EAS CONGRESS 2021

THE EAST ASIAN SEAS CONGRESS

Charting a New Decade of
Healthy Oceans, People and Economies

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Collab 15

Seminar On Innovative Solutions To Address Biofouling In The ASEAN Region

11 November 2021, 2:00 PM - 5:00 PM (GMT+7)
Online via Zoom

ORGANIZER:

PEMSEA
Partnerships in Environmental Management for the Seas of East Asia (PEMSEA) Resource Facility

KIOST
KOREA INSTITUTE OF OCEAN SCIENCE & TECHNOLOGY
Korea Institute of Ocean Science & Technology (KIOST)

IMO INTERNATIONAL MARITIME ORGANIZATION
International Maritime Organization (IMO)

East Asian Seas (EAS) Congress 2021

"Charting a New Decade of H.O.P.E. (Healthy Ocean, People, and Economies)"

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PROCEEDINGS

1. INTRODUCTION

The introduction and establishment of Invasive Aquatic Species (IAS) is considered as one of the threats to the biodiversity of the world's freshwater, coastal and marine ecosystems. The global economic impacts of IAS, including disruption to fisheries, damage to coastal industry and infrastructure, shipping industry, tourism industry and marine ecosystem services, have been estimated at several hundred million dollars per year (IMO). The main vectors of the unintentional transfer of non-indigenous species are ships' ballast water, biofouling of mobile marine structures and aquaculture practices.

Biofouling is the accumulation of aquatic microorganisms, plants, algae, or small animals on the surfaces and structures immersed or exposed to the aquatic environment. Significant research during the last 20 years have confirmed that biofouling had been underestimated as a possible vector for non-indigenous species and may in fact be one of the main mechanisms for their introduction or expansion of species into new marine or freshwater habitats.

Improving or minimizing biofouling on ships has the added benefit of improving their energy efficiency. As a result, biofouling has been identified as one of the potential key resources that may contribute in the short term to the reduction of greenhouse gas emissions from the shipping industry.

In order to improve the management of biofouling, minimize its role as a potential vector for the introduction of IAS and help maritime industries to reduce their carbon footprint, the International Maritime Organization (IMO), the United Nations Development Programme (UNDP) and the Global Environment Facility (GEF) have launched the GloFouling Partnerships Project. The project includes a conscious effort to seek the expertise accumulated by the private sector, through the Global Industry Alliance (GIA) for Marine Biosafety, a cross-sectoral platform that brings together global industries from maritime, shipping, ocean energy, aquaculture and other ocean-based industries to help identify common difficulties and solutions, facilitate technology development and break barriers for its uptake with the ultimate goal of improved biofouling management.

As a follow-up seminar to a Regional Seminar on Biofouling Management and Invasive Aquatic

Species in the East Asian Seas which took place in 23 June 2021, this collab which is part of a series of collabs under the East Asian Seas Congress 2021 focused at sharing the latest technology and research initiatives and discussed how they may help maritime industries to address issues related to biofouling, in support of the implementation of the IMO Biofouling Guidelines at the regional and national levels in the ASEAN region.

The half-day workshop was organized to:

- shed light on the biological and chemical characteristics of biofouling and the economic impacts of IAS transferred by biofouling and ways to obtain information on the economic impacts from relevant industries and other stakeholders;
- share information and knowledge on technological and other innovative solutions to combat biofouling; and
- identify cooperation needs across the marine value chain and beyond to support the uptake of innovative solutions and best practices on data and information sharing, policies, and programs.

2. OPENING OF THE WORKSHOP

2.1 **Dr. Won-Tae Shin**, **PEMSEA consultant**, welcomed and expressed his appreciation to more than 150 registered participants of the collab despite their busy schedules. He also acknowledged the financial support from KIOST in organizing the collab. Dr. Shin informed that it is the organizers intention that the collab be as interactive as possible and encouraged questions from the participants which they can share by raising their hands or typing them on the Q&A box of the zoom platform. He requested the speakers and panelists monitor the questions and bring them to the floor.

2.2 **Dr. Sukjae Kwon, Director, International Cooperation Department, KIOST**, gave the opening remarks. He welcomed the participants from all over the world. He mentioned that the biofouling seminar is timely in time of re-activation of the global marine fleets after its slow recovery from the global pandemic. He cited the rapid increase in number and volume of marine fleets navigating the seas of East Asia as more than 90% of the global goods transported through ships transit through the region. Dr. Kwon informed the collab that the RO Korean government is proactively responding to biofouling issues. It launched USD25Million five-year biofouling R&D project this year. KIOST is one of the two main awardees of the project and will develop environmental risk assessment and guidelines for biofouling of RO Korea. Dr. Kwon hoped that the participants will enjoy the presentations and discussions on various aspects of biofouling issues as well as the status of technological development. He further hoped that the information would be useful to the governments and industries involved in the maritime navigation in preparing for future regulations on biofouling management.

3. WORKSHOP PRESENTATIONS

3.1 **Mr. John Alonso, Technical Advisor, UNDP/GEF/IMO GloFouling Partnerships Project**, delivered a keynote presentation on biofouling and its economic impacts. He started with the distinction between the impacts of biofouling and impacts of invasive aquatic species (IAS). While biofouling creates significant impacts to shipping, oil and gas, maritime industries, aquaculture and coastal infrastructure, IAS also impacts aquaculture, tourism and environment and biodiversity sectors.

Mr. Alonso showed the adverse impacts of biofouling on maritime industries, in particular, the shipping sector which is suffering from fuel inefficiency up to 25-35% due to biofouling. As noted in the discussions during the Climate Change conference at Glasgow, Scotland last week, improving fuel efficiency in shipping sector would greatly contribute to combatting against global warming and climate change through the reduction in carbon emission and faster shipping time. As such, he suggested that preventing and removing biofouling is an urgent issue today, in light of climate change.

Mr. Alonso highlighted the fact that the benefits of managing biofouling far outweigh the costs of doing nothing about it. He suggested that biofouling can be managed effectively as solutions already exist. He concluded that investment in biofouling prevention and management will also render benefits to industries.

3.2 **Technical Solutions and Innovations on Biofouling Management**

Mr. Kim Yusik, CEO, Tas Global, Inc. presented the company's collaborative activity with research institutes on ship hull cleaning and efficient shipping. As the CEO of a hull cleaning company, Mr. Kim introduced the services of Tas Global including underwater towing locomotion technology for faster cleaning with IMO D-2 level and filtration system with 99% efficiency over 10μm particles. He mentioned that his company is collaborating with ship building companies, coating makers, and hull cleaners to promote efficient shipping.

Mr. Kim stressed the importance of adapting to field environment when conducting hull cleaning, including: wharf location, anchorage, external forces, cleaning speed and cleaning by-products (wastes) removal. He also introduced Tas Global's 350kg Remotely Operated Vehicle (ROV) with cleaning speed of 350m of both verticals in 6 hours. He also introduced his company's 3 stage filtration system with reverse filter cleaning modules and 5m final filter.

Mr. Kim mentioned that RO Korean government provided research and development (R&D) fund to the company for improving cleaning speed, developing eco-friendly cleaning methods, developing real-time monitoring of cleaning results and setting the standard for by-product capture rate measurement. He concluded that the R&D project is envisaged to make RO Korea one of global leaders in biofouling prevention and management.

3.3 National and Regional Measures to Manage Biofouling in ASEAN Region

Ms. Diane Factuar, PEMSEA Consultant, presented the summary outcomes of a rapid assessment study on biofouling management and IAS in East Asian Seas (EAS) region which was conducted in 2021 under the auspices of GloFouling Partnerships Project. She mentioned that EAS region, be it at the region or national levels, do not have specific policy and management strategy that address biofouling and its risks and that no single ministry or agency is responsible for biofouling.

As recommendations of the study, Ms. Factuar suggested that national policy as well as inter-agency coordinating mechanisms specifically addressing biofouling/IAS risks should be established. Also, she mentioned that awareness building and capacity development for better understanding and management response to the issue are necessary. As case studies, she introduced the results of a rapid assessment study on biofouling and IAS practices in Indonesia and the Philippines.

Ms. Factuar introduced current progress on setting the regional strategy for biofouling management. She mentioned that the regional strategy will be aligned with the IMO Guidelines and Guidance, but it will explicitly address the specific conditions of the ASEAN Region and aspects relevant for its implementation in the region. She mentioned that the regional strategy will lay the foundation for biofouling prevention and management in ASEAN region, which in turn can help inform the global strategy on biofouling management.

3.4 Industry Perspective on Biofouling

Mr. Jong Woo Park, R&D Part Manager, K Shipbuilding, presented the views of the RO Korea's shipbuilding industry on biofouling management. As the chair of the Sub-Working Group 1 on biofouling of the Active Shipbuilding Experts' Federation (ASEF) which is an IMO registered NGO (2017), Mr. Park mentioned that the 2011 IMO Guidelines is the key document for shipbuilders on the design and construction of ships against biofouling. He mentioned that although the Guidelines are not mandatory, it contributed to developing the IMO strategic directions on biofouling management as well as provide supplementary benefits such as improving ship's hydrodynamic performance, fuel-saving effect and decrease in air pollution.

Mr. Park introduced a range of options for ship design and construction for biofouling reduction system including anti-fouling coating system using copper, silyl acrylate, Zn acrylate, marine growth prevention system (MGPS) installation utilizing two electronic anodes, effective sea chest design, propeller and shaft design and others. He mentioned that these innovations in ship designs are critical in preventing biofouling buildup in ships.

Mr. Park also introduced current R&D for biofouling reduction technologies including hull and propeller performance measurement, computational fluid dynamics (CFD) simulation, anti-fouling paint including medetomidine technology, air bubble technology and ROV technology.

Echoing the views of the RO Korean shipbuilding industry, Mr. Park suggested that protecting marine environment through fuel-savings and air pollution reduction is important. He mentioned that the shipbuilding industry is proactively preparing for the national and international regulatory policy on biofouling management.

4. OPEN FORUM

Several questions were raised from the floor after the presentations:

- **Dr. Vallejo** inquired about the cost comparison between autonomous ROV for hull cleaning and the current practice of manual cleaning undertaken by the Philippine Navy. **Mr. Kim Yusik** of Tas Global clarified that autonomous ROV has not been developed yet and existing ROV requires an operator either on-land or on-ship. The cost of ship hull cleaning by ROV and manual cleaning conducted by divers cannot be directly compared due to many factors to be considered. However, Mr. Kim clarified that although ROV might be costly considering the price and operational cost of the whole equipment, there are safety considerations for divers doing manual hull cleaning.

- **Dr. Hiroshi Kawai, Kobe University**, commented that in ROV ship hull cleaning, niche area is complicated and more difficult so there should be a solution for cleaning those difficult to reach areas. **Mr. Kim Yusik** of Tas Global responded that, while it is true that niche areas are very difficult to reach, his company is developing the technologies for cleaning those areas, but the cost might be higher as much as ten times. He mentioned that other methods of cleaning such areas using hand-held tools are also under development.

- **Mr. Achmad**, Indonesia asked whether wastes from hull cleaning are collected on-site or dropped to the seabed. **Mr. Kim Yusik** of Tas Global answered that although the wastes are collected during the hull cleaning process, the ratio of collected wastes and those that fall to the seabed is very hard to calculate. Mr. Kim added that the collection efficiency is a function of cleaning speed and area of cleaning.

- **Dr. Hiroshi Kawai** mentioned that Mr. John Alonso's presentation contains good scientific data on the impacts of biofouling and IAS and that local introduction of IAS through aquaculture and through international ships are difficult to identify. He questioned that if IMO has any response for the cases for introduction of IAS from small scale local mariculture practices and small boats from international waters. **Mr. Alonso** responded that identifying the sources of IAS is quite challenging due to several factors including ship traffic, ballast water, aquaculture practices, recreational boats and so many other factors. He mentioned that IMO established guidelines for commercial shipping and recreational boats on biofouling which enable national and local governments to regulate local waters under the prevailing local conditions.

- **Dr. Kawai** mentioned that IMO Guidelines suggest easy access to ship chest for biofouling cleaning, but this might be vulnerable point to pirate access. **Mr. Park** responded that while ship chest should be easily accessible for cleaning, biofouling cleaning and navigational safety should

be treated separately in the IMO Guidelines by the shipbuilders and shipping industries bearing in mind of the risks posed by pirates.

- **Dr. Frances Nievales** of University of the Philippines-Visayas, Marine Science Institute commented that while ROV is quite an interesting concept for hull cleaning, wastes derived from cleaning as well as chemical used in cleaning may damage the marine environment. In this line, she asked about the fate of the ship hull cleaning wastes. **Mr. Kim Yusik** answered that the waste generated from hull cleaning will be transported to filter system where 99% of wastes and microorganisms are removed from water and treated on-land as industrial waste. Note that in an earlier discussion, he admitted to some wastes falling into the seabed.

- **Dr. Serena Teo** commented that we should work with the Convention on Biodiversity (CBD) for biosecurity issues since IMO has its jurisdiction limited to the international commercial ship traffic. She added that national governments should set up biosecurity plan for their jurisdictional waters including biofouling issues due to the fact that in many countries shipping may not be the major vector for IAS. Note that this is the direction proposed for the Philippines.

- Other questions from the floor were answered through Q&A box of the zoom platform by the speakers and panelists. A list of the questions and answers is attached as Annex 3.

5. PANNEL DISCUSSION

The panel discussions were initiated by **Dr. Hiroshi Kawai of Kobe University, Dr. Seung Ho Baek of KIOST, and Dr. Serena Teo of NUS** to provide more information on research initiatives undertaken by their respective organizations

- **Dr. Hiroshi Kawai, Specially Appointed Professor and Professor Emeritus, Kobe University**, Japan, introduced his research focused on seaweed ecology and taxonomy through which he has identified invasive seaweed species from outside of Japan and the impacts of seaweed and other microalgae species carried by the debris created by the 2011 Tohoku Earthquake and Tsunami.

- **Dr. Seung Ho Baek, Principal Researcher, KIOST**, introduced his current research on techniques development for management and evaluation of biofouling on ship hulls. His research is being supported by the Korean government as a part of the preemptive measures for global regulation on biofouling. He also explained the policies and practice of countries like New Zealand and California, US on regulating biofouling. Dr. Baek shared the preemptive response to international environmental regulations through the development of risk assessment techniques, ecosystem protection and management and institutional and policy support on biofouling issues. He mentioned that RO Korea is developing a plan for integrated management of ship's biofouling through the development of policy, technology and management system.

- **Dr. Serena Teo, Facility Director, St John's Island National Marine Laboratory, National University of Singapore**, stated that biofouling is a unique challenge for tropical Southeast Asia due to year-round tropical climate and high marine biodiversity including biofouling community and sensitive marine habitats next to shipping and aquaculture economic zones. Dr. Teo stressed the importance of science-based biofouling management and suggested that it is never too late to start building a biological baseline for biofouling community which requires collecting and identifying local fouling species. She suggested that having baseline data would enable faster detection of invasions and good science-based biofouling management would render numerous benefits including improving sustainability and saving money.

6. CLOSING REMARKS

6.1 Dr. Won-Tae Shin presented his preliminary conclusions and recommendations during the wrap up session. According to him: biofouling creates far reaching impacts to marine ecosystem and shipping industry through invasive aquatic species and fuel efficiency. Investment in biofouling prevention and management render benefits to industries as well as health of marine ecosystem, Biofouling is a pervasive challenge in Southeast Asia due to tropical warm water year around and high marine biodiversity, including biofouling community. Since ASEAN countries are largely lacking in policy and legal framework for combatting biofouling at both the national and regional level, some PEMSEA countries are investing in R&D for technologies on biofouling removal, prevention, and management.

Countries like Indonesia and the Philippines with support from the GloFouling Partnerships Project are also conducting baseline assessment on regulatory, policy, research and economic impacts of biofouling and IAS. R&D efforts in identifying invasive aquatic species are globally on-going, but more work needs to be done in understanding their life cycle, preventing, and managing their spread and addressing their impacts.

Dr. Shin recommends that: 1.) research efforts should continue in identifying country/region-specific biofouling community and their life cycle as well as setting the baselines, 2.) national governments are encouraged to develop their national policies on biofouling prevention and management, 3.) awareness building on biofouling issues should be promoted through knowledge sharing activities and platform, 4.) regional guidelines on biofouling should be developed in line with IMO Guidelines.

It is necessary to address the adverse impact of biofouling, particularly to the maritime industry given the fuel inefficiency of vessels which imposes damages to business and the environment (climate change). For more information, audiences are recommended to visit the following sites: https://www.glofouling.imo.org/ and/or https://pemsea.org/content/glofouling

6.2 **Ms. Aimee Gonzales, Executive Director of PEMSEA** extended her gratitude to all the speakers and panelists as well as the participants in engaging in an active discussion during the three-hour session. In particular, she expressed her gratitude to KIOST for co-organizing the seminar and lending their expertise and experience on the topic. She mentioned that conversation on regulating and managing biofouling at the regional level has just started.

As a follow-up step, Ms. Gonzales suggested that regional task force and regional guidelines be developed in order to effectively respond to biofouling issue in the ASEAN region. For this, she announced that IMO and PEMSEA will organize a regional workshop with key actors to formally create the regional task force and the regional guidelines early next year.

Ms. Gonzales suggested to share research results, innovations and solutions and thoughts on regional guidelines as a part of the development process in the region. She finally extended her appreciation to the speakers and panelists, moderator, KIOST and IMO as well as PEMSEA staff for mounting another successful collab with technical support from EventScapes.

The text of closing remarks is attached as Annex 4. The collab officially closed at 6pm Cambodia time (GMT+7).

PowerPoint presentations can be accessed here whereas the recording of the event can be found here.

ANNEX 1. PROGRAM.

Moderator: Dr. Won-Tae SHIN, PEMSEA Resource Facility (PRF)
Schedule in Cambodia time (GMT+7)

Time	Agenda	Speakers/Presenters
14:00-14:05	Welcome address and introduction to the seminar	Dr. Suk-Jae Kwon Head, International Cooperation Department, KIOST
14:05-14:25	Keynote presentation: Biofouling and its economic impacts	Mr. John Alonso Technical Analyst, IMO/GEF/UNDP GloFouling Partnerships Project
14:25-14:45	Technological solutions and innovations on biofouling management	Mr. Yusik KIM CEO Tas Global
14:45-15:00	National and regional measures to manage biofouling in ASEAN Region	Ms. Diane Factuar Consultant PRF
15:00-15:10	Q&A	Floor
15:10-15:20	Break	
15:20-15:40	Industry perspective on biofouling: K Shipbuilding, Inc.	Mr. Jong Woo Park R&D Part Manager K Shipbuilding, Inc.
15:40-16:50	Panel Discussion Dr. Hiroshi Kawai, Kobe University, Japan Dr. Seung Ho Baek, KIOST, RO Korea Dr. Serena Teo, NSU, Singapore Discussion and Q&A from floor	Suggested topics: Recent research findings on biofouling Status of country/industry response to biofouling Need for cooperation on biofouling in ASEAN region
16:50-16:55	Wrap up	Moderator
16:55-17:00	Closing remarks	Ms. Aimee Gonzales, Executive Director, PEMSEA

ANNEX 2. WELCOME ADDRESS AND INTRODUCTION TO THE SEMINAR.

Dr. Kwon Suk Jae
Director, International Cooperation Department
Korea Institute of Ocean Science and Technology

Hi everyone. As a co-organizer of this webinar, I would like to welcome all of you around the world who have keen interest in biofouling and alien invasive species. This webinar is collaboration between our institute KIOST, PEMSEA and IMO and very timely in time of global marine fleets are awakening after the global pandemic. I do believe that this webinar will be very useful to everyone and the hunger for knowledge.

We will see a rapid increase in number and volume of merchant marine fleet moving around the world as more than 95% of the global goods are transported through vessels. Also, global communities are determined to reduce carbon footprints as we see in the climate change conference in Glasgow. Biofouling is affecting the fuel efficiency and vessel operation. We need to take immediate action against the biofouling issues by developing technology and global action against it. Fortunately, IMO has set out a GloFouling partnership project which envisages to lay foundation for a global and regional platform for action against biofouling through global and regional guidelines.

Korea is one of leading trade countries in the world with 60% of GDP coming from the export and import of goods. Also, Korea is global leader in ship building industry. Therefore, Korean government is proactively responding to biofouling issues. In line with this, the Korean government launched a biofouling R&D project this year investing approximately US25M for 5 years. Through this project, the technologies for cleaning and transporting the biofouling materials will be developed. KIOST is one of two main awardees of the project. KIOST will develop environmental risk assessment and guidelines for biofouling.

In this webinar, we have invited speakers from Industry sector, Private sector, academe, research institutes and international organizations. Various aspects of biofouling issues will be discussed and the status of technological development will be presented. The information today will be useful to the government and industries involving the maritime navigation for preparing future trend and global regulation.

I hope that all the participants will be actively involved in the discussion. I believe Dr. Shin secured large rooms for questions and answers to entertain the questions from the floor. So, please enjoy the presentations from the speakers and panels and participate in the discussion session through questions and comments from the floor.

Welcome to the Biofouling webinar and enjoy the whole session from beginning to end. Thank you.

ANNEX 3. QUESTIONS AND ANSWERS.

#	Question	Asker Name	Asker Email	Answer(s)
1	For Mr. Yusik Kim The Philippine Navy asked me about autonomous ROV for hull cleaning. Can you comment on the costs compared with the hull cleaning methods we have now?	Benjamin Vallejo	bmvallejo1@up.edu.ph	Dear Mr. Benjamin Vallejo, First thing to clear out that autonomous function is not been developed, it is being developed in the Government R&D project, right now it is controlled by an operator (on-land or on-ship) and it is not hard to learn. About the cost, we sell our systems only to Authorities and Government and the system price, ROV, Filtrations system etc. is $1.8 million total, We can send you more detail, prices by parts, operation manual etc. We also have plan to build train facility in Philippine in the future. Here is my email address, ys.kim@usmtas.com Feel free to contact us for more information. Thank you Mr. Benjamin Vallejo
2	How did you manage the waste products that derived from the cleaning method? What are the methods that you apply to mitigate its occurrence? thanks.	DENR10-PMD Rosalia Acub	rosaliabacub@gmail.com	Dear Rosalia Acub, answering your questions, 1. How did you manage the waste products that derived from the cleaning method? -The waste products collected within filtration system, is transported to land and categorized as "Industrial wastes" and paid to remove as same as "industrial wastes" (for example industrial wastes in dry-dock. 2. What are the methods that you apply to mitigate its occurrence? Thanks. Cleaning method is important. Depending on cleaning method, wastes particles can be 100 times more or 1%. Therefore not damaging AF coating is the key and our sponge method is very protective according to data, please feel free to contact us for more ys.kim@usmtas.com
3	What is done with	mjnievales1@up.edu.	mjnievales1@up.edu.ph	It is classified as industrial wastes,

#	Question	Asker Name	Asker Email	Answer(s)
	the filtered captured organisms in your cleaning system? How is it disposed?	ph		carried to land and paid to dispose them. Biofouling wastes disposal regulation is being discuss in Korea. For more and update feel free to contact me ys.kim@usmtas.com
4	can you enlighten us about ballast water management convention for us to known on how to protect our protected seascape again invasive alien species	Mangayao Macapodi	cox_macapodi@yahoo.com	Live answered Unfortunately, due to limited time we cannot discuss BWM convention in this seminar but the Maritime Industry Authority has a plan to continue with their awareness seminar on BWM.
5	When disposed does this mean they are killed? i noticed that proporcentrum spp which are dinoflagellates are among the microorganisms that are of significant number that s filtered.. these are toxic dinoflagellates when can be bioaccumulated in the food chain and can be potentially lethal to humans eating fish that feed on proporcentrum	mjnievales1@up.edu.ph	mjnievales1@up.edu.ph	Live answered
6	to Diane .. i think the Philippines is signatory to many of these maritime rules including those relevant to biofouling and IAS. Perhaps it is just that our legal system is slow to pass laws that adopt those we are party to as signatory?	mjnievales1@up.edu.ph	mjnievales1@up.edu.ph	Yes our legal system is a factor that hinders us to fully and effectively implement maritime instruments that the Phil government have ratified.
7	For Container/Cargo ship berthing alongside at the port and needs to be re-painted or cleaned either ship waste or cargo residue without asking for permission from the port, does	MacBook Pro	menchann3568@gmail.com	There are several aspects in your question. For any type of cleaning activity you would need the authorization from the port, either directly or indirectly (through a service provider already established in the port). This would probably include some assessment on the biosecurity risk your hull may present - based on

#	Question	Asker Name	Asker Email	Answer(s)
	the IMO have a specific guideline or regulation on this matter?			where it has operated, for example. Not sure what you mean with painting - I am assuming you mean the non-submerged areas of the ship. This will really depend on the type of operation and the safety requirements in place, which would also ultimately depend from the port. My recommendation is to seek information because taking any action. For disposal of ship waste and cargo residue it would also require informing the port authority prior to any action. There would normally be a port reception facility. IMO's MARPOL Annex V, and the London Protocol would be applicable, but these are likely to have been incorporated to national regulations.

ANNEX 4. CLOSING REMARKS.

CLOSING REMARKS

Ms. Aimee T. Gonzales
Executive Director
PEMSEA

Good evening, everyone, we've come to the end of this very interesting webinar on a highly fascinating multifaceted topic. This webinar is the second regional event that we've organized with IMO on the issue this year.

An additional important objective of the UNDP/GEF funded GloFouling Partnerships Project's objective is to ensure that the project activities of providing baseline information on status of IAS and biofouling, helping shape regulations, and convening multi-stakeholders to discuss programs and actions to manage biofouling continue beyond the project's duration especially in the region which is characterized by varying status and resources of the maritime sector in the region.

We are grateful that Ro Korea's MOF and KIOST have joined us this time and are lending their expertise and experience on the topic and hopefully, our collaborative engagement to promote this issue in the region will be sustained and other country partners will join us too.
As the previous speakers have mentioned, there are pockets of research, business and technology innovation and some broad regulations that covers IAS, however, the conversation on regulating and managing biofouling at the regional level has just started.
So, the question is where do we go from here- what are our next steps in the region?

As Diane introduced in her presentation, we want to create a regional task force and will soon invite or advertise membership and bring the various actors and initiatives together, promote awareness, share information, analysis and solutions to help shape practical regional management guideline and national regulations/measures.

On November 15, I will be talking to the heads of various regional organizations in other parts of the world to discuss the template and process of developing the regional guidelines. I will bring with me the suggestions that came out of this meeting in order to pursue inclusive and robust preparation for the guidelines that will eventually inform the global discussion at the IMO.

IMO and PEMSEA are also discussing hosting a regional workshop with key actors to formally create the regional task force and discuss the draft regional guidelines early next year. We are monitoring the situation to check if this face-to-face meeting is indeed feasible, otherwise, we will organize another virtual meeting.

Therefore, what can you do to help advance the process?

First, do let us know if you want to contribute and be part of the process by sharing your research results, your innovation and solutions, and your thoughts on what should be in the regional guidelines.

Second, please spread the message and share results of these workshop with other relevant experts, organizations and agencies, to ensure a good representation of the many sectors impacted by the issue from the tourism, aquaculture, fishing, shipping, ports, navigation, universities, think tanks and government agencies.

Finally, I would like to thank all the participants in the collab for this rich discussion, the experts who lent us their time to make presentations and respond to questions, Dr. Won-Tae Shin for ably moderating the collab, the sponsors and organizers MOF, KIOST and IMO and the PEMSEA staff for mounting yet again another successful collab with technical and creative support from EventScapes and John Castillo.

We are featuring more interesting collabs in this Countries until the Main Conference and Ministerial Forum on Dec 1-2, 2021, so please check the congress website for more information on these events and participate in making your voices heard and actions and plans featured as we chart a post pandemic roadmap up to 2030 that aligns with global ocean agenda of the UNSDGs, climate change and biodiversity conservation.

Thank you and have a good evening.