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Preface

Dear readers,
This is the 17th issue of Marine Litter News by Asia Pacific Civil Forum on Marine Litter (APML). APML has been developed more than we expected before not only in the number of member organizations but also in the aspect of active contributions to tackling marine litter in the highly threatened areas.

In February, OSEAN and Korea Maritime Institute co-organized 2018 Korea Marine Litter Forum. Researchers shared the 10-year monitoring result of coastal litter, new findings of microplastics, an annual input of marine litter from terrestrial areas, and the Korean government's promotion of legislation on marine litter.

You can see the wonderful example of community-based sustainable ecotourism with sea turtle protection and underwater cleanup in Taiwan. Hiin Studio, an NGO, developed sea glass money.

Ocean Conservancy provided an opportunity to gather the International Coastal Cleanup (ICC) coordinators together in San Diego where the 6 International Marine Debris Conference was held. You should listen to the vivid stories of coordinators from 13 countries.

JEAN, Japan delivers the news on how to keep their partners invited in this issue. Interesting approaches to collect people's opinions and ideas in the workshop will be helpful for the readers who want to coordinate various stakeholders and sectors in marine litter issue.

GreenHub, Vietnam, sent the article which is basically ICC-based mitigation effort. The highlighted item among ICC ones is expanded polystyrene fragment which could be the most serious polluters of microplastics. It should be focused because it causes the tremendous number of microplastics.

Shanghi Rendu Ocean started to research the information of product brands of which marine litter are commonly found along the coast in China. Mr. Liu arises fundamental questions to make us look back at our daily consumption and plastic wastes.

This issue delivers the readers the exciting news about the first step toward the cooperation between one of the regional sea programs of United Nations Environment and APML. It could be a great start to promote international and regional cooperation in this region. NOWPAP RCU organized a successful annual event of workshop and ICC. I hope the readers enjoy the details from NOWPAP RCU, Dr. Liu.

Korea Marine Environment Management Corporation has successfully organized the training workshop, once a year. It gives a great opportunity to deliver key knowledge and information from the global leading researchers to the participants and to share ideas and best practices among them. Through the workshop, the successful development of a draft on the APEC Marine Debris Management Guideline was obtained.

Dr. Blinovskaya and her research team sent the very recent research product on microplastics in Russian Federation where not many researches have been published yet.

All articles have amazing stories and make us surprised to see the rapid progress in our efforts and outcomes. Every step forward can't be possible without our member organizations and partners. The fact that I can see such wonderful stories before anyone else gives me the privilege of being an editor. Now I am very pleased to open these to all the readers in the world.

With love,
September 2018

Editor, **Sunwook Hong**
(*Ph.D., President of OSEAN*)

Assistant editor, **Jong Su Lee**
(*Researcher of OSEAN*)

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Asia Pacific Civil Forum on Marine Litter

'2018 Korean Marine Debris Forum' Highlighted Land-Based Marine Debris

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'2018 Korean Marine Debris Forum' was held in Busan on February23, 2018. The objectives of this forum were the followings: 1) checking the marine debris-related issues and the changes in international trends in marine debris after elevated attention on marine debris and strengthened countermeasures for plastic marine debris and microplastics. About 90 people including researchers, NGO activists, teachers, students, government officials, and stakeholders from private sector were present in this forum.

The forum had two subjects as follows: 1) currents knowledge status and policies of marine debris 2) case studies from national and international scale. From the part of current knowledge status and policies, officials from Ministry of Oceans and Fisheries and Ministry of Environment gave a presentation for 'Direction for enacting laws about marine debris' and 'Management policy for land-based waste in Korea', respectively. In the later part, JEAN from Japan(Japan Environmental Action Network) presented a policy case titled 'Countermeasures against marine debris in ocean surrounding Japans. Sunwook Hong and Jongsu Lee from OSEAN gave a presentation titled 'Ten-year result from Korean National Marine Debris Monitoring Program: Findings and Accomplishment' and 'Estimation method for flow of land-based marine debris', respectively.

Besides the presentation, OSEAN exhibited educational materials and books and artworks of Jung-Ah Kim, who is art director of OSEAN.

The forum was the good chance to collect opinions from various part including government, private sector, and NGOs. Furthermore, the participants exchanged their opinions and experiences and discussed policies to address marine debris pollution and make productive measures to reduce marine debris in Korea.

Dr. Sunwook Hong of OSEAN presenting findings and outcomes from 10 year Korean National Marine Debris Program (Photo: OSEAN)


Jongsu Lee, researcher of OSEAN, presented the estimating tools for flow of debris into the ocean from land-based sources (Photo: OSEAN)

Jong-Ah Kim, art director of OSEAN introduced her works (Photo: OSEAN)

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From Trash to Money: a Successful Case Combining Green Turtles Protection and Beach Clean-up in Taiwan

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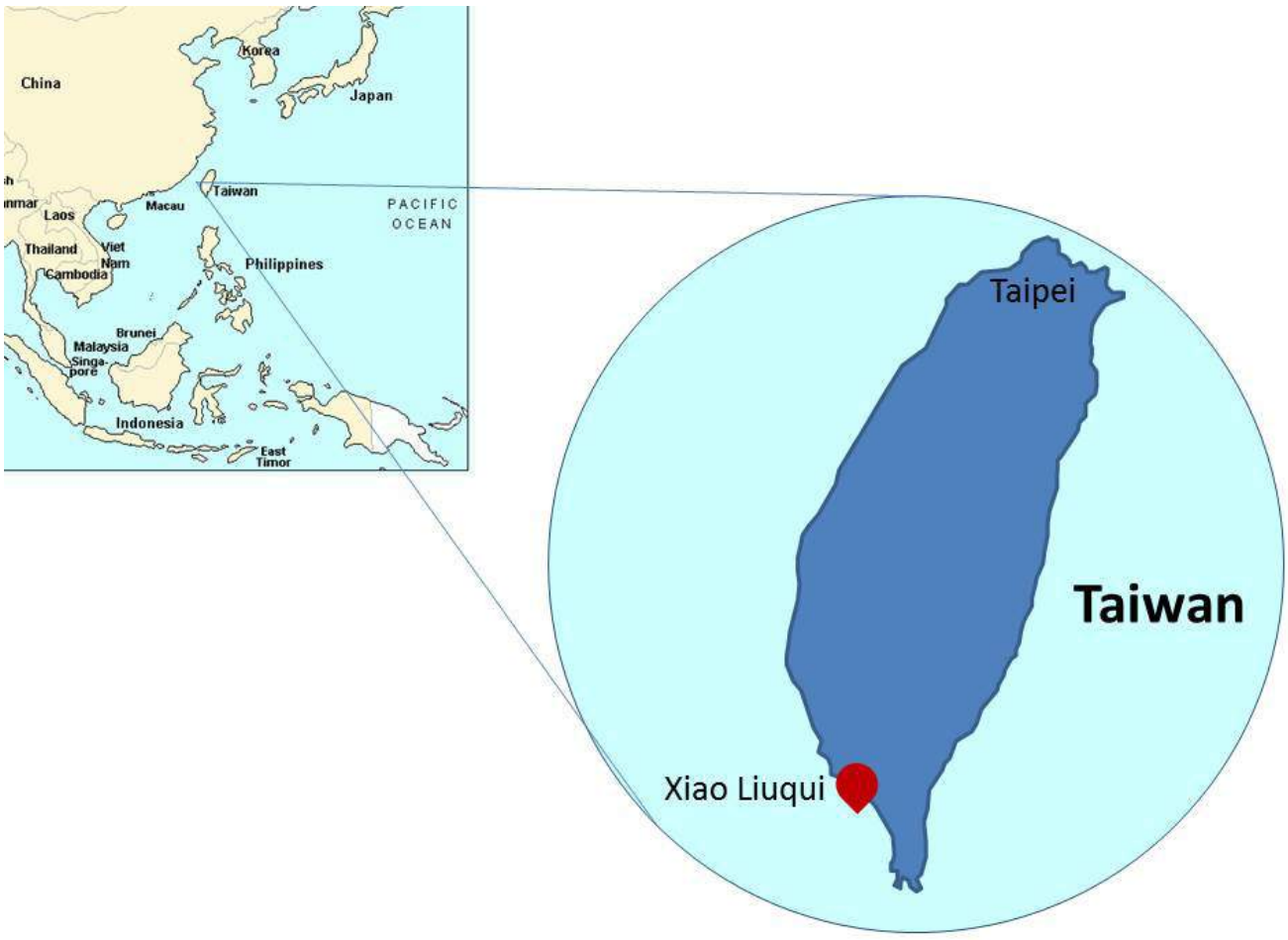

In last decade, Xiao Liuqiu has become a well-known island to see turtles in Taiwan. Located off the southwestern side of Taiwan near Kaohsiung, Xiao Liuqiu used to be an important base for fishery and there are hundreds of fishing vessels. Since the social economic condition changed, younger generation turn to run tourism instead of following traditional fishery. After few years of adjusting and developing, local community has realized that eco-tourism is better and more sustainable to attract tourists and they have recognized green turtles as one of the uniqueness. Actions initiated by local community such as volunteer doing regular underwater clean-up from 2011 and local fishing association proposing a ban of gill net fishing since 2013 have created Xiao Liuqiu suitable habitat for green turtles. In past five years, researchers have identified 163 sea turtles in Xiao Liuqiu. As a result, tourism business booms quickly and more external people move to the island running business.

The beach money (community currency) comes from the broken glass at beach and drawn by the local artist.

As an environmentally educational non-profit organization, Hiin Studio devotes to raise public awareness on the problem of marine debris pollution and promotes sustainable clean ocean. Inspired by the concept of beach money which is proposed by a conscious surfer in Japan, we like the idea of using sea glass (broken glass picked at seaside) as money to get some discount in certain shops. To make stronger link between tourists, the local government, communities and shop owners further develop the idea of inviting local artist painting the sea glass with green turtle or marine lives pattern. These beautifully painted glass are then used as money only circulated in local shops. The only way to get painted glass beach money is participating environment education and beach clean-up. With the support from local government, we hold a series of environment education and beach clean-up which we introduce green turtle's life and identify plastic as the biggest threat to green turtles. We not only address on the environment impact of single use plastic utensils, but we also offer solution like refusing straw or using reusable straws, bringing cup and container when traveling.

With the incentive of beautiful beach money, we have found that number of participants gets triple to quadruple compared to same activity we hold last year and participants become more willing and engaged, and pick much more trash after the environment education. While the average of waste picked during beach clean-up is around 3 to 4 kilo per person in

Taiwan, we have recorded 6 to 11 kilo per person in our activity. In our first trial to combine beach money with environment education and practice this year, we have cooperated with 88 local shops and engaged 441 people including tourists and local community during 5 beach clean-up.

We discovered the interaction from online social media to offline activity and back to online experience sharing which benefit to build the story and outreach the idea of reduction single plastic usage in daily life and tourism. We have found local communities inspired by the concept of beach money and willing to extend from using turtles as tourist attraction to further actions like actively participating beach clean-up and using reusable tableware to replace single use plastic items in order to leaving a healthy environment for green turtles. The beach money played more than a coupon but brought the impact of changing people's behavior and building the sense of honor on their actions.

Recently, Taiwan EPA (Environmental Protection Agency) announced that the government aims to make Xiao Liuqui as a demonstration of single use plastic free island. The planning measures include reusable cup rental, setting more public fountain, setting water treatment and encouraging hotels and hostels not offering single use amenities. Besides the action from government, we also see more and more local business (restaurants and diving shops) are voluntary to get involved in holding beach clean-up with beach money and encourage guests to use reusable containers. Although local economic circulation through beach money just begins, we look forward to expand this initiative, deepen the linkage between private and public sectors and make Xiao Liuqui an island free of single use plastic in the future.

Green sea turtles have become the iconic symbol of Xiao Liuqui, and people can easily find them during snorkeling or diving.

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Convening Global Leaders to Build Community and Impact

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The International Coastal Cleanup (ICC) began in 1986 with 2,800 volunteers picking up 124 tons of debris in Texas, and it would have been impossible to imagine what the event would become more than three decades later. Since the inception, nearly 13 million volunteers have collected almost 250 million pounds of debris from waterways and coastlines. In 2017, the momentum of ICC continued to grow: nearly 800,000 volunteers partook to collect over 20 million pounds of trash. Collectively, volunteers walked almost 19 thousand miles of coastline spanning over 106 countries. In this global movement, volunteers worldwide were unified in their goal—to curb the inputs of debris into the ocean. If you'd like to take a closer look into the results, please visit Ocean Conservancy's website here.

How is that 13 million ICC volunteers have dedicated hours to cleaning up their local waterways and beaches? The answer is the remarkable leadership on the ground in over a hundred countries: the International Coastal Cleanup Coordinators.

On March 10th and 11th, 2018, Ocean Conservancy's Trash Free Seas® Team convened these global leaders at the Global ICC Coordinator Symposium in San Diego, California, USA, prior to the Sixth International Marine Debris Conference. Partners from Nigeria, South Africa, Indonesia, China, Vietnam, Chile, Ecuador, Portugal, Norway, Canada, Australia, and Kuwait and beyond gathered together for the weekend to celebrate their outstanding history of the ICC and discuss the future of addressing marine debris.

Among other highlights, a speech by Alejandra Lopez de Roman celebrated her multiple decades of ICC work, but also candidly depicted the devastation following the 2017 earthquake in her home country of Mexico. Because of the extraordinary Coordinator network, Lopez de Roman explained how she was able to leverage resources to provide provisions to survivors and begin cleaning up areas of wreckage.

Christina Shaw of the Vanuatu Environmental Science Society highlighted the pivotal role of International Coastal Cleanup data in the government of Vanuatu's recent plastics policy, which has banned the manufacturing of plastic bags throughout the island nation. Eben Schwartz of the California Coastal Commission chronicled California's history with a statewide plastic bag ban and how implementing such a policy was so different, but equally critical, from the experience that Christina described. And Heidi Taylor of Tangaroa Blue explained her extremely precise data collection, with projects leading to government action on illegal fishing on the Great Barrier Reef.

Sade Deane of the Caribbean Environmental Youth Network explained of the importance of youth engagement. Rather than volunteers, she calls her cleanup attendees "Citizen Scientists." This designation empowers the students and leads to more precise data results at cleanups.

The network also discussed the rising importance of modern technology in cleanups, and more specifically, Ocean Conservancy's data collection application, Clean Swell. Clean Swell and TIDES allow anyone, anywhere, to contribute to and/or utilize ICC data. Coordinators shared their in-the-field experiences with data collection via Clean Swell, providing critical feedback that will help Ocean Conservancy further enhance and evolve ICC data collection.

The conference brought to light just how important it is to continue to bring leaders in the marine debris space together. The Global Coordinator Symposium was an amazing opportunity to collaborate, share experiences and learn from others. As the marine debris field rapidly grows and evolves, these shared moments become only more crucial for identifying practical and effective solutions. One coordinator reflected, "It was inspiring to learn about the different challenges that everyone faces and to see the unique ways they overcome those challenges. The environment was incredibly collaborative and supportive!" Beyond the opportunity to listen and absorb, the workshop atmosphere allowed attendees to ask the questions they needed to ask, and provide answers and advice on the spot. One coordinator described:

> *"…A number of coordinators were given the opportunity to share examples of how they had overcome barriers. Participants chose which coordinator experiences they wished to listen to. I had been struggling with issues around data collection, what we do with the data collected and how can volunteers feel valued... I was given a solution then and there during this session! Really informative weekend overall!"*

Coordinators walked away with a sense of community and inspiration for how to build on their fantastic work. Attendees indicated that their top priorities going into the 2018 ICC would be educating youth and adults on marine debris and solutions, increasing attendance for the ICC and other events, and engaging with corporations to achieve most sustainable outcomes for our ocean and waterways.

As we look forward to the 2018 International Coastal Cleanup, we express our most sincere thanks the coordinators for their dedication to the global movement.

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"The Cross Sectoral Effort of JEAN in Mitigating Marine Litter in Japan, from Awareness Raising, Lobbying, to a Pilot Study for Source Control."

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1. Expansion of the Awareness Raising Effort on Marine Litter Issues

In 2017 we received a financial aid from Japan Fund for Global Environment and hosted a couple of workshops on reducing plastic waste inviting various civil society organizations that have their own network. Two representatives participated from each of the twelve participating organizations including cooperatives, the 3R promotion organizations, and environmental conservation.

In 2018, we plan to develop awareness raising kit and distribute it to the participating organizations to utilize for their own awareness raising effort.

We expect that the use of the kit within the networks of participating organizations would contribute to raising awareness on the issue of marine plastic pollution among the wider public.

Fieldwork in Yamagata Prefecture

Workshop in Kamisu-city (Ibaraki Prefecture)

2. Amendment of the Law for the Promotion of Marine Litter Disposal

The Law for the Promotion of Marine Litter Disposal was enacted in 2009. However, a number of issues were becoming apparent. It was not adequate for dealing with newly arising problems such as marine micro plastic. Although removal of the litter on the coast has moved forward, there was no stipulation that leads to the reduction of plastic waste itself. Also, there was no adequate system to reinforce the mitigation effort in wide areas (e.g. financial support for civil society organizations).

Thus, JEAN in cooperation with other non-profit organizations such as the Partnership Office, engaged in lobbying for the amendment of the current law. As a result, a committee was held by the administrative government in the end of 2017 leading to the amendment in June 2018. Major points of amendment and those remained unresolved are as follows.

[Major Amendment]

- Addition of the tenor“conservation of marine environment” to the aim of the law.
- “Floating litter”and“sea bottom litter” were added to the definition of marine litter together with “drifted marine litter” for seamless removal and disposal.
- Explicit Listing of the relevant laws and regulations for the source control of marine litter.
- Prevention of the waste plastic generation including micro plastic.
- Strengthening the international cooperation.

[Unresolved points]

- Enactment of the basic national strategy, enhanced role of the national government.
- Establishment of a national council for marine litter mitigation
- Financial support for the civil society organizations whose efforts cover wide areas.

The Japanese government is to start the following two policy-related processes. To ensure that these efforts lead to the mitigation of marine pollution, civil society organizations including JEAN need to follow closely the processes.

1) Review of the national policy in accordance with the amendment
2) Development of “Plastic Resource Recycling Strategy” that includes reduction of single use plastic packaging and container

3. Promotion of marine litter source control through a pilot project by Japan Ministry of Environment

Japan Ministry of Environment has commenced a pilot project to examine measures to control marine litter at the source on land over three year period in April 2018. The project is implemented in two regions, Tokai region (i.e. Mie prefecture, Gifu prefecture, and Aichi prefecture) and Sanyo region (i.e. Okayama prefecture). Total budget for the project over three year period is approximately 85 million yen.

Majority of marine litter is generated on land and flows out to sea through rivers and streams. Thus the project aims to conduct baseline studies of the current status of litter on land, and to test the efficacy of source control measures in the watershed within the designated regions. The most effective measures are then identified and applied in other prefectures for source control. Also, in order to enhance the system to promote source control, possible measures including the utilization of existing systems are examined to develop a guideline and the likes to be distributed across the country.

In 2018, baseline studies and implementation plans are examined while stakeholder meetings are held in the designated project areas. This project is contracted to Japan Environmental Sanitation Center, an organization affiliated with the Ministry of Environment. JEAN will collaborate for the project in cooperation with other civil society organizations. The photographs below show litter in the rivers in Aichi prefecture, a part of the designated project areas.

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Styrofoam Situation Management in Bai Tu Long National Park and GreenHub's Effort to Deal with This Issue in Quang Ninh Province

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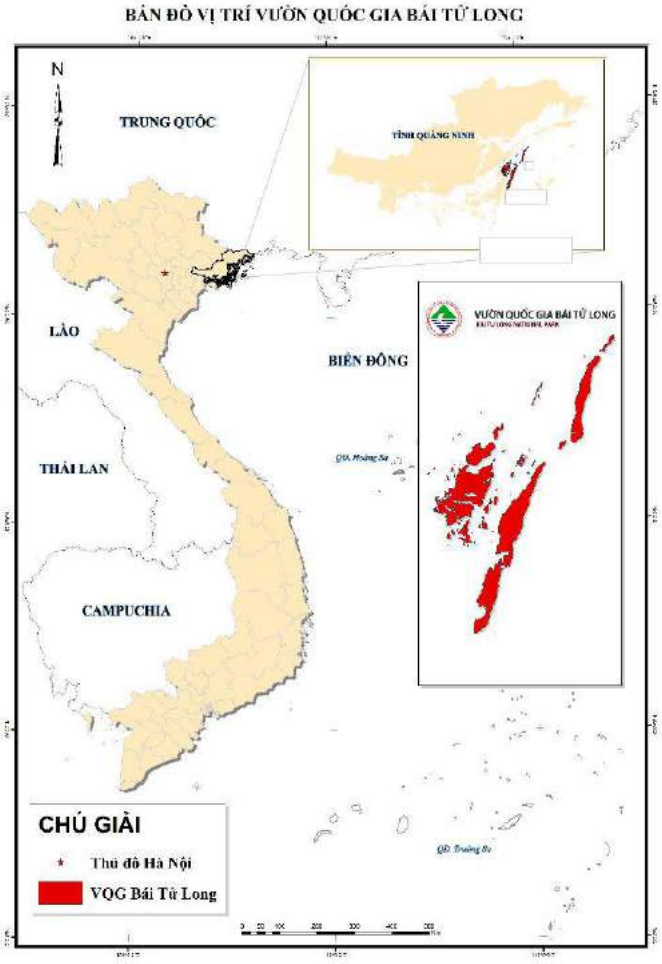
Introduction of Bai Tu Long National Park (NP)

Bai Tu Long National Park in Quang Ninh province was established under the Prime Minister's Decision No. 85/2001 / QD-TTg of June 1st, 2001. The total area of the National Park is 15,783 ha, of which the sea area is 9,658 ha, the remaining 6,125 ha is the area of floating islands. The buffer zone of the National Park is 16,534 ha, located on 5 communes: Van Yen, Minh Chau, Ha Long, Ban Sen and Quan Lan. Population in the buffer zone is 24,141 people.

In the area of Bai Tu Long National Park boundary, there are 109 aquaculture households in aquaculture areas as planned. These are the households that are permitted by the management board to develop their livelihoods and increase incomes.



Aquaculture activities in Bai Tu Long bay and effort to restrict using styrofoam in floating cages and rafts

At present, the aquaculture households in Bai Tu Long NP are mainly mollusk (clam) using mainly plastic and styrofoam materials, (used as protection and nursing cages). Recently, some households have used Cement ships for protection work. There are 50 protection rafts in which 35 raft house (area of each cage is 40 m^2 using about 40-50 Styrofoams with size of 1m x 80cm and 15 cement ships. There are 100 nursing rafts (each cage uses 10 styrofoams with size of 60cm x 40cm.

Ba Mun island, Minh Chau commune is in the core zone of the NP. Due to the geographic location, households on the Minh Chau commune mainly catch fish, there are only 03 households cultured, mainly clams, comos, oysters. Total number of styrofoams of 3 households are about 330 floats, half of buoys are 70cm * 50 cm, the other half is 2m * 1m.

In 2016, after the first coastal clean-up co-organized by Centre of Supporting Green Development (GreenHub), International Union of Nature conservation (IUCN) and partners, the Ha Long City People's Committee issued Decision No. 349/TB-UBND banning the use of polystyrene in floating structures in Ha Long Bay. Continue this effort, Quang Ninh province people's committee issued the Decision No. 4760 / UBND-NLN1, dated 3 July, 2017, on restricting the use of foam buoys and materials in aquaculture to affect the environment in the province. According to this decision, management Board of Bai Tu Long National Park has conducted propaganda for people involved in aquaculture activities in the region on the harm and impact of the use of foam buoys in aquaculture. Besides, when people participate in aquaculture in the NP, there will be a license from the Park. Early 2018, people involved in aquaculture must sign a commitment to "protection and sustainably aquaculture within the boundary of Bai Tu Long National Park" in a statement that "restricts the use of styrofoam in aquaculture activities"

Artwork from plastic and Styrofoam waste

From 29th, May to 8th, June, 2018, GreenHub co-organize with IUCN and partners the program of 'Artwork from plastic and styrofoam waste- I love sea and island - Born to be wild'. The program is organized in Minh Chau commune, including coastal clean-up, trash sorting training and art performance.

About 100 participants (including pupils in Minh Chau school) have involved in the coastal clean-up in1 hour and collected 141.5 kg of inorganic waste.

(Source: GreenHub)

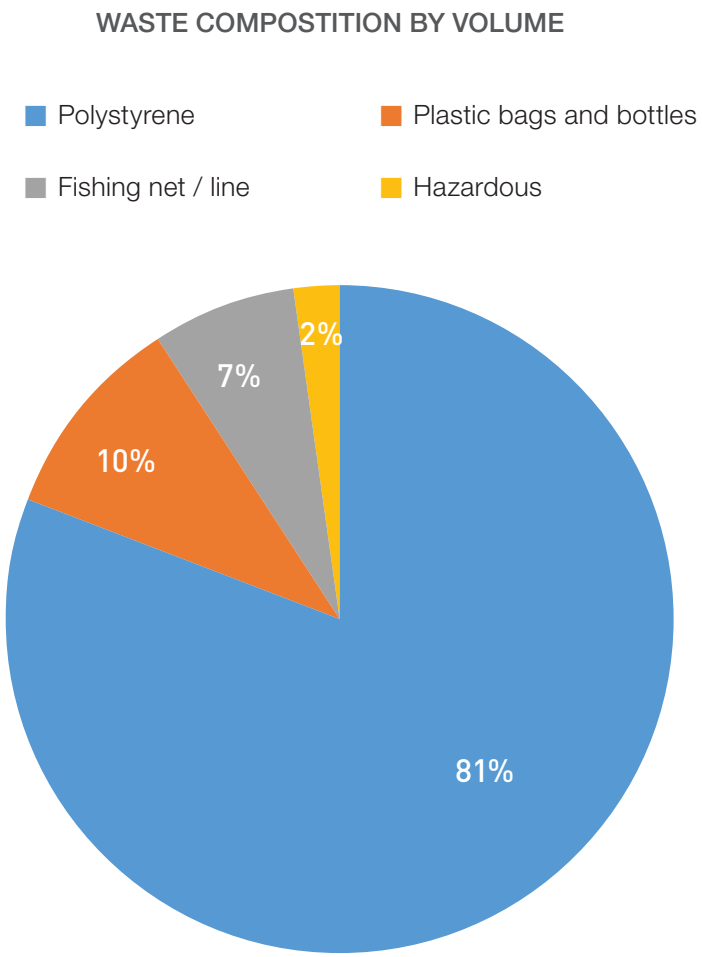
On the job trash sorting training

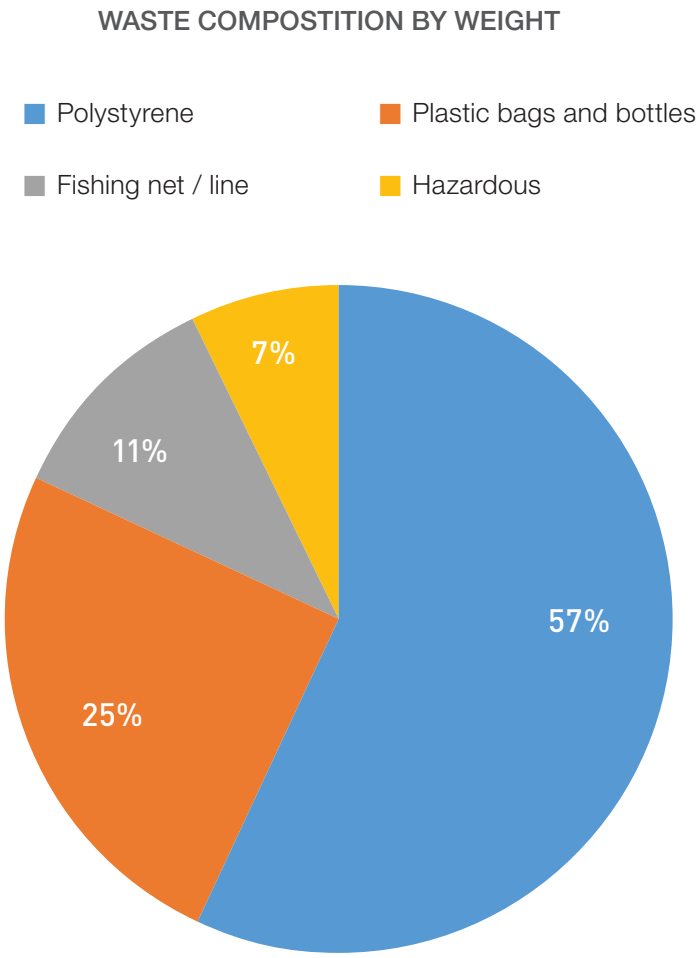
The waste was used to create very meaningful artworks which attracted a lot of tourist and local people to aware of Styrofoam waste and impacts of plastic/polystyrene to marine animals.

The art works in this event were done by IUCN volunteers

Sea turtle struggling in trash, try to escape from them

Compositions of the waste is shown in the following charts:





As we can see, although there are decisions to restrict using the Styrofoam in floating aquaculture cages/rafts at both city and province levels, significantly is only 3 aquaculture households are in Minh Chau commune, however, the polystyrene is still more than a half of the total waste (both by volume or by weight).

Ba Tu Long NP management board plans to review of using Styrofoam in the aquaculture activities and increase the communication program for polystyrene restriction. However, we find that the aquaculture farmers need technical and financial support, guideline and feasibility solutions. GreenHub, IUCN and our partners continue to accompany with local government and communities in this issue.

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Why We Need to Focus on the Brands of Marine Debris?

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BEACH LITTER BRAND AUDIT ANNUAL REPORT(2017)

In 2017, the marine debris issue became a global hot topic which caught the attention of the entire society. How to solve this problem? This question is raised inevitable by these discussions and they tried to give an answer. The answer, given by many environmental protection agencies including Rendu Ocean, is to start up the Brand Audit of the marine debris. So why we need to focus on the brands of marine debris?

All human needs for survival and life are summarized in food, clothing, housing and transportation. We produce and consume all kinds of products that meet the needs of necessities. Nowadays, as the society becomes highly commercialized, industrialized and urbanized, these products are all commodities; producers and consumers are almost completely separated, and there are many sellers embedded in them. We often ignore or even forget that there is another thing about the functioning of human society -- the disposal of waste such as waste after consumption. The waste, too, is commoditized, and waste producers are not waste disposers, nor are they cleaners, nor are they even collectors (such as homes and workplaces with cleaners). As a result, garbage problems disappear in our world. At this point, it's not a pleasant thing to pull the garbage problem back into everyone's eyes, a topic we can't avoid but successfully avoid.

Although it's an unpleasant thing, we should face it with a rationally positive attitude. As we look for a solution to the problem, it is inevitable to go through the hazardous areas full of mud and danger - to distinguish responsibilities. Maybe we fail to evade a mine and drag our feet wearily to success or hurt ourselves and discontinue the process, it is absolutely a hard journey. But every member in the society must face it together.
Consumption creates supply. Because consumers need to meet their own needs for food, clothing, shelter and transportation, producers' production and sellers' selling come into being. This is our starting point. If there is an original sin, it must be the sin of the consumer. The sins of producers and sellers are derivative. This is the ethical basis for " responsible consumption". As a consumer, we cannot avoid consuming, but we must have many solutions to the problems we have on own needs, not only one. The most extreme solution is to go back to be producers, produce our own products, use our own products and remove the market economy from our own world. However, to most people, it is obviously impos-

sible. Then, various kinds of economical and environmentally-friendly consumption guidelines such as not to consume disposable products show their value. Of course, there are lots of challenge- the natural instinct of pursuing convenience, the limitation of capacity to pay, the requirements of healthy and clean products, etc. As a responsible and rational person, we have to make our own choices.

With the premise of having options, responsible consumers should have responsibility in reducing the garbage we produce. If we must choose between being hungry and accepting small packages of food, we would choose to accept small packages of food, and therefore produce more garbage. Giving consumers this kind of choice is the responsibility of "responsible producers", the moral foundation of "responsible producing". For the time being, producers have two options. One is using more eco-friendly containers and packaging that are recyclable or are able to naturally degrade, for example using biomass instead of plastic or metals. In this way, either the range of service is limited and would therefore retreat to the primary phase of product economy or the price is so elated that products can only serve high-end associations. Both options deviate from the orientation of industrial production and global consumption. Therefore, the doable solution can only be another alternative: the consumers are responsible for recycling and disposing their own packaging that can't satisfy their daily needs. It's best not to create garbage or at least maintain an effective disposal that doesn't turn into a society problem. This is "the prolong of producers' responsibility's" moral foundation. The form of the bearing of prolonged responsibility that producers undertake has become many successful practices and theories, but it's just taking off in China.

The sellers, while facing the consumers, is a member of producer group; while facing the producers, they can be regarded as a standard consumer, asking producer to provide an opportunity of selection as well.

Under an ideal condition, responsible consumers and producers constitute the world, which is closed loop formation of a perfect optimum operation. Government is not required. It has always become the shield that producers preferred the most. There are 2 reasons. The first reason is that the government is the supplier of public service and that the dispose of trash is the responsibility of trash producer. It is converted into public service, an alternative solution when consumers and producers both cannot take up the responsibilities; the second reason is that the producers have already paid for the sufficient tax, which comes up to an economic problem. Have the producers consider the costing of debris disposing while day pay the tax?

Some producers, especially large brands, even take other producers as shields and claim that it is unfair to focus to brand products. However, what exactly is the criterion of fairness? If both people are guilty, can one of them defend himself to be innocent by claiming the guilt of the other one? Due to the brand effect, large brands have higher profits than smaller brands. Therefore, they should proportionately take larger responsibility instead of taking the same responsibility as smaller brands. Besides, from the perspective of efficiency, large brands also have greater influence, so they should make the first move since every tiny thing they do can bring huge improvements to the society. There is no absolute fairness in the real world. We can only do our best to reach the fairness. Hence a reasonable criterion should be: We should do all the things that we can and we must do. And our question now is not whether we should do, rather, the question is that to what extent the work should be done? The companies need to earn profits. If all the external economy is converted into costs, the company may have no profit to earn. If this happens, the companies will refuse to do the work since the economic condition doesn't allow them to, even though the work is technically feasible. Therefore, what we should is to discuss and find out the critical points of what we can do.

Due to its unmanageability, the problem of marine garbage is more complicated. Theoretically, in a community where garbage management is perfect, garbage is always under control within closed pipelines of generation, collection, transportation and processing. However, because of the regardless of intentional or negligent, the garbage disposal may get

out of hand in all links of the chain, freely wandering in the mountains, lakes and wilderness, finally entering the ocean. Those who have the duty to control but do not fulfill their obligations are also responsible to the issue, and even more reproached, especially those who throw rubbish and dump their garbage.

No matter whose responsibility it is, large amount of marine garbage is on the seashore and seabed. This is an unpleasant truth but we must directly face. Rendu Ocean, as one of the bellwether, decided to tell the unaware public the truth of the marine environment, in the form of upholding and running the monitoring network of marine waste. Besides, we also independently developed the "Marine Debris Brand Audit Card" with the world's leading position in 2016.

Truth is unpleasant and hurting; some individuals would even utilize the truth to attack others with malevolence; there also must be something that are not expect to see which we are not able to imagine at the moment. These are not what we are pursuing. What we are pursuing is the courage to face the truth directly, to find the solution corporately, to take the action unitedly. As a community of shared interests and destiny, we have to be united!
Just like garbage, anything may get out of control, and it's impossible to make a risk-free decision. What we can do is strive to control and minimize the risks, expose the truth, state the fact fairly and observe and consider fully. We should do what we should do, do what we can do.

Yonglong Liu, Chairman of Shanghai Rendu Ocean NPO Development Center November 9, 2017

A brief introduction of < BEACH LITTER BRAND AUDIT ANNUAL REPORT (2017)>

This report is the first to use Marine Debris Brand Audit Card to record the brands of the marine debris. It shows brand new profile of marine debris to the public. The Marine Debris Brand Audit Card is different from the traditional monitoring tools like ICC (International Coastal Cleanup) Card which sorting the marine debris according to usage, source and quality. The brands are more closely related to people's daily life and shorten the distance between marine debris and us. We hope to raise consumers and producers' awareness of environmental protection and promote responsible attitude to consumption and production.

This report introduces the background of the monitoring activity, analysis of the data and the comparison between the methods. It also shows the data acquired by 2527 volunteers among 40 activities in 12 coastal cities between 2016 September and 2017 December. Statistics result shows that about 11% of the debris found on the beach could be classified into brands. 71% of those brands were alcohol and beverage, 18% were snacks. In addition to that, this report also lists the most common brands on the beach; most of these brands are popular and well known by consumers.
This report is a trial to promote the solving of marine debris. We hope that the community could cooperate and work to make the ocean unblemished again.

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Asia Pacific Civil Forum on Marine Litter

NOWPAP Marine Litter Meetings in Busan, Republic of Korea, June 2018

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Experts call for harmonized approach to microplastics threat to Northwest Pacific seas

The growing threat of microplastics pollution in the Northwest Pacific seas requires a coordinated expert evaluation of their dangers to the marine environment, participants at a UN Environment-sponsored meeting held at the Korean Ocean and Fisheries Human Resources Development Institute in Busan, Republic of Korea on 3 July 2018, agreed.

Experts on microplastics from Japan, the People's Republic of China, the Republic of Korea and the Russian Federation attending the Expert Meeting of the NOWPAP special project: "Monitoring and Assessment Methods for Microplastics pollution" emphasized the need to harmonize standards and methods used for measuring and monitoring microplastics pollution.

The meeting was convened under the Action Plan for the Protection, Management and Development of the Marine and Coastal Environment of the Northwest Pacific Region (NOWPAP), a part of the four-decade-old Regional Seas Programme of UN Environment that works to prevent and reverse the accelerating degradation of the world's oceans and coastal areas.

The participants, also including representatives of NOWPAP Regional Activity Centers (RAC) and Regional Coordinating Unit (RCU), reviewed global, regional and national efforts to develop microplastics monitoring methods and identified gaps in such monitoring in the four NOWPAP member states.

Ranging from 5 mm to nano proportions, microplastics are produced from fragmentation of larger plastic fragments, but also are used in personal care and cosmetic products as well as in pre-production plastic resin pellets. They are increasingly contaminating the world's seas and oceans, posing a serious threat to the marine environment and marine

biodiversity as well as human health by entering food chains.

There is growing scientific evidence linking microplastics to persistent chemicals such as the pesticide DDT and toxic PCBs. Research shows these are adsorbed or embedded during production of plastics and present not only on ocean surfaces but even in deep-sea sediments. An assessment by the Tokyo University of Marine Science and Technology found the world's highest concentration of microplastics in the East Asian seas in the Northwest Pacific region at 1.7 million pieces per square km, about 27 times the global average making the region a global "microplastics hot-spot".

Dr. Atsuhiko Isobe of the Research Institute for Applied Mechanics, Kyushu University, Japan, Dr. Guyu Peng of East China Normal University, Dr. Sang Hee HONG of the Korea Institute of Ocean Science and Technology(KIOST) and Dr. Sergei MONINETS of the Sea Protection Institute, Maritime State University briefed the Expert Meeting about oceanic microplastic research in Japan, People's Republic of China, Republic of Korea and the Russian Federation, respectively, emphasizing the need for standardization and harmonization of monitoring methods.

Ms. Kanako SATO, Deputy Director, Office of Marine Environment, Water Environment Division, Ministry of the Environment, Japan, made a presentation on national efforts to harmonize microplastics monitoring.

Dr. Won Joon SHIM of the Korea Institute of Ocean Science and Technology(KIOST) briefed the Expert Meeting on work in microplastics monitoring by the Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection (GESAMP), the Sub-Commission for the Western Pacific of the Intergovernmental Oceanographic Commission (IOC-WESTPAC) and the Study Group of Marine Microplastics (SG-MMP) being established at the North Pacific Marine Science Organization (PICES).

Dr. Qingjia Meng, Associate Professor, Chinese Research Academy of Environmental Sciences, Ministry of Environmental Protection (MEP), presented an overview of the NOWPAP Special Project "Monitoring and Assessment Methods for Microplastics pollution".

The four NOWPAP Regional Activity Centres also briefed the meeting of planned activities in the field of oceanic microplastics monitoring.

Participants agreed that the Special Project would use existing microplastics monitoring criteria in NOWPAP countries. Existing eco-toxicological studies of the impact of microplastics on the environment would be used as part of a harmonized regional approach to microplastics ecological risk assessment. Monitoring of microplastics pollution would be carried out in selected sites in the NOWPAP region and a plan prepared for a regional programme for microplastics assessment and monitoring.
These recommendations were later endorsed by the 2018 Northwest Pacific Regional Action Plan on Marine Litter (RAP MALI) Meeting held on 5-6 June in Busan. The proposed Special Project is expected to be reviewed by the 23rd NOWPAP Intergovernmental Meeting (IGM) scheduled in Moscow in October 2018.

Addressing the threat to the marine and coastal environment from microplastics is a priority of the NOWPAP Medium-term Strategy (MTS) 2018-2023. The MTS aims to support scientific evidence-based policymaking in NOWPAP member countries to protect the marine and coastal environment for present and future generations, a key goal of the global 2030 Sustainable Development Agenda.

NOWPAP Member States review progress in marine litter management

Participants from government agencies, research institutions and international organizations from Japan, People's Republic of China, Republic of Korea and the Russian Federation met in Busan on 4 June 2018 to review regional progress in preventing and reducing marine litter in the Northwest Pacific seas. Representatives of non-governmental organizations (NGOs) from Bangladesh, Republic of Korea and Vietnam also attended.

The NOWPAP- Tripartite Environmental Ministers Meeting (TEMM) Joint Workshop on Marine Litter Management, held in Busan's Hotel Homers was jointly organized by OSEAN and NOWPAP with support from the Ministry of Oceans and Fisheries of the Republic of Korea, the Korea Environment Management Corporation and the Busan Metropolitan City Government.

In a message to the workshop, H.E. Mr. Seung Hwan CHO, Deputy Minister for Marine Policy Office, Ministry of Oceans and Fisheries, Republic of Korea, emphasized the transboundary nature of the marine litter problem.

"Marine litter is not just the concern of any single state, but is a global issue, as marine litter drifts along with the current, affecting the environment of all adjacent states. For this reason, joint efforts need to be made and mutual cooperation is essential to resolve the marine litter issue. I sincerely hope that through this workshop, NOWPAP member states can work toward fruitful and concrete outcomes, based on which the cooperation between us all will be further strengthened," the minister told the participants.

Presentations on progress in dealing with marine litter in Japan, People's Republic of China and Republic of Korea . were made by Dr. Kanako SATO, Deputy Director, Ministry of Environment, Japan, Dr. QingJia MENG, Associate Professor, Chinese Research Academy of Environmental Sciences, Ministry of Environmental Protection (MEP), People's Republic of China and Mr. Woo Rak SUH of the Korea Marine Environment Corporation (KOEM).

Mr. Nikolai KOZLOVSKII of NOWPAP POMRAC made a presentation on entitled "Rivers as a source of microplastic contamination of the marine environment. Current studies in the Russian Far East" and Dr. Sergey MONINETS, Director, Sea Protection Institute, Maritime State University, made a presentation titled Results of the Year of Ecology in the Russian Federation. Central and local government's efforts.

A special session on abandoned, lost or otherwise discarded fishing gear (ALDFG) in fisheries and aquaculture began with a video presentation by Joanna Toole of the Food and Agriculture Organization (FAO) of the United Nations on the development of best practice measures to reduce ALDFG and its impacts at the global level.

Presentations were also made by Dr. Sunwook Hong, President of OSEAN on the findings of the 10-year Korea Marine Debris Monitoring Program on derelict fishing gears, and by Ms. Daria ZADOYA of the Maritime State University on Assessment of the risks of marine pollution from the fishing industry in the Russian Federation.

Dr. Lev Neretin of NOWPAP RCU, briefed the workshop on UN Environment response to marine litter since the last NOWPAP-TEMM Workshop in 2017, including progress of activities of the Global Partnership on Marine Litter (GPML), the #CleanSeas Campaign and other activities, and the follow up to UN Environment Assembly (UNEA)-3 Resolutions.
Mr. Zhengguang ZHU of the Yellow Sea Large Marine Ecosystem (YSLME) Project, introduced the YSLME Phase II Project titled "UNDP/GEF Implementing the Strategic Action Programme for the Yellow Sea Large Marine Ecosystem:

Restoring the Ecosystem Goods and Services and Consolidation of A Long-term Regional Environmental Governance Framework".

Presentations were also made by Dr. Peter KERSHAW of GESAMP, Ms. Marina SAKAI and Ms. Wandi HUANG of the Trilateral Cooperation Secretariat (TCS) and Mr. Sang Soon MYUNG of the Ministry of Oceans and Fisheries (MOF), Republic of Korea.
Dr. Jongmyoung LEE, Chief Science Officer, OSEAN, described civil society efforts to reduce the global impact of marine litter, followed by presentations by Mr. Muntasir MAMUN of the Bangladeshi NGO Kewkradong, Ms. Nguyen Thi Thu TRANG of the Vietnamese NGO GreenHub. And Ms. Chieko AZUMA of the (Japanese?) NGO, JEAN.

The 2018 NOWPAP-TEMM Workshop was followed by a separate meeting of the NGO participants to share lessons learned and experiences in managing marine litter. They also discussed how NOWPAP could support civil society efforts in the region and beyond with best practices and knowledge-sharing.

School children clean up Busan beach on World Environment Day

Unmindful of the rain, scores of excited school children walked around Busan's popular Haeundae beach, picking up plastic cups, bottles, discarded fishing gear and other waste littering the seashore as they took part in a coastal clean-up to mark World Environment Day on 5 June.

Eighty junior school students from Busan's Dong Cheon Elementary School joined the International Coastal Clean-up Campaign (ICC) jointly organized by OSEAN, NOWPAP, Ministry of Oceans and Fisheries, Republic of Korea and Korea Environment Management Corporation (KOEM).

About 70 local people together with NOWPAP officials and civil society groups also took part in the ICC on the beach which attracts large number of tourists. A total of 51 kg of litter, including fishing rods and nets and styrofoam boxes were collected. The two-hour event also featured talks by experts and school teachers on marine litter. A special training was organized on how to collect and measure microplastic particles - products of plastic degradation harmful to the marine environment,

"I knew that there was rubbish on the beach, but not this much! I now know that we need to use less plastic," said 12-year-old schoolgirl, Shin Dong Yoon

The Busan ICC was the latest in a series of such events organized by NOWPAP annually on the Northwest Pacific beaches of its member states – Japan, the People's Republic of China, Republic of Korea and the Russian Federation.

The ICCs are part of the NOWPAP Regional Action Plan on Marine Litter launched in March 2008 to prevent the entry of litter into seas and coasts, monitor marine litter quantities and its distribution, and remove/dispose marine litter.

Annual marine litter management workshops and ICCs are held in each NOWPAP country in collaboration with NGOs. Public awareness is a key element of the Action Plan and a variety of brochures, leaflets and posters on marine litter have been published in local languages and distributed widely in the region. A series of guidelines to reduce marine litter have also been developed for the fishing, shipping and tourism industry as well as a booklet on recycling plastic marine litter.

Marine litter, found on beaches, shores and on the seas in the region, consists mostly of very slowly or non-degradable

waste such as plastics, including extended polystyrenethat originates from land- and sea-based sources from fisheries and aquaculture. It results in environmental, economic, health and aesthetic problems, including a possible transfer of toxic substances and invasive species. Marine life is also at risk of entanglement, suffocation and ingestion.

World Environment Day 2018

The 2018 World Environment Day (WED) theme "Beat Plastic Pollution" is encouraging people worldwide to take a critical look at their own relation to single-use plastic and make real efforts to break their dependency on disposable plastic.

World Environment Day is the single largest celebration of our environment each year. Since it began in 1974, it has grown to become a global platform for public outreach that is widely celebrated across the globe. For more information, visit www.worldenvironmentday.global

Meeting of the Northwest Pacific Regional Action Plan on Marine Litter (RAP MALI) Focal Points

On 5 and 6 June, NOWPAP marked the 10th anniversary of its Regional Action Plan on Marine Litter (RAP MALI) with a meeting of the RAP MALI Focal Points to review progress, promote regional cooperation on tackling marine litter including microplastics and to provide strategic direction for the development of the Northwest Pacific Regional Node of the Global Partnership on Marine Litter (GPML).

The Focal Points reviewed RAP MALI progress and proposed activities related to the Reginal Action Plan for the NOWPAP Regional Activity Centres (RACs) and Regional Coordinating Unit (RCU) in 2018-2019.

NOWPAP Programme Officer, Mr. Ning LIU briefed the meeting on progress by NOWPAP member states and the RACs in the three core elements of RAP MALI, namely prevention, monitoring and removal of marine litter. The NOWPAP RACs also presented progress in their work on marine litter.

The meeting agreed that the proposed NOWPAP Special Project on microplastics would use existing microplastics monitoring criteria in member states countries. Existing eco-toxicological studies of the impact of microplastics on the environment would be reviewed as a second component of the project. Microplastics pollution monitoring would be carried out in selected sites in the NOWPAP region and a plan prepared for a regional programme for microplastics assessment and monitoring.

The NOWPAP RCU also informed the meeting of progress in developing the Global Partnership on Marine Litter (GPML).

Dr. Lev NERETIN of the NOWPAP RCU, made a presentation on the necessity of updating RALI MALI which was launched in 2008. Participants suggested the preparation of a third regional review of Marine Litter in the NOWPAP Region as a preliminary step. The RCU was requested to prepare a project proposal for a Third Regional Overview of Marine Litter in theNOWPAP Region.

The meeting accepted with much appreciation, the invitation from Dalian City, People's Republic of China to hold the 2019 RAP MALI Focal Points Meeting jointly with the 2019 NOWPAP-TEMM Marine Litter Management Workshop and the 2019 NOWPAP International Coastal Clean-up, tentatively in September 2019.

The RCU proposed closer cooperation among members to promote civil society participation in NOWPAP marine litter activities in the region and beyond. The 2018 joint NOWPAP-Asia-Pacific Civil Forum on Marine Litter held concurrently with the 2018 RAP MALI Meeting was cited as an excellent example of such cooperation. The meeting requested the RCU to develop terms of cooperation with the Asia-Pacific Civil Forum on Marine Litter.

Fig. 1 ICC 6

Fig. 2 temm-nowpap workshop

Fig. 3 TEMM-NOWPAP

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Great Start for Collaboration Between APML and NOWPAP

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Asia Pacific Civil Forum on Marine Litter (APML) and Northwest Pacific Action Plan (NOWPAP) Joint NGO Forum was held on June 6, 2018 in Busan City, Republic of Korea. OSEAN and NOWPAP RCU (Regional Coordinating Unit) organized it to seek better way to cooperate for clean ocean in NOWPAP region and Asia Pacific region as well. NOWPAP is one of regional sea programs under UNE, having Korea, Japan, China, and Far East Russia as member states. APML is a network to connect 9 NGOs from 8 countries around Pacific Ocean, focusing marine litter issue. This is the very first meeting to have times for sharing experiences and information in person with APML and NOWPAP RCU and to officially report the result to UNE. During the forum, we discussed how to collaborate between NOWPAP and APML in practical and feasible ways to step up in near future. Thirteen people participated: 2 people from NOWPAP RCU, 10 people from APML (Republic of Korea, Japan, Bangladeshi, and Vietnam), and 1 observer from Russia.

NGO forum time table

14:00~14:20	Opening remarks (Dr. Lev Neretin, Dr. Liu Ning, NOWPAP RCU)
14:20~16:00	**Session 1: Marine Litter and Citizen Science** ● Presentation: 1. Local actions of Vietnam to address of marine litter (public awareness, monitoring, data citizen science) (by Ms. Nguyen Thu Trang, GreenHub, Vietnam) ● Presentation 2. Tracing a path to knowledge? Smart approach for citizen involvement (by Mr. SM Muntasir Mamun, Kewkradong Bangladeshi, Bangladeshi) ● Presentation 3: OSEAN: Marine litter monitoring and rapid assessment by citizens (by Dr. Jongmyoung Lee, OSEAN, Republic of Korea) ● Presentation 4: Tackling marine plastic litters through collaboration among the civil society organizations (by Ms. Chieko Azuma, JEAN, Japan)
16:00~16:20	Coffee break
16:20~17:30	**Session 2: Activation of NGOs' engagement in Asian region** ● Roundtable discussion: sharing the potential resources and opportunities and discussing ideas for cooperation with NOWPAP and other UNE regional sea programs
17:30~18:00	Summary of the forum

Ms. Nguyen Thu Trang, Director of GreenHub, Vietnam, introduced local activities for marine litter issue. The ICC data in Vietnam shows that Styrofoam fragments are the most abundant. Those are originated mainly from oyster aquaculture ground. The Ha long Bay Peoples Committee banned the use of polystyrene and called for the implementation of environment-friendly alternatives yet to be developed.

Mr. Muntasir Mamun, Director of Kewkradong Bangladeshi, shared the technical approach to make citizens engage in reporting garbage on the street. He himself developed this smartphone app which includes very simple categories and needs only a few of clicks for registration of littered garbage. The online map visualizes numbers and GIS information collected by individuals. It could deliver visual message to the public and provide motivation to participate in tackling marine litter problem.

Dr. Jongmyoung Lee, Chief scientist of Korea Marine Litter Institute, OSEAN, Republic of Korea introduced rapid assessment of beach debris by visual scoring which has been conducted with citizen science in Korea. Ministry of Ocean and Fisheries and Korea Marine Environment support this project to understand standing stock of beach debris and to identify management priority. Trained citizens survey, using smartphone app and all data are promptly posted to the Marine Litter Information System.

Ms. Chieko Azuma, director of international relationships, JEAN, Japan, gave a presentation about the very recent activities among their 30-yr experiences. JEAN has organized a series of workshop for sharing marine litter and microplastic issues for NGOs. Various NGO groups which have involved in river environment keepers, waste reduction, and so on developed concrete ideas together based upon communication and discussion.

During the discussion session, we identified resources and opportunities we have and summarized the suggestion for collaboration with NOWPAP and international efforts beyond NOWPAP region.

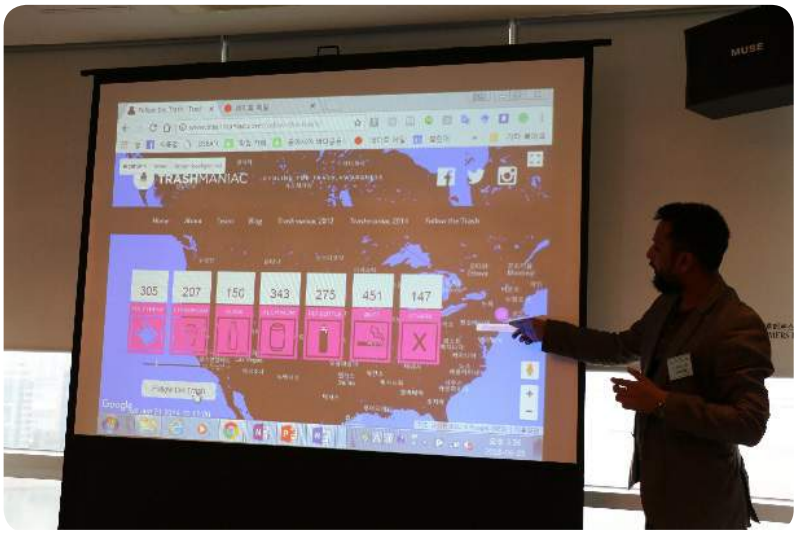
Resources: APML has organized its monthly webinar and issue biannual newsletter, and conducted other research project with CSIRO, Australia. APML has abundant experiences of monitoring of beach debris and visual scoring method to quantitatively estimate beach debris

Opportunities: GPML (Marine Litter Network) promotes extensive involvement of global societies in the activities. Jambeck et al. (2015) revealed major plastic waste inputs from China, Bangladeshi, and Vietnam. There is lack information of aquaculture as a growing source of derelict fishing gears and lack response to disaster such as typhoon and extreme weather. Funding opportunities increase (Toyota foundation, JICA, KOICA, Patagonia, Youngone Corp.). G7/G20 marine litter action plans and SDGs 14-1 have put pressure on the governmental effort and encouraged NGOs contribution. Four members have conducted CSIRO's global project. APEC Capacity Building workshop by Korean government and Korea Marine Environment Management has been held since 2017 and MOOC on marine litter provides Chinese version of materials.

Suggestions

1. GGGI could be a good platform to collect information on derelict fishing gears. Additionally, aquaculture-originated gears have never been highlighted although Styrofoam buoys from oyster-aquaculture of Korea, Japan, China, and Vietnam have caused serious problems. Lack information on these gears might miss important targets for tackling marine litter issue.

2. Visualization of debris status with app (initiated by Bangladeshi) will be an easy start for public awareness.
3. Standardized monitoring methodology for identifying types and sources of beach debris and temporal trend in comparable ways are achievable because OSEAN has tried to harmonize it in Asian region before and many member NGOs have experienced rapid assessment protocol for estimating standing stock and cleanup by local authorities.
4. The importance of capacity building can't be overstated. MOOC can provide multi-language version of the training course.
5. On-line meeting among APML members (and NOWPAP RCU if possible) is necessary to share the latest information and progress in 2018.



Mr. Muntasir Mamun, Bangladeshi shows the web site 'TRASHMANIAC' he initiated.

Presentation of Ms. Thu Trang, Vietnam (Courtesy of KOEM)

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The Successful Development of a Draft on the APEC Marine Debris Management Guideline

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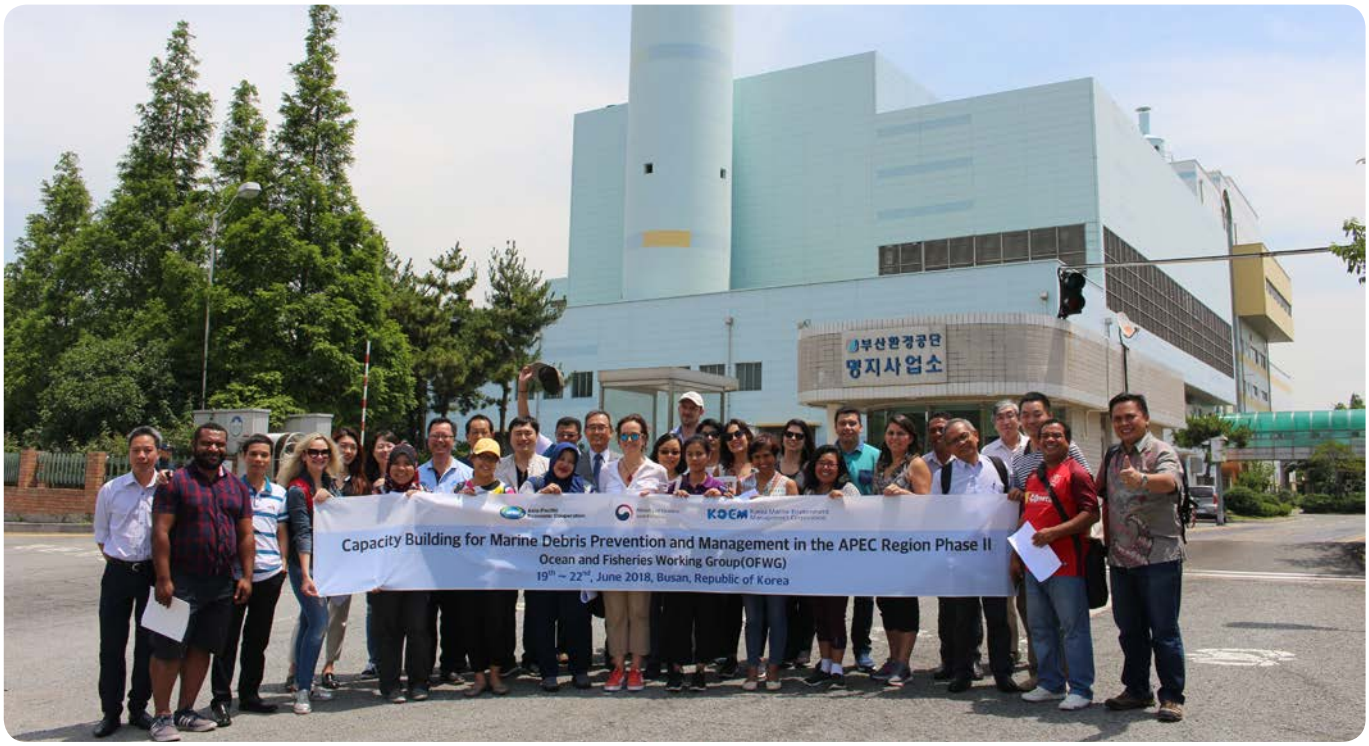

An APEC (Asia-Pacific Economic Cooperation) training workshop under the OFWG (Ocean and Fisheries Working Group), "Capacity building for marine debris prevention and management in the APEC region Phase II" was jointly organized by the Ministry of Oceans and Fisheries of the Republic of Korea and KOEM (Korea Marine Environment Management Corporation) from June 19-22 in Busan, Republic of Korea. 33 participants from 16 APEC economies, 1 observing economy (Timor Leste), 3 international organizations (UNEP NOWPAP, ASEAN, World Bank) and 19 renowned expert speakers in the field convened in this event, sharing expertise and knowledge regarding the most up-to-date marine debris management techniques and producing a draft on the APEC Marine Debris Management Guideline

Under the growing need to combat marine debris through a comprehensive multilateral approach, APEC OFWG previously endorsed the need for a systematic capacity building program to address marine debris, and approved the "Capacity Building for Marine Debris Prevention and Management in the APEC Region" Project in 2016. Phase I of the program took place in 2017 in Yeosu, Republic of Korea and discussed the diverse fields of the marine debris issue. APEC economies showed great interest in this program, as 15 of 21 APEC economies attended the program.

Building upon the progress made by Phase I, the Phase II of the program proposed to establish best systemic training methods on marine debris in the APEC region and develop regionally appropriate marine debris management policies through 1) sharing best practices of marine debris management policies and 2) developing a first draft of marine debris management guideline in the APEC region which could be used as a stepping stone for the regional action plan on marine debris management.

The program met the above proposed objectives by providing lectures from best practitioners in marine debris, practical field work based on technical instruments and methodologies, and discussion of marine debris situations from each economy's participants in the APEC region. A key note address was given by Dr. Jenna Jambeck on 'Plastic Waste Input from Land into the Ocean' in order to give the participants an overview on the impacts of marine debris and what must be done to reduce waste input. Experts from international organizations from UNEP NOWPAP, ASEAN and the World Bank as well as NGOs from the Ocean Conservancy and OSEAN gave presentations on international efforts to combat marine debris. Dr. Karen Raubenhemier introduced a comparative Analysis of Regional Marine Debris Action Plans which laid down the foundations on how to develop an APEC marine debris guideline. Presentations from experts in the field of microplastic, styrofoam buoy waste management as well as country presentations from participating economies was conducted to share some of the critical issues that are arising from marine debris throughout the world. A Drafting session for the guideline followed these informative sessions, enabling participants to be fully aware of the most recent issues, breakthroughs and concerns on marine debris. On the final day, participants were invited on a field trip to experience both land based and ocean based waste management in Korea by visiting the Busan Environment Corporation Material Recycling Center and KOEM's Marine debris clean-up vessel located at the KOEM Busan Branch Office.

As this project is directly linked with the mandates of the APEC OFWG, the results of the workshop will be first shared with OFWG. The final reports of the workshop and the revised version of the draft marine debris management guideline will be submitted for its endorsement during the 11th OFWG meeting in August 2018, Papua New Guinea. Ultimately, the long-term intended aim of the program is to assist developing APEC states with lacking governance, regulations, infrastructure and public awareness on marine debris into a position to reduce, monitor, and manage it effectively and economically as possible. Furthermore, it is hoped to support harmonized regional marine debris monitoring efforts and the standardization of methods, data, and evaluation of marine debris in the APEC region.


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Southern Far East Russia Coastal Waters Pollution with Microplastics

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Plastic products have become ingrained into our everyday lives since the middle of the XX century, which is due to their strength, wear resistance, low cost and bio-inertness. Every year, there is an increase in production volumes, two-thirds of which are disposable items and packaging mate-rials. Along with the increase in demand for plastics, the problem associated with the accumulation of waste is being updated. The most common polymers are polyethylene (PE), poly-propylene (PP), polystyrene (PS), polyethylene terephthalate (PET) and polyvinyl chloride (PVC). These substances are all represented in the structure of the litter recorded both in the coastal zone and in the sea wa-ters. Studies have shown that about 60% of the litter is represented by plastic waste, with more than 80% of pollution sources of the coastal-marine zone having a land-based origin (primarily recrea-tional activities). Of marine sources it is fisheries that should be noted, which share of waste in the structure of marine litter is about 20%. Polyolefins (PE and PP) and nylons are most widely repre-sented there, as the materials used in fishing gear manufacture [1, 2, 3]. In addition to the plastic waste itself, the so-called microplastics has become a threat in recent years. This term, just like the term “marine litter” has become firmly established among the scientific community. It has been ex-perimentally found out that plastics is decomposed at a relatively high rate in the marine environ-ment under the influence of natural and climatic factors [4]. Their structure is liable to break down as a result of hydrolysis, photolysis and other processes, thus accelerating the processes of defor-mation and weathering. Therefore, within several years, the formation of fragments of various di-mensions, including microplas-tics, is possible, the number of which increases annually in practically all the waters of the World Ocean

Microplastics enters the marine environment mainly in two ways: directly with waste efflu-ent (particles can be contained in various consumer products: cosmetic scrubs, synthetic abrasives, etc.), or with weathering of the macroplastics. Ex-periments conducted by Japanese scientists in which the plastic was subjected to natural temperature and hydrody-

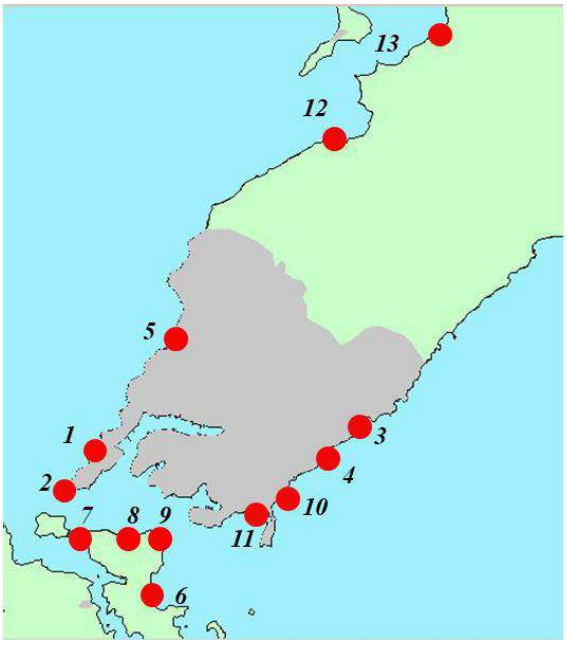
namic processes [5] showed that, for example, polystyrene is fragmented after a year, and when it decomposes hazardous substances are diagnosed in water (for example, bisphenol A, circulating hydrocarbon and others), affecting the endocrine system and leading to oncological diseases.
In addition to those listed, there are some other components, such as polyvinyl chloride, polymethyl methacrylate, phenolic plastics, amino plastics and polycarbonates. Although all these components belong to the group of polymers, with their break down in the marine environment, dif-ferent substances influencing the physiological, morphological and even genetic properties of a hu-man body in varying ways are emitted. For example, decomposition of polystyrene results in release of styrene proper and butadiene, both are possessing carcinogenic and mutagenic effects [6, 7]. With degrading of polycarbonates, bisphenol A is released, which is considered one of the most dangerous substances affecting the reproductive capacity of living organisms. Thus, the assessment of the distribution of microplastics in the coastal marine areas and its impact on the environment are important environmental issues, which are studied by specialists in various regions of the world. Russia is no exception. Active studies of microplastics in the marine environment in the South of the Russian Far East have been conducted by the experts of the Far Eastern Federal University and the Maritime State University named after Admiral G.I. Nevelskoy since 2014 [8]. The research done within the previous forty years has shown that the pollution of the World Ocean with plastics has attained such a scale that this material has already become a part of the diet of marine life, and, subsequent to them, a part of the human diet [9, 10]. One of the most obvious problems of plastic contamination is the death of sea animals and birds, which easily take multi-colored pieces of plas-tics for something edible, plastic particles, fill their gastrointestinal tracts, and as a result of which a bion perishes with hunger.

The concentration of pollutants and the sources of their input to the coastal and marine envi-ronment in Russia differ significantly from other regions. And the inhabitants of Russia do not even suspect that the microplastics is an international problem, focusing only on relatively large plastic objects. It should also be noted that Russia lacks special legislation to co0ver the issues of litter in the coastal zone and in the sea areas in general, in contrast to, for example, countries of southeast Asia, where plastic contamination of the surface, the water column and bottom substrates is regulat-ed at a national level.

The coast of the Far East Russia features a relatively low development. Small population density, the development of the predominantly extractive sector, distinguish the region among the nearest neighbors. However, an unfavorable ecological condition is characteristic of its southern part. The Peter the Great Bay stands out not only as a unique natural and climatic region, where the species of temperate and subtropical latitudes conjoin, but also as a rather polluted water area, espe-cially in its northern part. Numerous sources of pollution, discharging conditionally purified waters into the bay, also input plastic particles.

A similar situation (with varying gravity degree) is typical for all the port water areas. Therefore, in order to work out a strategy for managing surface contamination, the primary task is the development of a methodological base, namely the development of a method for monitoring floating litter. Furthermore, the main task of monitoring is determining the main patterns of occur-rence, migration of the litter and its accumulation locations. The regularity of the process will allow to establish sources of pollution and determine the movements of litter, and therefore, to optimize the system of treatment operations.

Accordingly, 13 monitoring points have been allocated in the Peter the Great Bay (the Sea of Japan / East Sea) to include recreational and industrial areas that differ in hydrodynamic regime, in five of which plastic samples are encountered on a regular basis [11]. The geography of the study considering the scale of Russia is small so far, but its expansion is annually noted. [Figure 1] shows the reference points for monitoring microplastics in the northern part of the Peter the Great Bay.



1. Fedorova bay (Vladivostok);
2. Tokarevsky lighthouse;
3. Steklyannaya bay;
4. Gornostay bay;
5. Vtoraya rechka mouth;
6. Ayaks bay;
7. Channel;
8. Pospelova cape
9. Bosfor Vostochny strait;
10. Patrokl bay;
11. Uliss bay;
12. Bogataya river mouth
13. Uglovoy bay

Fig. 1 Monitoring sites in Vladivostok coastal zones

In samples taken from the Bosporus of the East Strait and the Golden Horn Bay, microplastic particles of about 2-3 mm in size are regularly found. In the open areas of the Ussuriisky and Amursky Bays the microplastics is practically not represented. The analysis of environmental conditions in the areas where the particles are detected allows for a suggestion that the most likely sources of pollutant input are the coastal sources.

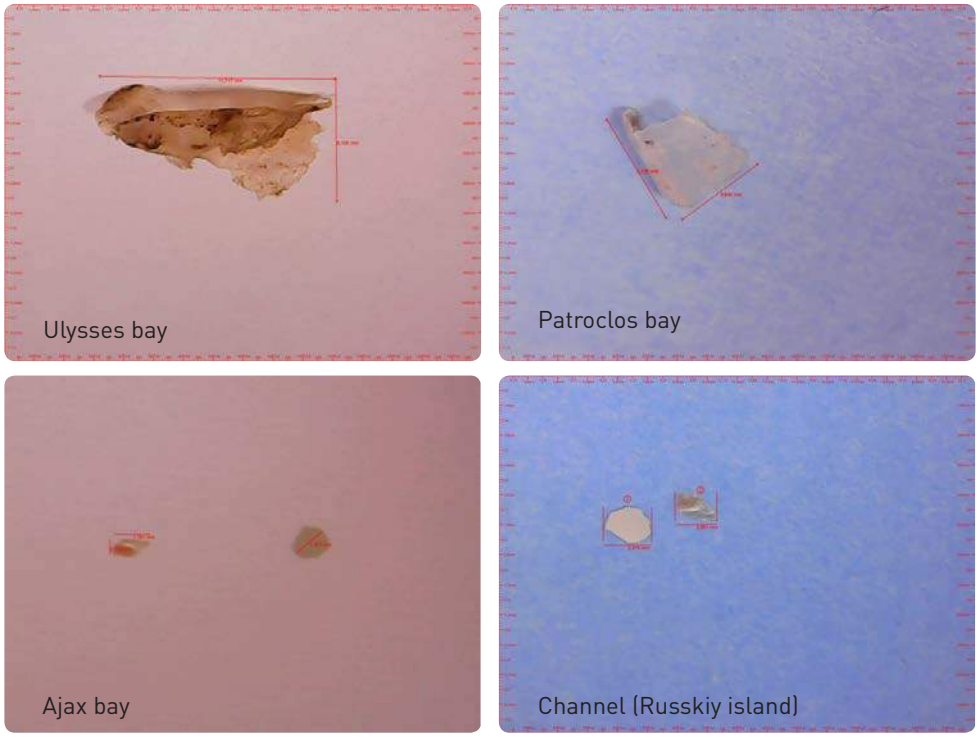


Fig. 2 Microplastic fragments in the samples

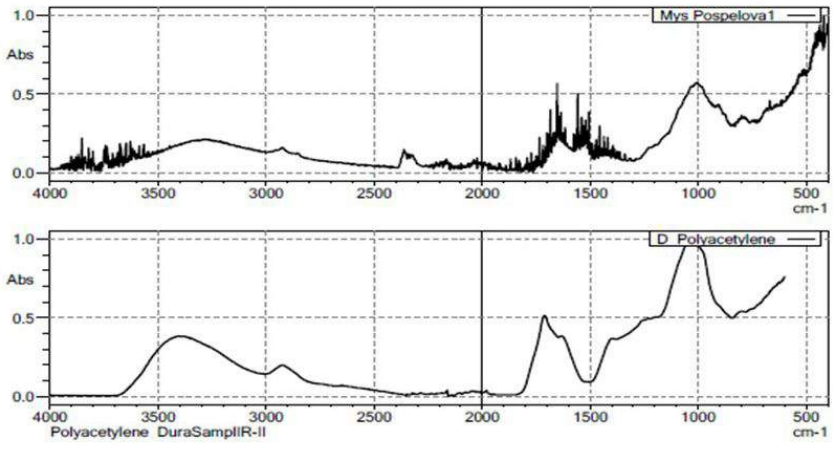
[Figure 2] shows an example of microplastic fragments found in the waters surrounding Vla-divostok. Virtually all particles are polyethylene and polypropylene. The maximum size of the iden-tified sample is 11 mm (in the Ulysses Bay).

The analysis of the methodological base used for sampling has shown that there is no single approach to the selection of microplastics in the marine environment. At the same time, there are fundamental similarities, which were taken as a

basis for sampling in Russian waters. The most ex-pedient seems to be the use of plankton networks, which net-mesh size allows retaining the smallest particles. In our case, small Apstein nets with a beaker1 were used. Sampling is carried out by trawl-ing from a small craft carried out for 10 minutes at each monitoring station. Thus, taking into ac-count the size of the net, the speed of the vessel and the time of collection, the volume of the pumped water was about 10 cubic meters. Then, the lifted net was further washed with seawater to collect the microplastics from its walls. The entire pollut-ant was then slid into a metal beaker, which completes the net. The obtained sample was placed in a marked container to determine the qualita-tive composition of the collected microplastics.

A qualitative analysis of the samples was carried out on the basis of the Nanocentre of the Far Eastern Federal University using the methods of infrared microscopy (IR) and spectrophotome-try. Using an infrared microscope the Shimadzu AIM-8800 the dimensional composition was fixed. Further, the samples were analyzed at an IRTraser-100 IR spectro-photometer with a Quest FTIR attachment (frustrated total internal reflection) of a horizontal type (Shimadzu, Japan) with a meas-urement range of 400 to 4000 cm-1 and a resolution of 2 cm-1. The identification was carried out by automatic comparison with the Spectrum Library (STJ-Europe Spectral Database, Germany). The method is based on physical phenomena that arise when the light is reflected at the interface be-tween two media with different optical densities. When the light, passing through a medium with a relatively high refractive index (an FTIR crystal) falls on the interface with a medium with a lower refractive index (sample) at an angle of incidence greater than the critical angle (the maximum angle of total reflection), then the radiation from this boundary surface is reflected almost completely. However, even with complete reflection, the radiation still penetrates into the medium bordering the crystal to a small depth.

The depth of penetration of the light beam into the sample is a function of the wavelength, the refractive indices of the crystal and the test substance, and the angle of incidence. Depending on whether the neighboring medium absorbs or does not absorb the radiation, that is, in this case a sample, the intensity of the reflected light changes. As a result, a reflection spectrum similar to the transmission spectrum is obtained. In this spectrum, the wave numbers at which the absorption spe-cific for a given substance takes place will be the same as when measured in transmitted light. This ap-proach is a modern non-destructive method of analysis in the infrared region of the spectrum, which makes it possible to obtain exhaustive information from a microscopic sample. In combination with the IR spectrometer, a powerful system is formed indispensible for the study of solid samples.



	Score	Library	Name	Comment
1	672	27 - ATR-Polymer2	D_Polyacetylene	Polyacetylene DuraSamplIR-II
2	669	43 - A_FoodAdditives2	A_Microfibrillated Cellulose_100G-4	Microfibrillated Cellulose(Product name;CELISH FD-100G[^C;Sales origin;Daicel Chemical Industries Ltd.)[^@DuraSamplIR2(diamond)
3	667	8 - ATR-Polymer2	D_Cellulose2	Paper DuraSamplIR-II
4	667	6 - T-inorganic2	Glass2	Glass Transmission
5	667	50 - A_FoodAdditives2	A_Powdered Cellulose-4	Powdered Cellulosec(Product name;VITACEL L-600[^C;Sales origin;TOAKASEI CO.,LTD.)[^@DuraSamplIR2(diamond)

Fig. 3 Pospelov cape sample spectrophotometry result

Among all synthetic materials, polyethylene, a substance obtained by polymerization of eth-ylene molecules, while observing certain technological processes is considered to be the clear leader,. Polyethylene is used not only as a packaging material, but also in the construction industry. This substance is most often found in the structure of microplastics. As for cellulose, which is also very common in the samples obtained, it is characterized by poly-morphic properties and is used for the production of artificial fibers, which also provides ample op-portunities for its both domestic and industrial application, which increases the likelihood of its in-put to the marine environment. In samples taken from the northern coast of the Russkiy Island in the way of Pospelov Cape, particles of polyethylene and cellulose are found everywhere. [Figure 3] shows the results of laboratory processing of materials.

Thus, it should be stated that most of the detected microplastic particles belong to environ-mentally hazardous compounds. As it already been mentioned, in samples from Ajax and Ulysses bays, it is the polypropylene, one of the most common polymers, which is most frequently found. This is accounted for by its characteristics, due to a variety of methods of its production and pro-cessing. It is obtained directly from gaseous propylene by polymerization. This polymer is most of-ten used for the manufacture of disposable tableware, which accounts for almost 90% of recreation-al waste. Considering the structure of the macroplastics found in these areas, it should be noted that the recreational activity is the source of the input of these pollutants to the marine environment (in the Ulysses Bay area there is a large yacht mooring, while the area of the Ajax Bay is a leisure and recreation center of the townspeople).

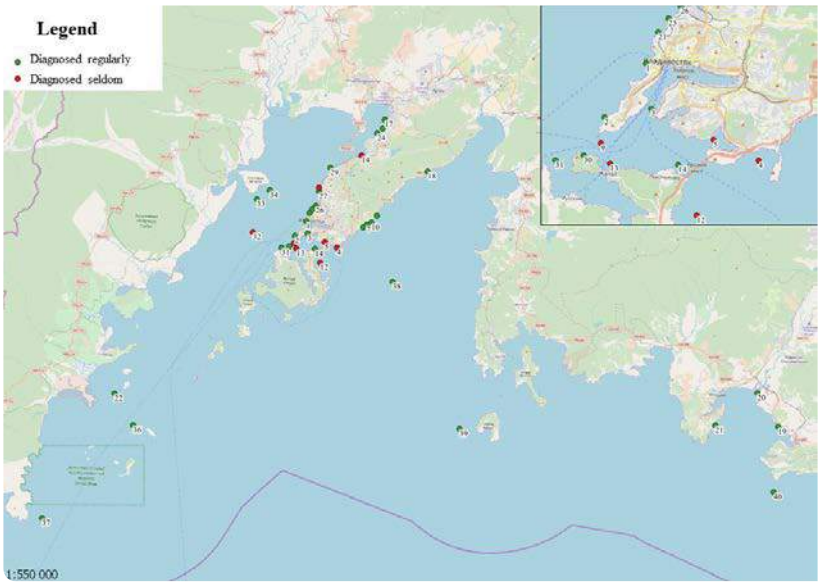


Fig. 4 Sampling route in the coastal waters of Vladivostok

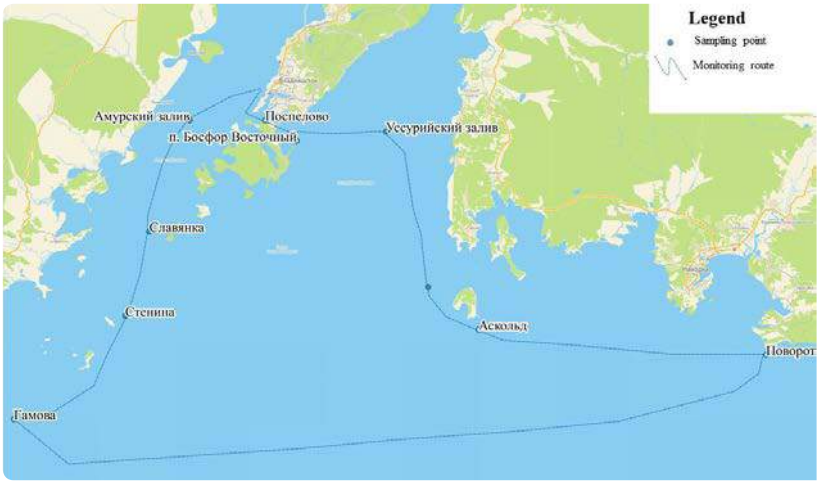


Fig. 5 Monitoring route in the open water area of Peter the Great Bay

Field survey routes are regularly adjusted in accordance with hydrodynamic factors; however, in the most probable areas of microplastics distribution in the near-surface layer, they remain unchanged. [Figure 4] shows a regular sampling route in the coastal waters of Vladivostok. According to the results of this passage of 2016, microplastics is not encountered at all points, which is probably due to the active removal of particles into the open part of the bay. In 2017, the first large-scale expedition was conducted to study microplastics in the open water area of Peter the Great Bay [Figure 5] . During a week-long expedition, 220 nautical miles were covered and samples were taken at 10 points, in 4 of these microplastics was not found. In the remaining 6 samples polystyrene, poly-propylene and polyethylene prevailed (35-50%). A particularly large number of them was recorded in the waters off the Slavyanka Bay. Also a small amount of cellulose and fiber was recorded.

Since 2016, we have been studying the content of microplastics in the soil. Studies were

car-ried out on seven beaches of Vladivostok, two beaches in the top of the Amur Bay and three beach-es of the Bay of Posiet. Sampling from the shoreline was carried out at regular intervals (about 300 meters). In each point a square of 1m x 1m was selected, from each corner of which as well as from the center a scoop of soil weighing about 100 grams was taken. The sample was thoroughly mixed.This way more than 100 soil samples were selected in two steps (autumn, spring). Subsequent laboratory analysis of the first series of samples showed that after sample settling, the fragments of the microplastics were visually detected on an irregular basis. Therefore, an express method was used, which allows extraction from the entire volume of the sample obtained. For this purpose trichloromethane which dissolves all kinds of plastics was used. The whole volume of the sample was thoroughly mixed with trichloromethane, and then the solution was separated from the soil through a paper filter.

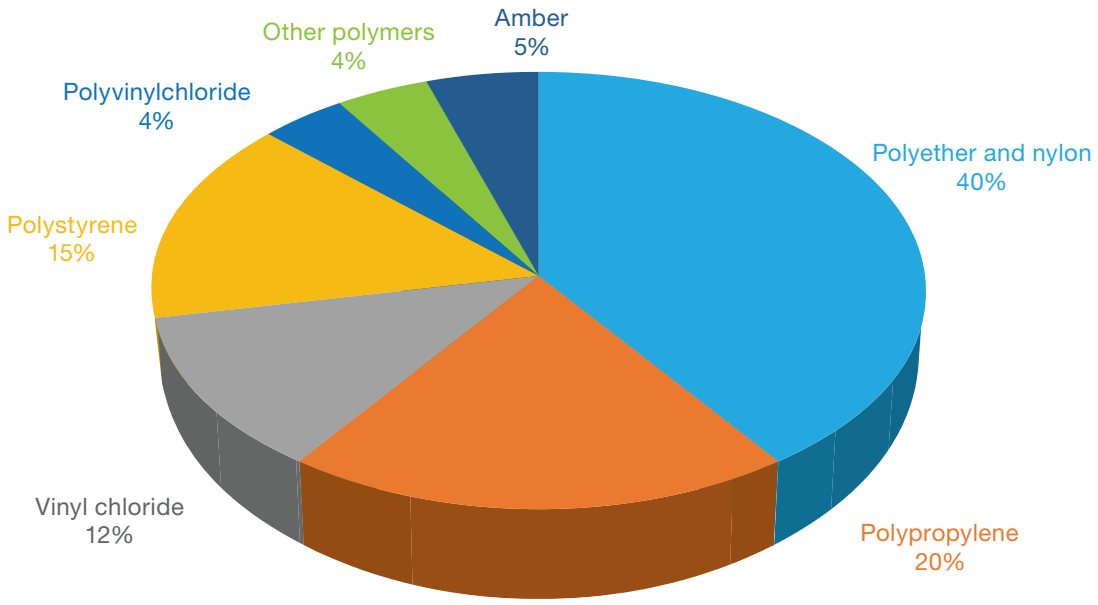


Fig. 6 Coastal ground microplastic structure

A rotary evaporator was used for segregating concentrated microplastics. The sediment ob-tained after evaporation was analyzed by means of an IR spectrophotometer. Unfortunately, this method does not allow us to determine the size composition of the microplastics, but its concentra-tion in the study area is very small, which makes it feasible to study only its qualitative composition at this stage. As the results of the analysis showed, the main pollutants of coastal soils are polyeth-ylene and styrene [Figure 6] . Paraffins are found in small amounts.

The amount of data received is large, so software tools from the family of geoinformation systems are used for their pro-cessing, interpretation and subsequent visualization. GIS-technologies also allow automating certain stages of monitoring for planning the observations and revealing the regularities. Features of GIS allow developing maps of pollution dynamics, carrying out a compara-tive analysis, and the available statistical database becomes an important tool in decision-making on the status of the water area.

Observations made give us the grounds to ascertain that the microplastics is regularly found in the water area of Peter the Great Bay. A qualitative analysis of the obtained samples suggests that this type of pollutant can adversely affect the quality of sea water and the state of marine biota. To assess pollution trends and the impact of microplastics the main components of ecosystems, research in this field will be continued.

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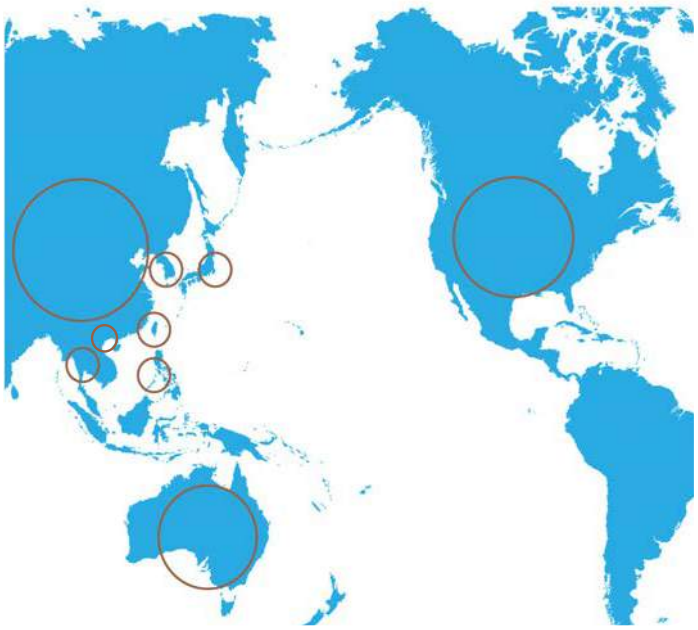

What is Asia Pacific Civil Forum on Marine Litter?

Asia Pacific Civil Forum on Marine Litter is a network established in 2009, made of NGO groups dedicated to protection of marine environment from marine litter in Asia Pacific countries.

Network member groups are:

Japan Environmental Action Network (JEAN)
Our Sea of East Asia Network (OSEAN)
Taiwan Ocean Cleanup Alliance (TOCA)
Shanghai Rendu Ocean NPO Development Center
Kewkradong Bangladesh
ICC Philippines
Tangaroa Blue Foundation
Ocean Conservancy
Greenhub

To the readers,

East Asian countries are connected to each other environmentally, geographically, historically, or culturally through shared regional seas. The East Asian region is one of the most dynamic economic centers with some of the busiest shipping lanes in the world. With the spread of mass production and consumption over the last decades came the huge increase in solid waste generation. There are, however, not enough waste treatment facilities and management measures, which makes the region vulnerable to marine debris pollution.

Entering the seas in large amounts, floating debris has become a source of concerns and conflicts among some neighboring countries. This transboundary environmental problem requires concerted efforts of all the relevant stakeholders beyond sectoral and political boundaries. In this regard, OSEAN (Our Sea of East Asia Network) and JEAN (Japan Environmental Action Network), the marine debris NGOs in Korea and Japan, have shared a vision in which people in the East Asia could act together as one community in protecting our precious marine ecosystems. We believe that NGOs in the East Asian countries have an important role in sharing experiences and acting together to address the marine debris issue in the region from the bottom up.

The city governments of Shimonoseki and Nagato, and JEAN co-organized '2009 Marine Litter Summit - Shimonoseki•Nagato Meeting' on October 16-18, 2009, in Shimonoseki, Japan. OSEAN suggested in the meeting to start an 'East Asian Civil Forum on Marine Litter' through which relevant NGOs and organizations in the East Asia could share experiences and information and work together on the marine debris problems. OSEAN and JEAN have reached a consensus to launch the forum and publish biannual newsletters. So we have launched the East Asian Civil Forum on Marine Litter and we are delivering marine debris news from member countries via e-mail to people who are concerned with this problem on local, national, and regional levels. In late 2012 now, we have four members above. We hope that the forum could provide a venue for all of us to share our vision, experiences, and creative actions.

This is the first effort to link the East Asian people beyond geographical and language barriers to a common goal of protecting our seas from marine debris pollution. NGOs and organizations that have interests and passion to make our seas clean and healthy are more than welcome to join us. For more information, you can contact us at loveseakorea@empas.com. Please let us know if you have any problem in receiving the newsletter. These articles are also available online at http://cafe.naver.com/osean.

Secretariat,
Sunwook Hong (OSEAN) and Kojima Azusa (JEAN)

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