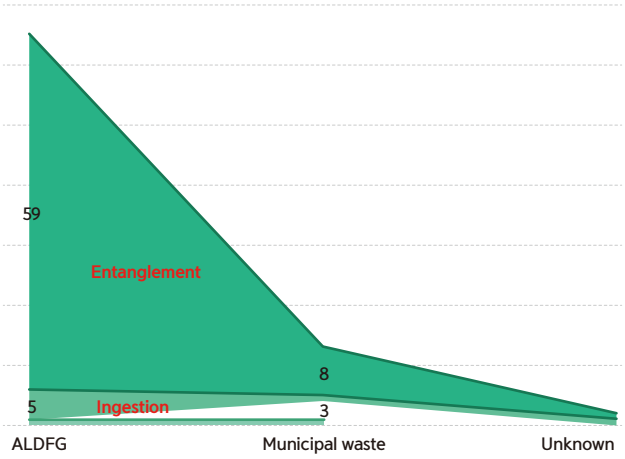
▲ Figure 5. Victim form



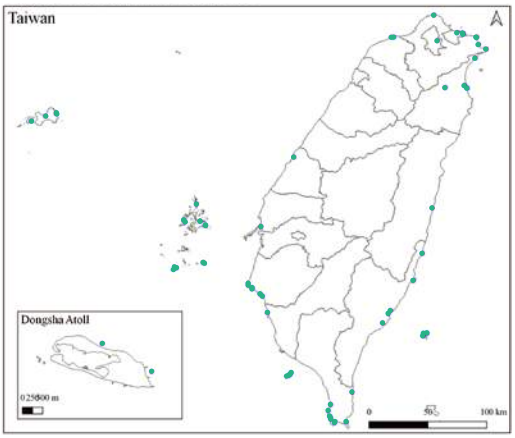
▲ Figure 6. Types of debris



▲ Figure 7. The relationship between debris and species



▲ Figure 8. The relationship between debris and species



▲ Figure 9. The map of reported sites

Reference

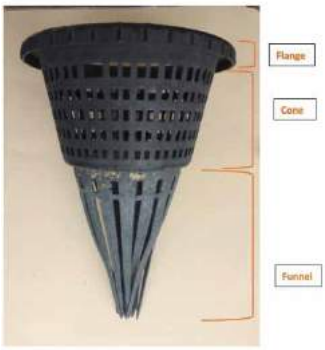
Kuhn, S., Bravo Rebolledo, E. L., & van Franeker, J. A. (2015). Deleterious Effects of Litter on Marine Life. In M. Bergmann, L. Gutow, & M. Klages (Eds.), Marine Anthropogenic Litter (pp. 75–116). Springer International Publishing. https://doi.org/10.1007/978-3-319-16510-3

Schuyler, Q. A., Wilcox, C., Townsend, K. A., Wedemeyer-Strombel, K. R., Balazs, G., van Sebille, E., & Hardesty, B. D. (2016). Risk analysis reveals global hotspots for marine debris ingestion by sea turtles. Global Change Biology, 22(2), 567–576. https://doi.org/10.1111/gcb.13078

Analysis of Derelict Eel Trap Entrances From North Pacific Fisheries and Their Impact on Endangered Hawaiian Monk Seals

Dr. Carl J. Berg | Senior Scientist, Kauai Chapter, Surfrider Foundation | cberg@pixi.com
Lauren C. Blickley | Hawaii Regional Manager, Surfrider Foundation | lblickley@surfrider.org
Cheryl S. King | Eel Trap Project Consultant | sharkastics@gmail.com

Lost and discarded fishing gear poses a major threat to Hawaii's marine and coastal ecosystems. Yet, given its international scope, large geographical range, and difficulties in tracing the source of gear, derelict fishing gear remains a challenging problem. One of the most abundant and easily identifiable items of marine debris on Hawaiian shores are the cone-shaped trap entrances (TE) used to capture Pacific hagfish eels (Eptatretus stoutii) and Black hagfish (E. deani) off the Pacific coast of North America, and hagfish eels (E. burgeri) and conger eel (Conger myriaster) from East Asian waters of Korea, Japan and China (Figure 1).[1,2]



▲ Figure 1. Diagram of an eel trap entrance with parts labeled.

Not only do the traps contribute to the global plastic pollution pandemic, but they are also responsible for harming marine animals, notably endangered Hawaiian Monk Seals (Neomonachus schauinslandi). For example, between the years 2000–2020, the U.S. National Oceanic and Atmospheric Administration (NOAA) reported that TE cones were removed from the snouts of 13 pups and one yearling of the endemic and endangered Hawaiian Monk Seal. These cones were removed from seals in the Papahānaumokuākea Marine National Monument, encompassing the Northwestern Hawaiian Islands. Without removal, TE cones may remain firmly affixed to a seal's muzzle, resulting in the seal unable to forage and ultimately die.[3]

▲ Figure 2. Hawaiian monk seal pup with eel trap entrance stuck on its snout. Photo courtesy of NOAA, Pacific Islands Fisheries Science Center, Honolulu. Permit #848-1695

[1] Ki, S. U., Park, C. K., Lee, K. W., Lee, K. S., Park, J. T., & Lee, W. K. (2021). Ovarian Development of Conger Eel in Korea, Conger myriaster, in Captivity. Development & reproduction, 25(4), 269–277. https://doi.org/10.12717/DR.2021.25.4.269

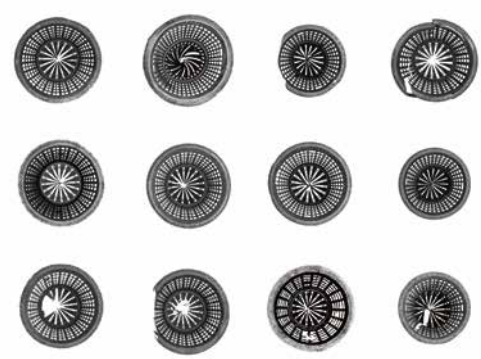
[2] Park, C. D. "Conger-eel fisheries in Korea." Nippon Suisan Gakkaishi 67 (2001): 127–128.

[3] Thea Johanos, (2021) Hawaiian Monk Seal Entanglements in Hagfish Trap Cones, 2000–2020. National Marine Fisheries Service, Pacific Islands Fisheries Science Center, Internal Report IR-21-008.

In 2021, Surfrider Foundation launched the North Pacific Eel Trap project aimed at reducing the number of lost and discarded hagfish traps and thus their impact on Hawaiian Monk Seals. As part of this project, Surfrider Foundation started a public awareness campaign across the North Pacific. Community members are encouraged to collect and remove TE from shorelines to ensure they do not re–enter the ocean, drift via the North Pacific Gyre to Hawai'i, and harm more seal pups. As part of the removal process, Surfrider Foundation requested individuals to take photographs of the collected TE. These photos were emailed to hagfish@surfrider.org and entered into a citizen science database that enabled us to identify and enumerate the different models of TE washing up on Hawaiian shorelines.

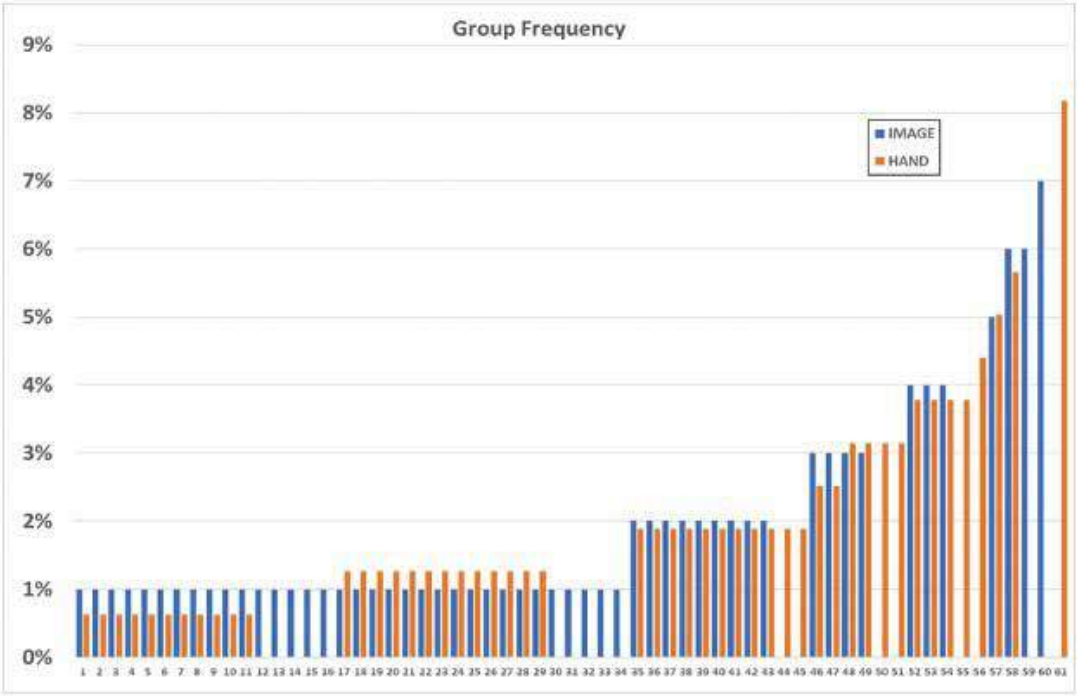
▲ Figure 3. Surfrider Foundation's multi–national request for information on derelict eel trap fishing gear

During the first year of this program, collaborating non–governmental organizations and community volunteers collected and reported over 7,500 TE parts from the Main Hawaiian Islands and the West Coast of the United States. Hundreds of TE were hand–sorted into groups based on a combination of characteristics of size, hole patterns, markings and writing embossed on the flange. Only 26.8% of the 7,480 TE pieces collected as beach debris were whole. In contrast, 45.8% comprised only the top "cone," while 13.2% comprised the finger–like "funnels." In a sample of 812 TE from the island of Kauai, 87.9% were approximately 12.7 cm in diameter across the flange, 7.3% were 11.4 cm, and only 4.8 % were 13.3cm or larger. Additional hand–sorting into groups was done from standardized digital images based on seven characteristics. A project is underway to use computer Machine Learning (AI) to group the thousands of images from collections from all the islands. In doing so, we can develop a more statistically accurate understanding of the relative abundance of the different models.



▲ Figure 4. Examples of digital images of beach–collected TE used for hand–sorting and AI grouping.

Preliminary analysis of the hand-sorted TE and images shows that not all of the models are equally represented in the collections, with just a few models collectively making up 52% of the abundance.



▲ Figure 5. Percentage of abundance of 61 different models of TE. Orange bars represent data from hand sorted TE, while blue bars represent data from sorting of digital images as in Figure 4.
X-axis is the model number and y-axis is the percentage of time it was found in the collection that was sorted

Of a sample of 5,286 TE with complete flanges examined closely, only 8% were embossed with writing. Therefore, we do not know in which country most TE were made and used. One TE was embossed with "Made in Korea" and 136 with the names of companies in Korean lettering, suggesting that these were manufactured and used in South Korea. A total of 62.8% of those embossed had the company name of 영진 (Youngjin) and 18.2% with 유일 (Yooil), making them the most common name-identified TE in the beach collections. It is unknown if these are the most commonly used TE, or if they make up a disproportionate percentage in beach collections due to degredation and being discarded at sea.

Our goal is to collaborate with marine debris specialists throughout East Asia and North America to collect TE from their shores, identify the makers of the most common models, and determine where and how trap entrances are being used. Our eventual goal is to support efforts in the regions of the North Pacific to reduce the loss or discarding of TE into the ocean. Improved design and/or harvesting method could help save Hawaiian monk seals if TE were made so that the cone portion splits apart and thus cannot get entangled on their snouts. Similarly, the use of biodegradable TE would prevent ghost fishing of lost traps which would help improve the fisheries and help save monk seals.

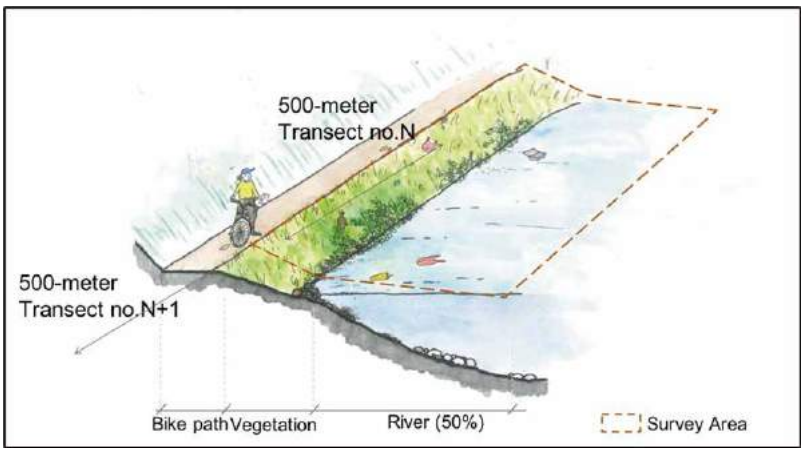
All the Way to the Ocean? Understanding the Distribution and Dynamics of Floating Litter at Two Estuaries of High Population Density With Visual Assessment and Wood Drifters*

Jason Hu | Research Director, IndigoWaters Institute | jason@indigowaters.org

Riverbanks are crucial areas for studying the sources and fates of riverine litter. However, the transport of floating plastics on the downstream riverine surfaces are still unknown due to multiple environmental factors of geography and hydrology. In western Taiwan, 95% of the population lives in fluvial plains. Due to its high population density and high runoff from typhoons and rainfall, several studies assume Taiwan's rivers as one of the rivers that discharge the most amount of plastic waste into the ocean.[1,2] To understand the distribution, movement, and fate of litter in Taiwan's rivers, we designed two projects with the assistance of citizen scientists to collect data on two main rivers in Taiwan.

Cycling and Counting – the Tamsui River

In 2020, we conducted a census survey of rapid assessment at the Tamsui River basin, where eight million people live. Twenty-four citizen scientists cycled and recorded each 500-meter transect along 242 km river banks of Tamsui River and 39 km coastline at the river mouth. They used a 14-liter garbage bag, the designated garbage bag in this region, as the relative unit for quantifying debris volume. They recorded the volume of litter and the top three abundant litter categories through visual quantification. The survey area is shown in Figure 1.



▲ Figure1: Bicycle survey approach and transect boundaries

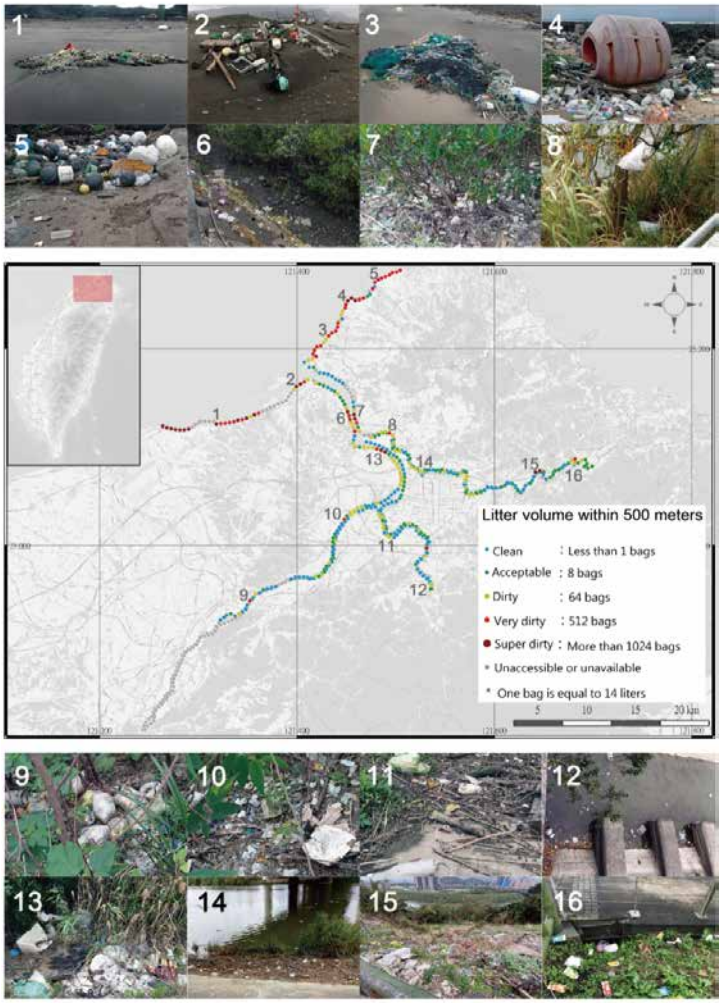
* Part of this article has been published in Schneider, F., Kunz, A., Hu, C. S., Yen, N., & Lin, H. T. (2021). Rapid-Survey Methodology to Assess Litter Volumes along Large River Systems—A Case Study of the Tamsui River in Taiwan. Sustainability, 13(16), 8765.

[1] Lebreton, L. C. M., van der Zwet, J., Damsteeg, J.-W., Slat, B., Andrady, A., & Reisser, J. (2017). River plastic emissions to the world's oceans. *Nature Communications, 8*(1), 15611. https://doi.org/10.1038/ncomms15611

[2] Schmidt, C., Krauth, T., & Wagner, S. (2017). Export of Plastic Debris by Rivers into the Sea. *Environmental Science & Technology, 51*(21), 12246–12253. https://doi.org/10.1021/acs.est.7b02368

There were 648.3 m^3 of debris recorded in 562 transects within the watershed between March and mid-April 2020. We discovered a significant gradient difference between the average density of riverine and coastline litter and found a diversity of composition between the riverine and coastline litter. The average density of coastline litter was 15.3 m3/km, while the density at the downstream river was 2.8 m3/km, and the density of three branches upstream ranged between 0.2 to 0.6 m3/km. The most common types and frequency of coastline litter were plastic bottles (80.3%), Styrofoam foamed fishing buoys (77.0%), and hard plastic buoys (60.7%). The findings indicated that the primary source could be created from local or foreign fishery activities, and bottles could have drifted over a long distance. The most common types and frequency of riverine litter were plastic bags (59.9%), plastic bottles (51.8%), and single-use tableware, cups, and straws (26.9%) that may have come from everyday wastes of neighboring residents. From the photos recorded, the upstream litter was concentrated in some hotspots or recreational areas where residents dumped household wastes. On the other hand, the downstream hotspots were located in the eroding riverbank of the bend and root parts of the mangroves.

According to the data and photos from this survey, we can identify the movement of anthropogenic litter from its source to the ocean on a larger scale. When the trash is littered upstream, it is relatively clean and intact, and its source often points to neighboring residents or visitors. Conversely, the litter downstream that has drifted back and forth with tides and ebbs in rivers looks dirty and are broken into small pieces. Besides, the distribution of downstream litter is more like coastal litter in that it would have been influenced by hydrology, wind, and geology and aggregated into hotspots. (See Figure 2)



▲ Figure 2. A heatmap shows the pollution levels in the study area.
Number 1 to 16 are photos from different places on the map. Number 1 to 5 were taken along the coastline, and 6 and 7 were taken in the mangroves. Number 9, 12, 15, and 16 were taken upstream while others were taken downstream.

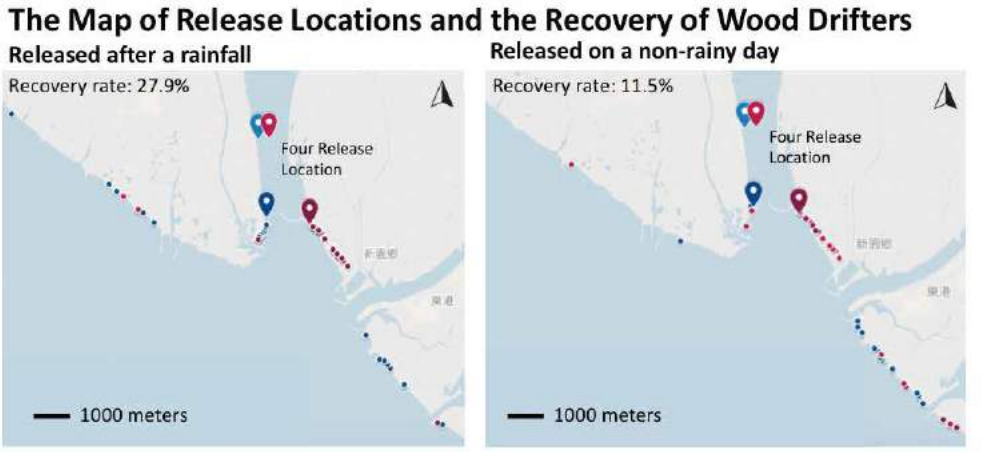
Lost and Found – the Gaoping River

Before the rainy season ended in 2021, we conducted a tracing experiment of riverine litter at Gaoping River, the most extensive fluvial plains in Taiwan with two million inhabitants. From four release locations in the center of the Gaoping River and its riverbanks, we released 1,040 wood drifters that have a low impact on the environment and five tracking devices; this was done two times. One was after a regional rainfall, and the other was during a non-rainy day (Figure 4). These drifters and devices were able to simulate the movement of anthropogenic floating litter, including the traces, the time grounded in riverbanks, and the distance of transportation. From the next day after release to the fifteenth day, citizen scientists surveyed five times along the 12 km riverbank and coastline to record the time and coordinates of wood drifters.

▲ Figure 3. Two sizes of wood drifters are placed on its side (left) and seen from above (right). The measurements of the thick drifter is 15*10*5 cm and 15*10*1.5 cm for thin ones.

▲ Figure 4. Releasing wood drifters at the Gaoping River

We found 205 wood drifters grounded, and the recovery rate was 19.7%. On average, wood drifters were grounded after drifting for three days and two kilometers. 77.1% of the drifters found were still lodged in the riverbanks before entering the ocean (Figure 5). We assumed that the changes in the direction of the wind within four days after releasing might have been the reason that caused drifters to aggregate on one side of the riverbank. The release location (light blue dot in Figure 5) with the lowest recovery rate, which was lower than 1%, was an erosion bank near where the Gaoping River bends. Due to its deep riverbed and faster flow speed at this location, most released drifters flowed into the sea. On the other hand, the release location with the highest recovery rate (dark purple dot) was at the sandbar silted up near the riverbank. Wood drifters only floated for a few hundred meters and grounded at the ebb as a result of slow flow speed and gusty winds that swayed the drifters toward the riverbank (Figure 5).



▲ Figure 5. The recovery map of wood drifters released after rainfall and on a non-rainy day. Two release locations (light blue and pink) are on the bridge that is about 2 km from the estuary; the others (dark blue and dark purple) were at a coastline about 1 km from the estuary.

We found hotspots of grounded wood drifters and the hotspots of marine litter after analyzing the litter composition along 14 locations along the coastline. Among numerous categories of marine litter, the hotspots of wood drifters almost matched up with the distribution of foamed debris such as Styrofoam. However, the difference in size between thick and thin wood drifters (Figure 6) and the rise in water levels due to a bit of rainfall didn't seem to impact the movement of drifters. Nevertheless, understanding how windage and runoff influence the transport of drifters will be necessary.

▲ Figure 6. The recovery map of two sizes of wood drifters. There were more drifters grounded at the left riverbank but it seems like there is no significant difference between the two sizes of drifters.

The movement and fate of riverine litter are pretty complicated. After a two-year study on the two main rivers in Taiwan, we found that discarded riverine litter moves less than marine litter, and that they are found closer to the source. Local small-scale hydrology and geological characteristics such as the shape of the river, vegetation along the riverbank, tide and ebb, and the peak of a flood are all potential causes of litter hotspots and their dynamicity within a short period.

NEW

Introducing IndigoWaters

澄洋環境顧問
IndigoWaters

Established in 2019, IndigoWaters aims to contribute to achieving a clean ocean through scientific surveys and regional cooperation. IndigoWaters' core principle is dedicated to factual data and resource connection to help advance comprehensive policy management on marine debris. Moreover, IndigoWaters specializes in monitoring the source, distribution, hotspots, and temporal and spatial changes of plastic debris in various environments to tackle complicated issues regarding marine debris. In the past three years, IndigoWaters has conducted surveys of coastal debris, riverine debris, and sea bottom debris with partners including government sectors, academies, junior high school students, and local non-governmental organizations (NGOs). With a group of more than 40 trained surveyors, all passionate and enthusiastic, IndigoWaters adeptly arranges large-scale surveys in Taiwan. By continuously monitoring and collecting data on coastal debris, IndigoWaters helps the Environment Protection Administration to prioritize the most polluted coastline for a cleanup. In addition, IndigoWaters has contributed to publishing two guidebooks after conducting coastal surveys and fishermen interviews to address abandoned, lost, discarded fishing gears (ALDFG).

IndigoWaters has also enhanced the work of citizen science. In 2020, IndigoWaters collaborated with multiple NGOs such as Taiwan Turtle Spot, Congratulafins, and Taiwan Environment Information Association to hold a first Marine Citizen Science Carnival which attracted more than 600 participants in one day. Subsequently, IndigoWaters also assisted the Taiwan Ocean Conservation Administration in holding the first Marine Citizen Science Datathon. By analyzing and visualizing data from different NGOs devoted to marine citizen science projects, this provided an opportunity for the public to learn about marine creatures and to understand how to change their behavior in order to protect the ocean. This year, IndigoWaters will coach three local NGOs to convert their data into easily understandable infographics. With the involvement of young researchers, recreational industries, data engineers, and infographic designers, IndigoWaters hopes that long-term data would help raise public awareness on marine conservation in the local communities.

Lastly, IndigoWaters also tirelessly raises public awareness on reducing single-use plastics and promotes the concept of zero waste. By ordering reusable lunch boxes and providing refillable cups, IndigoWaters strives to demonstrate that reducing unnecessary plastic waste is possible. To learn more about IndigoWaters' work please visit https://www.indigowaters.org or email info@indigowaters.org.

ISSN 2287–8971

The newsletter is biannually published by APML.

Asia Pacific Civil Forum on Marine Litter

Japan Environmental Action Network (JEAN)
202, Mansion SOPHIA,
3-4-12, Minami-Cho, Kokubunji-Shi, Tokyo, Japan
http://www.jean.jp Cleanup@jean.jp
+81-42-322-0712 +81-42-324-8252

Our Sea of East Asia Network (OSEAN)
101-210, Daim Sol County, 23-57 Jukrimsamro, Gwangdo,
Tongyeong, Gyeongnam, South Korea
http://www.osean.net osean@osean.net
82-55-649-5224 +82-303-0001-4478

IndigoWaters Institute Co., Ltd. (IndigoWaters)
5F., No. 172, Yongde St., Gushan Dist., Kaohsiung City 804054,
Taiwan
http://www.indigowaters.org info@indigowaters.org
+886 952 534 881

Shanghai Rendu Ocean NPO Development Center
Room 222, Building C, No.633, Eshan Rd, Shanghai, China,
Zip Code 200127
http://www.jintan.org liuyonglun@163.com
+86-21-61762119

Kewkradong Bangladesh
C4 Arambag Eastern Housing, Mirpur-7, Dhaka 1216,
Bangladesh
Muntasir@gmail.com
+88 01911 310 275

ICC Philippines
Units 8 & 9, CCP Bay Terminal, CCP Complex, Roxas Blvd.,
Pasay City, Philippines,
http://sites.google.com/site/iccphilippines/home
coastalcleanupphilippines@blogspot.com
+63917 372 87.02 iccphilippines@gmail.com

Tangaroa Blue Foundation
PO Box 757, Port Douglas, QLD 4877, Australia
www.tangaroablue.org info@tangaroablue.org
+61.410166684

Ocean Conservancy
1300 19th Street, NW, 8th Floor, Washington, DC 20036, USA
www.oceanconservancy.org cleanup@oceanconservancy.org
+1-202-429-5609

Centre for Supporting Green Development (GreenHub)
Planning and Investment Ministry Building, 10th floor, office 1008,
8b Ton That Thuyet, Hanoi, Vietnam
www.greenhub.org.vn info@greenhub.org.vn
+84 4 629 26764

CECR
R.501-502, E1 Building, Trung Tu Diplomatic Compound,
No 6 Dang Van Ngu, Dong Da, Ha Noi,Vietnam.
www.cecr.vn cecr.vn@gmail.com
+84 243 972 8063/64.

Indonesian Waste Platform
www.indonesianwaste.org nina@indonesianwaste.org
+62 813-5344-6507

ISSN 2287-8971