

Asia Pacific Civil Forum on Marine Litter

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# Preface

Dear readers,

At the 5.2 United Nations Environment Assembly (UNEA) last March, member states unanimously reached a monumental agreement to create a legally binding treaty to tackle plastic pollution. Tremendous efforts are taking place all over the globe to pass the agreement at the next 6th UNEA.

In our newsletter, more and more different groups are sending us their amazing news. In the opinion section, you can hear the voices of Bangladesh action groups on microplastic pollution and critical opinions of Australia's Great Barrier Reef ecobrick. In the activity section, there is news about the 7th Marine Debris Conference (7IMDC) held in Busan, Korea last September. The IMDC had been held in the US from the 1st to the 6th, but for the first time, it was held in Korea in a place other than the US. OSEAN, which is in charge of APML's secretariat, has made many contributions, such as organizing sessions, presenting academic research results, operating exhibitions and booths, and organizing International Coastal Cleanup as a co-hosting organization, and APML members actively participated. We have more news on Vietnam's good example of women-centered waste management, International Waste Platform's educational program promotion, ICC Philippines' expansion of ICC through collaboration with local governments and high schools, response to the open plastic waste incineration problem in Pakistan's remote islands. As a research activity, CSIRO Research Institute in Australia reported the news that the Global Plastics Leakage Project is spreading to 18 countries. In a place that has not been heard of before, Malaysia introduced the litter audit activity to find the cause of occurrence using information on the surface of garbage.

Civic groups and research institutes tend to pay more attention and activity to the plastic problem than ever before. Citizen science plays an important part in the activities of civic organizations, and women's roles and solutions through education are also important. Researchers are getting more data through citizen science. Governance among civic groups, schools, research institutes, and governments is increasingly important. At least through this Marine Litter News Issue, the boundaries seem to be fused and developed in a desirable direction, which I think is very encouraging as an editor.

I am deeply moved and respectful to the members of APLM and our collaborators who are doing their best to end plastic pollution. 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. We promise to be with you with touching and surprising news in the next issue.

With gratitude

*Sunny Hong*



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# Microplastic, Cosmetics, and Our Responsibilities

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This article was originally written in Bangla language and published on bdnews24.com  
Link: <https://bangla.bdnews24.com/opinion/l4amnrflug4>

We don't need to introduce you all to the word microplastic. In the preceding decade, microplastic was one of the most talked about words in the world. Since microplastic can often be less than 5 millimeters, it can be minuscule, microscopic, and practically invisible. No artificial substance is more dangerous than which we intrinsically connect in our daily life. We either do not know or do not understand that this is true, or even if we know, the microplastic size is so small that we tend to ignore it.

Microplastic is just a fragment of any kind of plastic. It could be any plastic whatsoever. Any substance that has a physical form and is built with plastic compounds or polymers, all fragments of that substance will exhibit fundamental properties of that plastic. Irrespective of how small the plastic is or what name is given to it, it remains, in the end, plastic.

According to popular notion, when larger plastics disintegrate or their constant breakdown results in their reduction, microplastic is only formed. It is not true that microplastic can be created only after disintegration. Our overall social image of microplastic is not wrong but perhaps quite inadequate. The usage of microplastic can be seen in all the products of our daily use, and we are often unaware of it. A simple example is that of cosmetics/beauty products.

Every year about 3,800 tons of microplastic are released into the environment, and it comes only from the cosmetic products we use daily. This statistical data has been received from Europe only. Although there are specific international parameters or guidelines for plastic use, it is now a proven truth that cosmetic goods have plastic (synthetic polymer), irrespective of the name it exists as<sup>1,2</sup>.

Our civilization is heavily plastic-dependent. Plastics are present in products ranging from cosmetics and paints to medicines and producers of agricultural goods. From these kinds of goods, Countries from European Union alone produce nearly 42,000 tones of plastic-based pollutants in microplastic form every year<sup>3</sup>. Once this microplastic produced from common goods used in our daily life is mixed with the environment, no mechanism has been discovered to date to collect them back.

In some cases, certain cosmetic goods have in their constituents nearly 90% of synthetic polymer, plastic polymer, or simply plastic<sup>4</sup>. Once the tiny or microscopic components of these cosmetic goods are used, it goes through the process of washing, from our bathrooms, toilets, rivers, canals, and ponds (where the washing happens) to the processing of sewage systems. The amount of plastic-like elements present in this product<sup>4</sup> will equal the amount of plastic-like elements that will be added to the environment. If it is possible to purify the water in water treatment plants, the residue left after purification is mostly let to be mixed with the soil. But it is not like these treatment plants are not useful at all.

Cosmetics manufacturing companies do not list plastic as an ingredient used in their showroom products. They list ingredients in the names of water-soluble polymer/WSP, liquid, semi-solid, biodegradable, etc. All of these are artificial or engineered nano-plastics. It remains plastic even when sieved through standards of regulations for the ease of enterprises.

Water soluble polymers can be defined as a kind of plastic that dissolves in water. And due to this, it is used in different types of cosmetics, paints, building materials, agricultural products, etc. Polyvinyl alcohol is another kind of water-soluble polymer manufactured the most in the world in the past century and the most frequently used too –<sup>5</sup> 650,000 tons per year<sup>6</sup>.

It is said that these water-soluble polymers dissolve in water completely, but there's a catch in the story. When the density of polymers increases, the tendency to dissolve decreases. It is further complicated when a distinct amount of catalyst is required for the dissolution. For example, a particular amount of humidity, certain kinds of microorganisms, and a specific amount of time and temperature all influence the dissolution process. The time taken can be altered if the water-soluble polymer is passed through a water treatment plant. Even if that happens, the exact number of controlling criteria needed for all of it to dissolve completely in water is impossible to achieve outside a laboratory setting. These facts show that no matter what is said, a more significant part of the plastic polymers released from water-soluble polymers would eventually end up in the environment<sup>7</sup>.

Certain studies have revealed that out of ten cosmetics in the market, microplastic can be found in nine, but it is not listed in the list of ingredients used in that particular product<sup>8</sup>. These studies have been conducted on products from the European market. At the same time, out of the 144 products taken from the Asian market, 68 products were for the body, 31 were for use on the face, and the others were different cosmetics. The results of this study have shown the discharge of microplastic in the environment<sup>2</sup>.

There are numerous other such examples, and they will always be. But the truth is presented to us as a half-truth – no company explicitly mentions whether or not the products we use every day have plastic in them. It is challenging for commoners like us to understand the intricacies of scientific explanations. Is anyone simply telling us, 'What you're putting on your face doesn't contain any plastic?' People who are producing these goods are also greenwashing<sup>9</sup> us. They are telling us that this is good, use it. They say this is eco-friendly, and we swarm to buy it.

But what is to be done about it? Just like everyone else, you and I are also concerned about this planet earth. And this is no exaggeration. We feel pity in our ways: maybe we become dazed with guilt. But what is to be done? We cannot stop beautifying ourselves everyday. Everyone wants to appear beautiful in front of themselves or front of others. But let us be attractive for the sake of our planet, at least for a day. Be it in a week, a month, or a year. Let us be beautiful without using harmful plastic cosmetics.

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<sup>1</sup> Assessment of Toxicity and Biodegradability of Poly (vinyl alcohol)-Based Materials in Marine Water Olalla Alonso-López, Sara López-Ibáñez, and Ricardo Beiras

<sup>2</sup> Personal Care and Cosmetic Products as a Potential Source of Environmental Contamination by Microplastics in a Densely Populated Asian City Saidu M. Bashir, Sam Kimiko, Chu-Wa Mak, James Kar-Hei Fang and David Gonçalves

<sup>3</sup> ECHA, Microplastics, under "What are the concerns?" (n.d.). Helsinki: European Chemicals Agency. Accessed: February 2022. Available at: <https://echa.europa.eu/hot-topics/microplastics>.

<sup>4</sup> Leslie, H. A. Review of microplastics in cosmetics: Scientific background on a potential source of plastic particulate marine litter to support decision-making (2014). Amsterdam: Vrije Universiteit. Accessed: February 2022. Available at: <https://research.vu.nl/en/publications/review-of-microplastics-in-cosmetics-scientific-background-on-a-p>.

<sup>5</sup> Chiellini, E.; Corti, A.; Solaro, R. Biodegradation of Poly(Vinyl Alcohol) Based Blown Films under Different Environmental Conditions. *Polym. Degrad. Stab.* 1999, 64, 305–312.

<sup>6</sup> Xu, S.; Malik, M.A.; Qi, Z.; Huang, B.T.; Li, Q.; Sarkar, M. Influence of the PVA Fibers and SiO<sub>2</sub> NPs on the Structural Properties of Fly Ash Based Sustainable Geopolymer. *Constr. Build. Mater.* 2018, 164, 238–245.

<sup>7</sup> Arp, H. P. H. & Knutsen, H. 'Could We Spare a Moment of the Spotlight for Persistent, Water-Soluble Polymers?' (2019). In *Environmental Science & Technology* 54(1), 3–5.

<sup>8</sup> Statista. Leading 20 health and beauty brands ranked by consumer reach points in Europe in 2020 (May 2021). Accessed: February 2022. Available at: <https://www.statista.com/statistics/900345/most-chosen-health-and-beauty-brands-europe/>.

<sup>9</sup> <https://en.wikipedia.org/wiki/Greenwashing>

# EcoBricks Found on Coasts of Australia's Great Barrier Reef Region

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A new type of litter item, the EcoBrick, has been washing onto Australia's shores over the past few years. EcoBricks are lastic bottles that are packed tightly with clean, dry, used plastics, including soft and hard plastics, to a set density so that they can be used as building blocks for construction projects or art pieces (Figure 1). They were first created in Guatemala in 2003 as a way to contribute to a circular economy by cleaning up plastic litter and stopping plastic from breaking up into microplastics<sup>1</sup>. Since then, the EcoBrick movement has grown globally with 140,264 EcoBricks from 151 countries registered on [gobrik.com](http://gobrik.com) and unknown amounts unregistered<sup>2</sup>. EcoBricks have even become a TikTok trend with the #Ecobrick being viewed over 18 million times<sup>3</sup>.

EcoBricks are known as a sustainable initiative for recycling plastics that are found in the environment. The benefits of creating EcoBricks include sequestering plastics that would otherwise enter the environment and containing them in a much smaller space, providing a low-cost construction material that can act as a natural insulator and be used over and over again. EcoBricks also help to raise awareness of the global plastic pollution crisis, can minimise air pollution by reducing the amount of plastics incinerated at landfills and can provide economic incentives to local communities when NGOs pay for them. However, the question remains whether the benefits of EcoBricks outweigh the disadvantages.

The disadvantages of EcoBricks are economic, health-related and environmental. In an economic sense, EcoBricks sound like a free and easy way to create a construction material. However, civilians must be trained on how to make EcoBricks because they must be created in a specific way in order to be safely used as construction material. This includes only using clean, dry plastics as fillers because if the material is wet or dirty then bacteria, mould and dangerous gases can build up in the plastic bottle. EcoBricks are very labour intensive when made correctly – requiring 30–60 minutes for each EcoBrick<sup>4</sup>. Although the materials for the EcoBricks are “free” if they are collected as a waste product, this labour cost can be immense, especially considering that buildings constructed from EcoBricks can range from 1000–10,000s bricks required<sup>5</sup>. Additionally, the plastic bottles will break down when exposed to sunlight and the elements and therefore it is recommended to cover the EcoBricks completely in other compounds, such as cob when used in construction projects to prevent degradation (Figure 2). If they are left exposed to the sunlight then the plastics can leach chemicals into the environment damaging the soil and potentially entering the water table<sup>6</sup>. Microplastics and chemicals leached from the bottles can be dangerous to wildlife and humans<sup>7,8</sup>. Many plastic chemicals are known to be cancer-causing agents and

<sup>1</sup> Hopkins, R. (2014, May 29). EcoBricks and education: how plastic bottle rubbish is helping build schools. *The Guardian*. <https://www.theguardian.com/lifeandstyle/2014/may/29/ecobricks-and-education-how-plastic-bottle-rubbish-is-helping-build-schools>

<sup>2</sup> Alliance, G. E. (n.d.). GoBrik. [www.gobrik.com](http://www.gobrik.com). <https://www.gobrik.com/#global/>

<sup>3</sup> TikTok Wants You to Make “EcoBricks” From Plastic Trash. Should You? (n.d.). LX. <https://www.lx.com/climate/tiktok-wants-you-to-make-an-ecobrick-from-plastic-trash-should-you/55946/>

<sup>4</sup> Taaffe, J., O'Sullivan, S., Rahman, M. E., & Pakrashi, V. (2014). Experimental characterisation of Polyethylene Terephthalate (PET) bottle Eco-bricks. *Materials & Design*, 60, 50–56. <https://doi.org/10.1016/j.matdes.2014.03.045>

<sup>5</sup> karensouthall. (2019, July 1). The House that EcoBrick built. *Two Steps Freelance*. <https://twostepsfreelance.com/2019/07/01/building-with-ecobricks/>

<sup>6</sup> Hall, S. (2020). What are EcoBricks and are they a Solution to Plastic Pollution? AZO Cleantech. <https://www.azocleantech.com/article.aspx?ArticleID=1054#:~:text=These%20non%2Drecyclable%20plastics%20are,aquatic%20plant%20and%20animal%20life>

<sup>7</sup> Kibria, G., Nugegoda, D., & Haroon, A. K. Y. (2022). Microplastic Pollution and Contamination of Seafood (Including Fish, Sharks, Mussels, Oysters, Shrimps and Seaweeds): A Global Overview. *Emerging Contaminants and Associated Treatment Technologies*, 277–322. [https://doi.org/10.1007/978-3-030-89220-3\\_14](https://doi.org/10.1007/978-3-030-89220-3_14)

<sup>8</sup> Takada, H., Koro, M., & Kwan, C. S. (2021). Marine Plastic Pollution: Chemical Aspects and Possible Solutions. *Current Topics in Environmental Health and Preventive Medicine*, 83–92. [https://doi.org/10.1007/978-981-16-6249-2\\_10](https://doi.org/10.1007/978-981-16-6249-2_10)

more research is needed to understand the impacts of microplastics on human health<sup>9,10</sup>. Plastics are also highly flammable so when they are used as a building material in lower socioeconomic developments that use open flames as light and for cooking it can lead to flammable living spaces. Environmentally, EcoBricks don't address the cause of plastic pollution but instead only address the symptom. Rather than stop the use of plastics at the source by reducing consumer consumption, EcoBricks encourage people to collect and save the plastics that they use so they can create the EcoBricks and ultimately delay plastic pollution issues into the future. In fact, there are anecdotes that indicate the general public in some countries used more plastics in order to create EcoBricks<sup>11</sup>. This is linked to a lack of awareness of the downsides of plastic. Finally, Tangaroa Blue Foundation, an organisation focused on removing and preventing marine debris, has recorded 68 EcoBricks in beach clean-ups along the coast of Queensland, Australia. The continued collection of EcoBricks in beach clean-ups would also indicate that they in themselves are becoming a source of plastic pollution in the ocean.

It is important that we continue to collect data on where EcoBricks are being made, what materials are being used to create them and where they are found in the environment as a source of litter. The Australian Marine Debris Initiative (AMDI) Database is an online platform supported by Tangaroa Blue Foundation that allows volunteers and organisations to submit and view data, including all EcoBricks, from beach and urban clean-ups around Australia. Tangaroa Blue Foundation and 10% for the Ocean<sup>12</sup> are trying to determine the source of the EcoBricks we are collecting on Australian beaches and it would help us to know about EcoBricks in your country. We would be grateful if you could take a few minutes to answer these 10 questions found in the survey below:

<https://forms.gle/TBaw8K68KQ9wZwQz9>

If you have any questions or more information about EcoBricks in your country please reach out to us at [lincoln@tangaroablue.org](mailto:lincoln@tangaroablue.org)



▲ Figure 1 : EcoBricks found along Australia's coast by Tangaroa Blue Foundation



▲ Figure 2 : Global Ecobrick Alliance building a wall with EcoBricks using cob, a natural building material, to bind the EcoBricks together.  
<https://www.ecobricks.org/earth-methods/>

<sup>9</sup> Jiang, Y. (2021). Recent Progress and Research Trends in Microplastic Pollution and the Potential Health Risks. *Bulletin of Environmental Contamination and Toxicology*, 107(4), 575–576. <https://doi.org/10.1007/s00128-021-03367-5>

<sup>10</sup> Prakash, A., Thaniem, M., & Muniyandi, M. A Review on Emerging Microplastics Pollution in the Marine Environment: A Threat to Seafood Security and Human Health. <http://dx.doi.org/10.13140/RG.2.2.35878.19528>

<sup>11</sup> Unknown. (2018). Changing the Dialogue About "Waste" with EcoBricks. *Local Futures*. <https://localfutures.medium.com/ecobricks-plastic-waste-downstream-technology-and-system-level-change-646e0f891ba1>

<sup>12</sup> 10 percent for the ocean. (n.d.). 10 Percent for the Ocean. Retrieved August 23, 2022, from <https://www.10percentfortheocean.org/>

# Contributions of Asia–Pacific Civil Forum on Marine Litter Members at the 7<sup>th</sup> International Marine Debris Conference

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The 7<sup>th</sup> International Marine Debris Conference (7IMDC), the world's longest–running international conference on marine litter, was held in Busan, South Korea. It garnered the attention of many scientists, researchers, academics, civil society organizations and environmentalists eager to meet and learn after socially distancing for two years. Among the enthused were members of the Asia–Pacific Civil Forum on Marine Litter (APML). As a regional group comprising of civil society organizations, research institutions, and activists in the Asia–Pacific, APML members have been avid attendees of IMDC for many years and took this opportune moment to share their work during 7IMDC.

Trang Nguyen and colleagues from Center for Supporting Green Development (GreenHub) presented a poster that illustrated how citizen science can be used to establish baseline measurements that can help understand the quantification and characterization of marine litter along the Vietnamese coast. Other members of APML, including Our Sea of East Asia Network (OSEAN) and IndigoWaters Institute (IndigoWaters) also presented posters on monitoring and citizen science. Dr. Sunwook Hong from OSEAN and Minsoo Woo from the Korea Institute of Ocean Science and Technology introduced a new digital citizen science program called Ocean Knights and IndigoWaters presented posters on assessing marine litter volumes in rivers using a rapid survey methodology and on alternatives to traditional data collection. In addition, IndigoWaters also had poster presentations illustrating the type and composition of anthropogenic debris, the harm inflicted on marine life due to marine debris, and a guidebook on abandoned, lost, or otherwise discarded fishing gear (ALDFG) sources in East Asia.

There were nine technical sessions at 7IMDC with monitoring and research sessions having the most number of oral presentations. Jongsu Lee from OSEAN presented on how citizen science efforts in South Korea have led to effective beach monitoring and Ning Yen from IndigoWaters highlighted the importance of collecting monitoring data for policy change purposes while Jason Hu, also from IndigoWaters, introduced a study using GPS drifters to understand the fate of floating litter. Besides co–chairing one of the monitoring sessions, Dr. Hong also presented a decision–making framework that can help with choosing an appropriate shoreline monitoring methodology and Dr. Jongmyoung Lee from OSEAN introduced a collaborative study that used GIS–based spatial exploration and analysis for selecting monitoring sites.



During a technical session on sea-based sources, Jongsu presented a study examining solid waste generated from ships in South Korea and in a technical session on international collaboration Dr. Lee introduced an international development project titled Enhancement of Marine Litter Management in Manila Bay to underscore the collaboration between South Korea and the Philippines. Outside of technical sessions, another important collaboration among OSEAN, Korea Marine Environment Management Corporation (KOEM), Indonesian Waste Platform, and Communities Organized for Resource Allocation was showcased during a luncheon. Attendees got a glimpse on how OSEAN and KOEM collaborate with stakeholders in Indonesia and the Philippines and learned how regional cooperation can help reduce the generation and impact of marine litter.



▲ APML members after dinner in Busan, South Korea

On the last day of 7IMDC, APML members also helped with a beach cleanup that was jointly organized by OSEAN, KOEM, Ocean Conservancy, and the United Nations Environment Programme. More than 200 participants helped collect and record beach debris found on Busan's Gwangalli Beach and they even had a chance to sift microplastics using the equipment provided by OSEAN. The week-long participation and contribution of APML members at 7IMDC was undoubtedly valuable in many ways and it also strengthened our solidarity. While many of us already look forward to the 8th IMDC, 7IMDC will certainly have a special place in the hearts of many APML members and be fondly remembered for years to come.



▲ 7IMDC participants at Gwangalli Beach after a beach cleanup

# Empowering Women for Collective Actions in Plastic Reduction, Collection, and Recycling

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Plastic waste pollution is a serious environmental issue in Vietnam. An estimated 0.28 to 0.73 million tons of plastic waste are released into the environment each year (Jambeck et al., 2015<sup>1</sup>). In 2016, 0.57 million tons of plastic waste not properly managed leaked into Vietnam's coastal regions (Law et al., 2020<sup>2</sup>). Centre for Supporting Green Development (GreenHub), established in 2016, is a Science and Technology Organization aiming to create a community to practice sustainable lifestyles. From 2020 – 2023, under the United States Agency for International Development sponsorship, GreenHub implemented the project "Local Solutions for Plastic Pollution" (LSPP) in Da Nang, Hoi An, and Hanoi. To carry out the project, GreenHub has collaborated with the Women's Union of all the mentioned cities to develop community models and initiatives regarding production, collection, and recycling. The approach of the model is shown through the 6S model: Situation – Solution – Support – Supervision – Scale-up – Sustainability.

## In Da Nang: City women participate in community waste management during the Covid-19 epidemic

Within the framework of LSPP, GreenHub supports the initiative "Mobilizing the Green Living Clubs to participate in waste management in the community under the context of the COVID-19 pandemic" in 2021–2022. GreenHub provided training on plastic waste and environmental health to the members of the Women's Union, supported Da Nang Women's Union to organize creative communication campaigns about plastic waste reduction, and provided equipment and vehicles for the Women's Union to collect recyclable waste.

The Women's Union of Da Nang City implemented the initiative and established seven Green Living Clubs in seven districts with a total of 126 members. GreenHub and the City Women's Union supported seven clubs with seven waste collection bins for hazardous and recyclable waste with clear instructions and seven waste collection vehicles to make the collection activities more efficient.



▲ Figure 1 : Bag-shaped Bin and Vehicle for collection

<sup>1</sup> Jambeck, J.R., Geyer, R., Wilcox, C., Siegler, T.R., Perryman, M., Andrady, A., Narayan, R. and Law, K.L., (2015) Plastic waste inputs from land into the ocean. *Science*, 347(6223):768–771.

<sup>2</sup> Law, K. L., Starr, N., Siegler, T. R., Jambeck, J. R., Mallos, N. J., & Leonard, G. H. (2020). The United States' contribution of plastic waste to land and ocean. *Science advances*, 6(44), eabd0288.

After nearly seven months, seven Green Living Clubs have mobilized 80% of local people to participate in sorting and collecting 32,410 cans; 1,464,024 kg of plastic waste; 707,180 kg of paper; 753,750 kg of metal, accounting for nearly 22 million VND to support 98 disadvantaged individuals.

The initiative has helped the Women's Union to promote its role in directing and guiding the clubs to deploy activities, increase the capacity of the association's staff and strengthen the communication in waste classification. At the same time, the initiative has also supported the clubs in attracting and promoting community participation in waste classification. Through the initiative implementation, the Women's Union has learned to organize activities based on the current situation of the locality, collecting opinions and needs from the residential community for implementation, mobilizing the participation from the community, and performing well the two-way communication with the locality. Furthermore, regular activities have been organized by the Women's Union and Green Living Clubs to help local people feel familiar and motivated.

With the active contribution to environmental protection in general and plastic waste reduction in particular of Green Living Clubs and the City Women's Union in the past time, GreenHub has been continuing to accompany and support them soon, specifically in capacity building for club members in organizing communication events about plastic waste to the community.

### In Hanoi – Bac Tu Liem District:

In Bac Tu Liem district, the domestic waste collected and transported in 2021 was 99,434 tons. When the GreenHub project approached the Women's Union of Bac Tu Liem district for the first time in 2021, there were specific concerns, mainly when the responsibility of environmental protection lies with everyone, so it cannot be solved quickly. Thus, the fact that Bac Tu Liem Women's Union is accompanying GreenHub in a big project on plastic waste is indeed an ambitious mission. Among the series of activities GreenHub carried out with the District Women's Union over the past six months, there are three main activities, including i) the practice of waste classification and treatment at households; ii) the contest "Bac Tu Liem women join hands to reduce plastic waste"; and iii) the recycled playground in the community.



▲ Figure 2 : Training on making enzymes from organic waste for Bac Tu Liem Women's Union

GreenHub has accompanied the Women's Union to implement the methods of developing a waste classification, collection, and treatment habit at each household. After providing training, more than 500 Women's Union members took lessons on waste classification and treatment methods, such as recycling waste, making organic fertilizer from compost, making enzyme dishwashing liquid, etc. In addition, the contest "Bac Tu Liem women join hands to reduce plastic waste" brought incredible outcomes. Nearly 38,5 tons of waste was collected by the Women's Union, of which plastic waste accounts for around 10.1 tons. Another model is the community recycled playground in Lien Mac ward, where old wheels and discarded ceramic pieces have been used for development, spreading the message "Waste as a resource."



▲ Figure 3 : Lien Mac playground is made from plastic waste

### Conclusions

The role of women in plastic waste management is crucial. Acknowledging this, GreenHub has promoted cooperation with the Women's Union at all levels to perform many meaningful activities, movements, and compelling, effective models. By applying three principles, "Co-creation," "Capacity building," and "Expertise sharing," the Women's Union has actively promoted initiatives to operate more efficiently and link business models with startup initiatives. The essential factors for this success include i) the local women's leadership and entrepreneurship; ii) the joint effort of both men and women in model implementation to create social values and contribute to local environmental protection actions for a greener Vietnam.

The lessons from Women's Unions' cases are valuable to contribute to replicating the best practices of the model "Collection and classification of waste", turning waste into money, raising funds for social work, humanity work, and grassroots activities to other places. Those environmental protection models can create livelihood, economic development, and startup opportunities to encourage women's interest and participation. After the communication and implementation phase, men and women are encouraged to overcome gender inequality and prejudice in solid waste management and plastic pollution environmental problems. In addition, it strengthens cooperation to implement environmental protection projects and initiatives between the Women's Union and non-profit organizations, thereby promoting the effectiveness and sustainability of environmental protection activities.

# Advocating for Including Environmental Education Programs in National Curricula and Action Plans

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The International Waste Platform (IWP), established in 2018, currently comprises members from 35 countries<sup>1</sup> following a common vision. Its members commit themselves to align their objectives, support the implementation of strategies on ocean and climate action, as well as to share ideas, best practices, programs, knowledge and opportunities that also include reducing plastic debris from the source. IWP shares this collective knowledge among its members and disseminates it to open access educational resources for its members and their communities through the <https://international-wasteplatform.org> website.

In 2022, IWP particularly focused on the promotion of formal and informal environmental education programs by presenting best practice approaches at conferences and by striving for a more effective cooperation that embodied a collective approach.

Waste management and recycling are underrepresented topics in national curricula (UNESCO, 2016), and the COVID-19 pandemic aggravated this situation by disrupting school schedules and by creating unmanageable levels of biomedical plastic wastes (Benson et al. 2021). As a result, opportunities to introduce up to date information and programs addressing emerging issues like plastic pollution have become scarce. To make matters worse, countries often lack personnel and financial resources to develop and run such educational programs. Therefore, IWP has been strongly advocating for an inclusion of environmental education programs in national curricula and action plans. It is of fundamental importance that children – from a young age onwards – learn how they can act on a personal level to prevent, reduce and potentially recycle plastic waste and also learn how to respond to climate change.

To this end, IWP members contribute and provide solutions for the UN Sustainable Development Goals (SDGs). We leave no one behind by offering and providing free access to existing approaches and learning materials and by helping with translations and the dissemination of learning materials even in the most remote regions (SDG 4). Furthermore, IWP members develop programs to combat climate change and to tackle pollution in the sea and on land (SDG 13, SDG 14, and SDG 15). We strongly support creating synergies by knowledge sharing and follow a multi-stakeholder approach to build on local knowledge of contributors and to seek opportunities for future collaboration (SDG 17).

Most recently, IWP members from Australia, Indonesia, Myanmar and South Africa presented their replicable and successfully implemented programs at the Second International Conference of the African Marine Waste Network – Towards Zero Plastics to the Seas of Africa in May 2022 and they also presented at the 7th International Marine Debris Conference (7IMDC) in Busan, Republic of Korea in September 2022. Through these conferences, IWP members have been raising awareness and have been actively ensuring that their voices are heard.

If you are interested in learning more about IWP and wish to connect with us, please use the following QR code.



#### Literature

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<sup>1</sup> Inter alia OSEAN from South Korea.

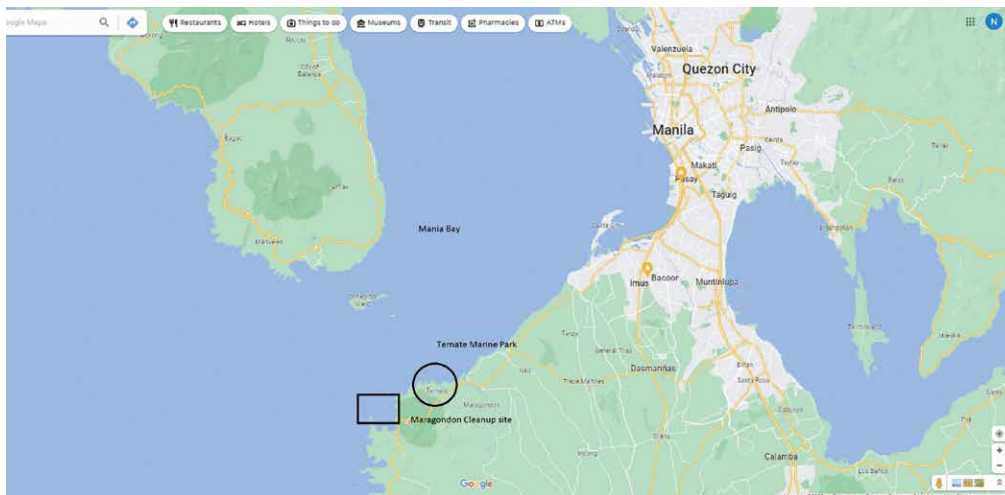
## ICC Philippines At Work

Noemi S. Alvaran RN MCMDR | ICC Philippines- Cavite Coordinator | babebee03@yahoo.com

September 2022 has been a busy month for ICC Philippines. Aside from the annual International Coastal Cleanup, in which the Philippines actively participates, coordinated by the ICC Philippines with all sectors of civil society, they also organized a Biodiversity Assessment and Monitoring System Seminar in cooperation with the Department of Environment and Natural Resources (DENR) in the Province of Cavite on September 28, 2022. President Geronimo P. Reyes of ICC Philippines, Inc., a marine scientist wanted to upgrade the skills and capabilities of the volunteer scuba divers who are very passionate about protecting the natural coral reefs of Manila Bay. The participants learned methodologies implemented by the marine scientists of DENR, UP Marine Institute, and other research institutions in the country on how to assess and document the kind of litters collected from underwater and the types of corals with consideration of their overall condition. The skills acquired through this training will make every underwater cleanup and coral reef monitoring more science-based, where data gathering can be used as a reliable source of information for the local government and other concerned agencies.



▲ Figure 1 : Biodiversity Assessment & Monitoring System Orientation Seminar led by ICC Philippines President Geronimo P. Reyes in cooperation with the Department of Environment and Natural Resources (DENR). Participants were joined by the Philippine Coast Guard Special Operations Unit, the Coast Guard Auxiliary Scuba Divers, and the volunteer scuba divers for marine conservation



▲ Figure 2 : Location of Ternate Marine Park and the ICC 2022 Cleanup site in Maragondon

ICC Philippines has been an active partner of the Cavite Provincial Government Environment Natural Resources Office (PG ENRO) in many marine environment protection activities, such as coastal and underwater cleanups, mangrove rehabilitation, and coral reef conservation. They were invited as a partner organization during the launching of the Department of Environment and Natural Resources program for solid waste management through a mobile game application called Philippine's Trash Buster last September 17, 2022 in Ternate High School, where over a hundred students and teachers attended. The history of International Coastal Cleanup, its missions and a summary of previous trash data collected was briefly presented through a PowerPoint presentation. The emphasis on proper waste disposal, especially for the face masks being worn every day by the students and teachers, was part of the presentation supported by the two (2) minutes videos of cleanups done by volunteers in the Cavite area. Each participant and guest were given fliers and face mask lanyards to remind them of their responsibility in properly disposing of their masks. A poster about how face masks can harm the underwater marine life if not disposed of properly was also endorsed to the school principal.



▲ Figure 3 : ICC Day at Maragondon, Cavite.

The young volunteers were commended for their participation in the program. They were given fliers with beaded lanyards as souvenirs by the ICC Philippines Cavite Coordinator.



▲ Figure 4 : Fliers with lanyards distributed to the participants



▲ Figure 5 : The Poster that reminds everyone to properly dispose of litter and how a face mask can harm the corals



▲ Figure 6 : Presentation of ICC Results

# Remoteness is No Respite From Marine Litter – a Case of Jiwani, Pakistan

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Henderson Island is part of the UK's Pitcairn Islands group and is considered as one of the most remote islands in the world, located in the South Pacific about 5,000 km east of the nearest land mass. However, despite its remoteness, Henderson Island's beaches are littered with an estimated 37.7 million pieces of debris. This may hold for many other places far away from major population centres, but marine litter have not spared the island, and its beaches are more polluted than anyone could expect.

Pakistan, located in the northern Arabian Sea, has a coastline of about 1,000 km. Karachi is a megalopolis city in Pakistan with an estimated population of more than 30 million. The beaches of this town are littered with marine debris as the town lacks an organized solid waste disposal system. Jiwani is one of the smallest and most remotely located towns, about 700 km farthest from Karachi (Figure 1), with a meagre population of 18,000. About 95 % of the population of this small town is directly or indirectly involved in fishing or ancillary activities.



▲ Figure 1 : Coast of Pakistan (Northern Arabian Sea)

Jiwani was well known for its serene beaches; some are biodiversity hotspots. The most important beach in Jiwani is located northwest of the town, on a rocky ledge protruding from sand dunes. This beach is known as Nawab Bungalow beach, named after the Chieftan of the area. The beach is known for its diverse marine life, some of which are not reported in any other part of Pakistan. This rocky beach has unique fauna, including feather stars (crinoid), pearl oysters, and sea fans that are endemic to the beach (Figure 2). A major part of the rocky ledge is covered with small black mussels (*Brachidontes pharaonis*), giving a unique lustre to the shore.





▲ Figure 2 : Rocky ledge of Nawab Bungalow Beach, Jiwani known for its diverse marine life

Despite its remoteness, Jiwani's beaches have been polluted with debris, resulting in the loss of the town's beauty and serenity. The town does not have any formal disposal system, and garbage is dumped where ever it is feasible; sometimes thrown from the cliffs into the sea (Figure 3). Under the influence of the longshore current, the garbage was observed to be piled on beaches along Jiwani, mainly on the Nawab Bungalow beach giving it an ugly look to its beautiful shores (Figure 4). It is extremely agonizing that major part of the marine litter on this beach consisted of plastic. In 2020, WWF–Pakistan has an Information Centre near the beach and decided to take some remedial measures to control the increasing menace of marine litter accumulation in this biodiversity hotspot. It was difficult to convince people not to dispose of the garbage along the coastline. The disposed of garbage ultimately accumulates on Nawab Bungalow beach and other rocky sandy shores along the Jiwani coastline.



▲ Figure 3 : At Jiwani, garbage dumped from cliffs along the coastline



▲ Figure 4 : Garbage accumulated on Nawab Bungalow Beach, Jiwani

WWF–Pakistan along with some elders of the fishermen community held a meeting with the Tehsildar (Administrator) of Jiwani in December 2020 who promised to declare a dumpsite for Jiwani and put a ban on dumping of garbage on the coastline. Ultimately Taakani Tayab, located on the mountain side about 4 km from the Nawab Bungalow beach, was designated as a dump site for the town of Jiwani (Figure 5). Initially, there was resistance from the coastal community. However, ultimately, the disposal of garbage was shifted to this area. Local administration used to burn the garbage at the dumpsite, but meetings were held with the Tehsildar (Administrator) of Jiwani in May 2022, and a ban was imposed on the burning of garbage in the town. Now garbage from Jiwani Twon is being dumped at Taakani Tayab, which is periodically buried till some arrangements for recycling are developed for this remote town.



▲ Figure 5 : Garbage is taken at a dumpsite at Taakani Tayab, Jiwani

Reduction of uncontrolled dumping of garbage along the coastline improved the situation, and the accumulation of marine litter on beaches has declined. After the monsoon season (June to August), known for intense wave action, most beaches were observed to have little or no garbage.



▲Figure 6 : Nawab Bungalow beach devoid of garbage  
(Photo taken on 27 April, 2022).



▲ Figure 7 : Nawab Bungalow beach biodiversity and beauty restored  
(Photo taken on 27 April, 2022)

Nawab Bungalow beach was almost devoid of accumulated garbage (Figure 6). The beauty of this important beach is now restored (Figure 7). Although there are breaches and sometimes garbage is still being thrown on the beaches. However, its frequency and quantities are insignificant, therefore, not contributing much to the marine litter on the coastline. Punitive actions have been taken against violators, and some have been fined.

The uncontrolled disposal of garbage and its dumping along the seacoast may lead to serious consequences, including loss of biodiversity, the entanglement of marine animals, and loss of aesthetics & serenity of the beaches. The WWF–Pakistan along with fisherman communities took initiative to reduce marine litter dumping and control garbage disposal, which ultimately resulted in the restoration and serenity of the remote beaches in Jiwani

# An Update From the CSIRO Marine Debris Team in Australia

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### Global Plastics Leakage Project

Our global plastics leakage project is going strong and we feel very fortunate to have now partnered with like-minded organisations in the following countries: Australia, Bangladesh, Cambodia, China, India, Indonesia, Kenya, Malaysia, Nigeria, Peru, Philippines, Seychelles, South Africa, South Korea, Sri Lanka, Taiwan, Thailand and Vietnam. **Please let us know if you would like to learn more or to get involved! [denise.hardesty@csiro.au](mailto:denise.hardesty@csiro.au)**



▲ Map showing which countries have been surveyed for marine debris using the CSIRO method.

Recently, we led a two-week intensive learning workshop and field campaign in Phuket, Thailand as part of our partnership with the United Nations (UN) and Coordinating Body on the Seas of East Asia (COBSEA). This work was supported by the Sea Circular program and Sweden Sverige. More than 30 people from Thailand, Vietnam, Cambodia, Malaysia and Philippines (and Australia) came together to learn skills, share stories, and collect meaningful data. Each participant walked away with the knowledge and skills to teach others on how to conduct marine debris surveys in their respective countries; follow up surveys have already been completed in the Philippines and Cambodia with more fieldwork and training coming up in Malaysia and Vietnam. The participants were friendly and fabulous even when doing surveys in a torrential rainstorm!



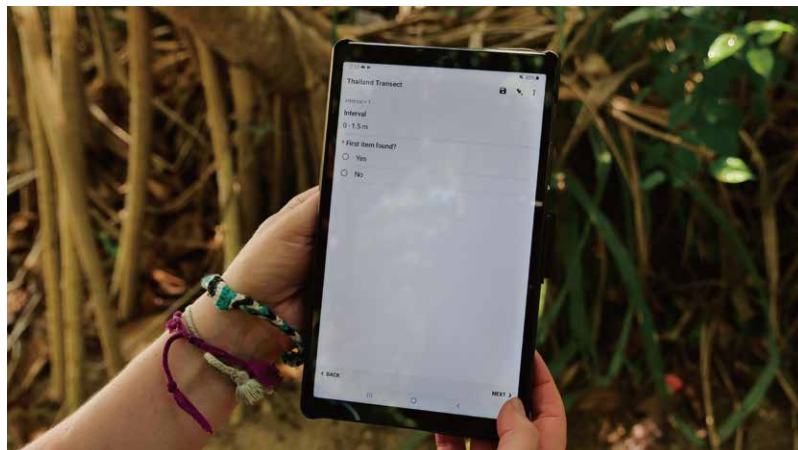
▲ A team in Thailand heading out for a big day of training.



▲ Surveying in heavy rain did not deter anyone's high spirits!

## A New App for Data Collection

We are excited to share with you the **Open Data Kit (ODK) data entry portal/platform** which works on Android devices. This is an easy-to-use app-like tool that you can use on your mobile phone or tablet. This app is free, which means data entry takes less time and will even work if the user is offline or has no reception. Please get in touch with us if you would like to learn more about the data collection approach we are now using ([denise.hardesty@csiro.au](mailto:denise.hardesty@csiro.au)). Importantly, the app allows users to convert to their local language and we will soon be uploading videos and other training materials directly to the platform for ease of use in the field.



▲ Using the new ODK data entry tool to input survey data.

## Training Materials and Videos for Remote Learning

As everyone knows, the world has changed with Covid-19. With the global pandemic, we needed to adapt how we provided training. Because of the difficulty in travel, we have started running some of our **training and capacity building courses virtually**. To better support these activities, we have also recently **updated our handbook** and we have produced some **training videos** that can assist new surveyors to learn the correct process of surveying litter. The training videos explain some background information, correct techniques and go into detail about how to use our new data collection app. They will be available by the end of 2022 and we are very excited to share them! These videos are being produced in partnership with the UN and COBSEA with support from Sea Circular and Sweden Sverige.



▲ A screen grab from one of the new training videos with TJ talking about how to perform a litter survey at an inland site.

**Also**, we have a book that will be coming out next year that highlights grassroots efforts to end plastic pollution, creating new products from ‘waste,’ and providing information that is critical in advocating for change at governance, manufacturing and end-user levels. The book will be released on World Oceans Day 2023. Please reach out if you’d like more information!

### Key findings from our recent work with country partners and other interesting stuff:

- Socioeconomic factors drive litter density, not population density (<https://iopscience.iop.org/article/10.1088/1748-9326/ac5690/meta>)
- A global assessment of the relationship between litter on land and the seafloor (<https://www.sciencedirect.com/science/article/abs/pii/S0269749120302141>)
- Less litter in Australia ([https://www.cell.com/one-earth/fulltext/S2590-3322\(22\)00263-9](https://www.cell.com/one-earth/fulltext/S2590-3322(22)00263-9))
- Global estimates of fishing gear lost to the ocean each year (<https://www.science.org/doi/10.1126/sciadv.abq0135>)
- The important contribution to waste management by the informal sector (waste pickers) (<https://www.sciencedirect.com/science/article/pii/S1462901122002866>)

# Coastal Litter Audit in Tun Mustapha Park, Malaysia, with Capacity Building in Mind

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## Introduction

Plastic has become an indispensable part of people's daily lives. Plastic production was estimated to be 380 million tons in 2015<sup>1</sup>, and more than 10 million tons of plastic waste end up in our oceans every year, making plastics the predominant type of marine litter<sup>2</sup>. This threatens ocean health and biodiversity of the marine ecosystems, food security, fisheries, and tourism industries<sup>3-5</sup>. Malaysia is ranked 8th in the world out of 192 coastal countries assessed for mismanagement of plastic waste<sup>2,6</sup>, which is also the most common type of litter found on Malaysian beaches<sup>7</sup>. However, knowledge regarding the consequences of plastic consumption and the threats connected to marine debris in Malaysia is still lacking, as well as coastal surveys are fragmented and very limited<sup>5</sup>. The GCRF Blue Communities(<https://blue-communities.org/>) Malaysian Case Study (BC MY) team conducted a study to understand the types, geographical, and systemic sources of mismanaged plastic wastes in the coastal areas of Tun Mustapha Park (TMP), Sabah (Figure 1).

<sup>1</sup> Almroth, B. C., & Eggert, H. (2019). Marine Plastic Pollution: Sources, Impacts, and Policy Issues. *Review of Environmental Economics and Policy*, 13(2), 317–326. <https://doi.org/10.1093/reep/rez012>

<sup>2</sup> 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>

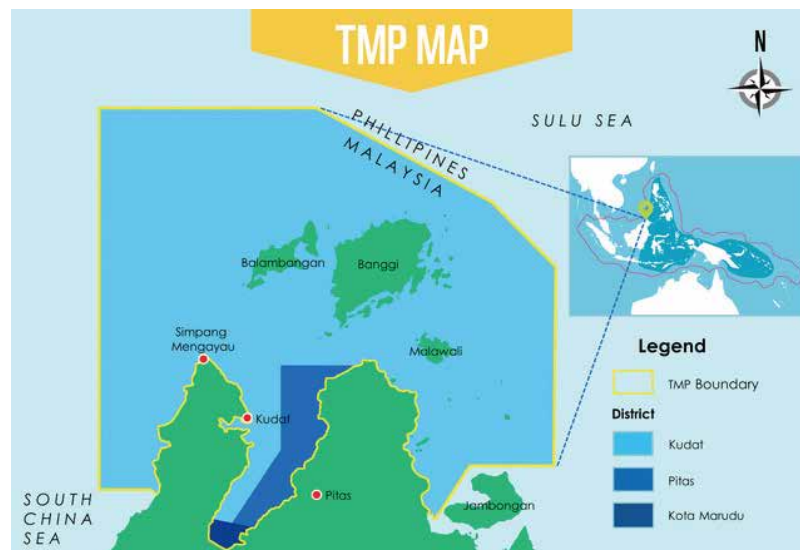
<sup>3</sup> Renaud, P., Stretz, J., Lateheru, J., & Kerbachi, R. (2018). Marine Litter Prevention: Reducing plastic waste leakage into waterways and oceans through circular economy and sustainable waste management. Eschborn: Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH.

<sup>4</sup> International Union for Conservation of Nature. (2021, November). Issues Brief: Marine Plastic Pollution. <https://www.iucn.org/resources/issues-brief/marine-plastic-pollution>

<sup>5</sup> Fauziah, S. H., Rizman-Idid, M., Cheah, W., Loh, K.-H., Sharma, S., M.R, N., Bordt, M., Praphotjanaporn, T., Samah, A. A., Sabaruddin, J. S. bin, & George, M. (2021). Marine debris in Malaysia: A review on the pollution intensity and mitigating measures. *Marine Pollution Bulletin*, 167, 112258. <https://doi.org/10.1016/j.marpolbul.2021.112258>

<sup>6</sup> Ministry of Energy, Science, Technology, Environment and Climate Change. (2018). Malaysia's Roadmap Towards Zero Single-Use Plastics 2018 – 2030: Towards A Sustainable Future. <https://www.pmo.gov.my/ms/2019/07/pelan-hala-tuju-malaysia-ke-arrah-sifar-penggunaan-plastik-sekali-guna-2018-2030/>

<sup>7</sup> Fauziah, S. H., Liyana, I. A., & Agamuthu, P. (2015). Plastic debris in the coastal environment: The invincible threat? Abundance of buried plastic debris on Malaysian beaches. *Waste Management & Research*, 33(9), 812–821



▲ Figure 1: Map of Tun Mustapha Park, Sabah<sup>8</sup>

Citizen science, where members of the public voluntarily get involved in scientific research, is increasingly recognised as an effective approach for studying plastic pollution due to the plastic litter occurrence being widespread and patchy<sup>9</sup>. Involving public members in the research process helps researchers raise awareness<sup>10</sup> and might even develop a sense of urgency amongst the involved citizens<sup>11</sup>. Involving citizens from coastal communities in Malaysia in this data collection also fills a research gap identified in a recent meta-analysis<sup>12</sup>, stating that developing regions are still strongly underrepresented in citizen science.

With collaboration from the Kudat Turtle Conservation Society (KTCS – <https://www.facebook.com/KTCS.BORNEO/>) and 12 local citizen scientists, the litter audit exercises were conducted at three sites in Kudat (Esplanade Kudat, Kosuhui Simpang Mengayau, and Bak-Bak Beach). These sites were selected because (1) they are highly impacted by litter, (2) they have high foot traffic, and (3) they are accessible by cars. The three sites also fall under different management authorities, allowing for future study on the district-level solid waste management coverage and effectiveness.

## Methods

The litter audit involved geo-tagging of litter using a free open-data mobile application, Litterati (<https://www.litterati.org/>), within a 100-metre long and 30-metre wide area in the three litter hotspots identified (Figure 2). Litterati was chosen due to its ability to add tags in the local Malay language and good app performance in areas with poor internet connection. Figure 3 highlights the litter audit protocol. The litter audit was conducted once daily for three days and on the day before street sweeping for optimum litter accumulation.

<sup>8</sup> Sabah Parks. (2017). Tun Mustapha Park Integrated Management Plan 2017 – 2026.

<sup>9</sup> Zettler, E. R., Takada, H., Monteleone, B., Mallos, N., Eriksen, M., & Amaral-Zettler, L. A. (2017). Incorporating citizen science to study plastics in the environment. *Analytical Methods*, 9(9), 1392–1403. <https://doi.org/10.1039/C6AY02716D>

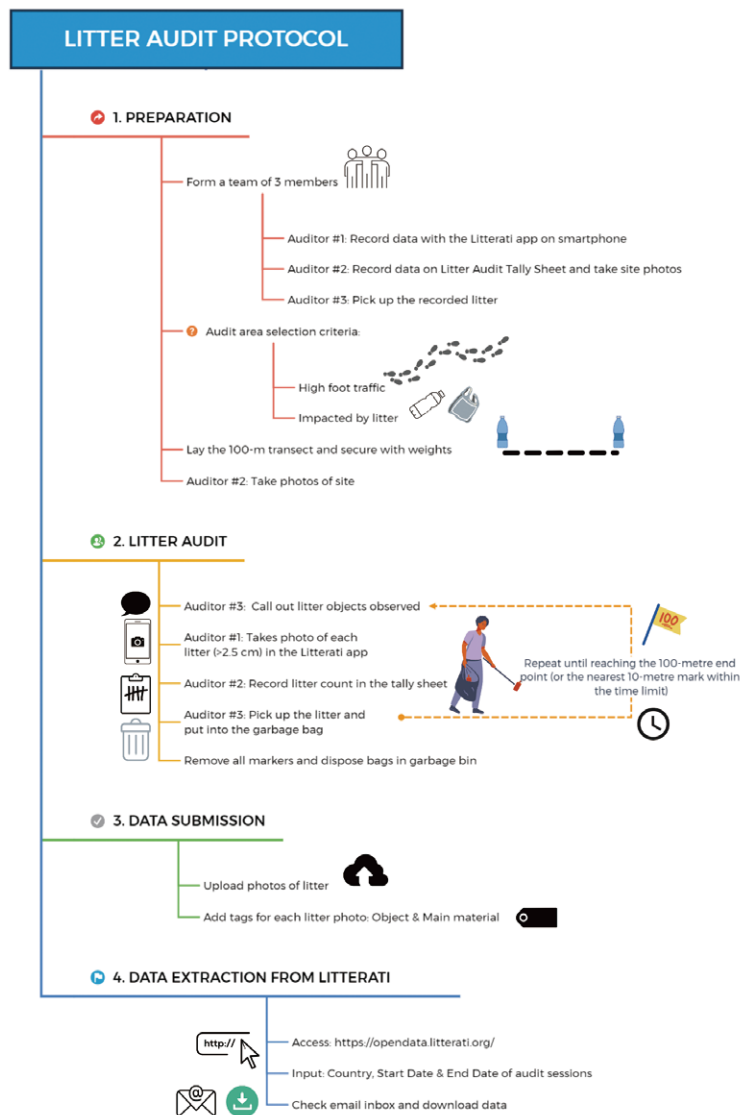
<sup>10</sup> Locritani, M., Merlino, S., & Abbate, M. (2019). Assessing the citizen science approach as tool to increase awareness on the marine litter problem. *Marine Pollution Bulletin*, 140, 320–329. <https://doi.org/10.1016/j.marpolbul.2019.01.023>

<sup>11</sup> Theobald, E. J., Ettinger, A. K., Burgess, H. K., DeBey, L. B., Schmidt, N. R., Froehlich, H. E., Wagner, C., HilleRisLambers, J., Tewksbury, J., Harsch, M. A., & Parrish, J. K. (2015). Global change and local solutions: Tapping the unrealized potential of citizen science for biodiversity research. *Biological Conservation*, 181, 236–244. <https://doi.org/10.1016/j.biocon.2014.10.021>

<sup>12</sup> Kawabe, L. A., Ghilardi-Lopes, N. P., Turra, A., & Wyles, K. J. (2022). Citizen science in marine litter research: A review. *Marine Pollution Bulletin*, 182, 114011. <https://doi.org/10.1016/j.marpolbul.2022.114011>



▲ Figure 2 : Recruited citizen scientists laid the 100m intersects and conducted the litter audit



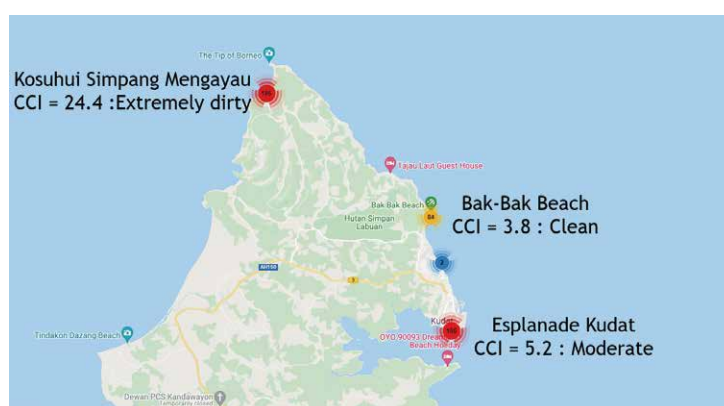
▲ Figure 3: Litter audit protocol<sup>13</sup>

<sup>13</sup> GCRF Blue Communities Malaysian Case Study. (2022). Getting started with citizen science: A guide to litter audit, Manuscript submitted for publication, UM Press, University Malaysia.



## Findings

Data extracted from the Litterati application shows that Kosuhui Simpang Mengayau had the highest Clean-Coast Index (CCI) of 24.4 due to the exorbitant number of litters audited thus considered as 'Extremely Dirty' compared to the other two sites. Esplanade Kudat had a CCI of 5.2, which is 'Moderate', followed by Bak-Bak Beach, 'Clean' with a CCI of 3.8 (Figure 4). Esplanade Kudat and Bak-Bak Beach fall under the local authority's jurisdiction, Kudat Town Board, which organises regular garbage pickup services. Unlike these two sites, Kosuhui Simpang Mengayau is under the management of the Sabah Tourism Board but has no regular schedule for garbage collection unless requested, thus explaining the high CCI in the area.



▲ Figure 4: Map showing the location of the three audit sites and their Clean-Coast Index (CCI)

Out of 367 total items of marine litter collected, plastic waste was the most common totalling up to 86.6% (Figure 5). The top 10 items collected across the three audit sites were all made of plastics; among them were beverage bottles, bottle/container caps, takeaway food packaging, straws, food wrappers, and others. Based on the five major categories of marine litter sources by Ocean Conservancy<sup>14</sup>, more than half of the litter audited was food-related from the shoreline and recreational activities, followed by ocean/waterway activities. Other sources found in Kudat were smoking-related activities, dumping activities, medical/hygiene, and undetermined sources (Figure 6). These findings show that the primary source of marine litter in the audit areas are heavily influenced by beach users and are land-based, particularly from the shoreline and recreational activities, conforming to the findings from previous litter audit studies carried out in coastal areas<sup>15-17</sup>. The dominance of food-related litter in these areas is not surprising considering that Kosuhui Simpang Mengayau is a popular tourism spot among local and international visitors, whereas Esplanade Kudat and Bak-Bak beach are recreational areas with hawker stalls and restaurants that the locals frequently visit.

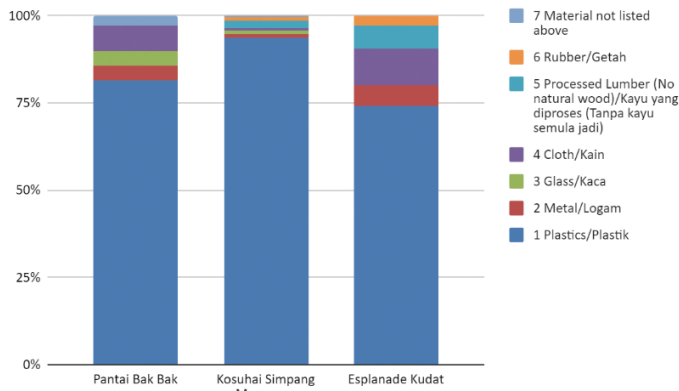
<sup>14</sup> International Coastal Cleanup Report 2011. <https://oceanconservancy.org/wp-content/uploads/2017/04/2011-Ocean-Conservancy-ICC-Report.pdf>

<sup>15</sup> Munari, C., Corbau, C., Simeoni, U., & Mistri, M. (2016). Marine litter on Mediterranean shores: Analysis of composition, spatial distribution and sources in north western Adriatic beaches. *Waste Management*, 49, 483–490. <https://doi.org/10.1016/j.wasman.2015.12.010>

<sup>16</sup> Pradit, S., Nitiratsuwan, T., Towatana, P., Jualaong, S., Sornplang, K., Noppradit, P., Jirajarus, M., Darakai, Y., & Weerawong, C. (2020). MARINE DEBRIS ACCUMULATION ON THE BEACH IN LIBONG, A SMALL ISLAND IN ANDAMAN SEA, THAILAND. *Applied Ecology and Environmental Research*, 18(4), 5461–5474. [https://doi.org/10.15666/aeer/1804\\_54615474](https://doi.org/10.15666/aeer/1804_54615474)

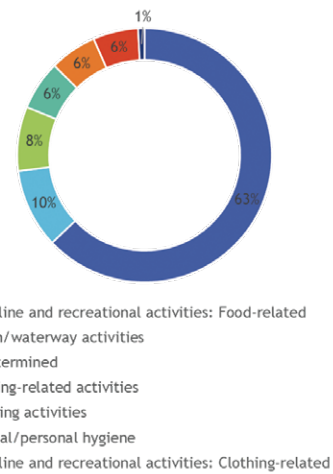
<sup>17</sup> Mghili, B., Analla, M., Aksissou, M., & Aissa, C. (2020). Marine debris in Moroccan Mediterranean beaches: An assessment of their abundance, composition and sources. *Marine Pollution Bulletin*, 160, 111692. <https://doi.org/10.1016/j.marpolbul.2020.111692>

Litter Material Composition



▲ Figure 5: Composition of litter material audited across all three audit sites

Sources of Litter



▲ Figure 6: Sources of litter collected in Kudat during the litter audit

### Moving Forward

The communities of TMP, particularly the young people, have continuously demonstrated their enthusiasm and willingness to be part of the research and contribute to their communities. Through a citizen science litter audit exercise, the BC MY team seeks to empower the coastal communities and build their capacities towards the ever-changing dynamics in the interaction between coastal communities and the marine environment<sup>18-19</sup>. Plastic waste is the most common type of litter found in the coastal areas of Kudat, Sabah, which is consistent with the findings of the Maritime Institute of Malaysia survey in 2011<sup>20</sup>. Future research could focus on exploring the impact of different managements at these sites on marine litter. Based on these findings, the team is developing an online questionnaire survey to gauge coastal communities' attitudes, perceptions, and behaviours concerning marine plastic pollution and their local governments' solid waste management system. In the long-term, these data will help the team to formulate evidence-based interventions adapted to the local context of TMP as one of the local actions in responding to the global issue of marine plastic pollution.

<sup>18</sup> Lim, V.-C., Justine, E. V., Yusof, K., Ariffin, W. N. S. W. M., Goh, H. C., & Fadzil, K. S. (2021). Eliciting local knowledge of ecosystem services using participatory mapping and Photovoice: A case study of Tun Mustapha Park, Malaysia. *PLOS ONE*, 16(7), e0253740. <https://doi.org/10.1371/journal.pone.0253740>

<sup>19</sup> Mohd Noor, M. I., N. Alagappan, P., Then, A. Y.-H., Justine, E. V., Lim, V.-C., & Goh, H. C. (2022). Perspectives of youths on cultural ecosystem services provided by Tun Mustapha Park, Malaysia through a participatory approach. *Environmental Education Research*, 0(0), 1-18. <https://doi.org/10.1080/13504622.2022.2075831>

<sup>20</sup> Hagir, R., Luthfi, M. A., & Chong, E. (2012, July 16). *Clean Coast Index Report 2011 – Part 2*. Marine Group, Malaysian Nature Society Selangor Branch. <https://mnsmarine.wordpress.com/2012/07/16/clean-coast-index-report-2011-part-2/>

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## Japan Environmental Action Network (JEAN)

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