



Ocean and Climate Dialogue

**EAST ASIAN SEAS' RESPONSE TO THE
GLOBAL CLIMATE CHANGE CHALLENGE**

8 JUNE 2022, 9 AM - 3 PM (UTC+8) VIA ZOOM



Ocean and Climate Dialogue: East Asian Seas' Response to the Global Climate Change Challenge

8 June 2022, 9 am - 12 pm (UTC+8)

Online via Zoom

PROCEEDINGS

1. INTRODUCTION

The Ocean and Climate Dialogue was organized by Partnerships in Environmental Management for the Seas of East Asia (PEMSEA) Resource Facility. It was held on 8 June 2022 via Zoom and was attended online by national and local governments, civil society, academe and research institutions, non-government organizations, private sector, and other interested parties from 14 countries in the East Asian Seas region and beyond.

The ocean makes up 71 percent of the planet and provides many services to countries and their coastal communities—from mitigating weather extremes to generating the oxygen we breathe, producing the food we eat, to storing the excess carbon dioxide (CO₂) we generate. At the same time, the ocean bears the brunt of climate change as evidenced by rising sea surface temperature and sea level rise, all of which affect the health of marine species along the coasts, nearshore, and deep ocean ecosystems as well as people's livelihood and well-being.

Recognizing this inextricable link between the ocean and climate, the Glasgow Climate Pact was adopted in November 2021¹ to anchor ocean-related issues and solutions in the multilateral climate change regime. The Pact highlights the “importance of ensuring the integrity of all ecosystems, including in forests, the ocean and the cryosphere, and the protection of biodiversity [...]” and its role in strengthening adaptation and mitigation action. The Pact also enjoins the relevant work programs and constituted bodies under the UNFCCC “to consider how to integrate and strengthen ocean-based action in their existing mandates and work plans and to report on these activities within the existing reporting processes.”

The Sustainable Development Strategy for the Seas of East Asia (SDS-SEA) also identifies climate change and disaster risk reduction as one of its priority programs in the region. The link between ocean and climate change is also highlighted in the Preah Sihanouk Ministerial Declaration signed by PEMSEA's country partners in December 2021 to reaffirm their commitment to blue economy and support global efforts to achieve the goals of the Paris Agreement with mitigation and adaptation as crucial underlying principles in accelerating blue economy.

As a follow up of countries' commitments in the Preah Sihanouk Ministerial Declaration and as the region's contribution to operationalizing the commitment in the Glasgow Climate Pact, the Ocean and Climate Dialogue was convened to examine how the region is executing the actions

¹ During the 26th Conference of Parties (COP 26) of the United Nations Framework Convention on Climate Change (UNFCCC)

agreed in COP 26 on the ocean-climate nexus, particularly on climate adaptation at the national level. The results of the discussion will be integrated into the ongoing consultations on the development of the shared SDS-SEA Implementation Plan (IP) 2023-2027.

Specifically, the Ocean and Climate Dialogue aimed to:

1. Deepen the participants' understanding of the:
 - a. Linkages between the ocean and climate change;
 - b. Linkages between the Glasgow Climate Pact, United Nations (UN) Sustainable Development Goals (SDGs), and other global commitments/actions (e.g., UN Decade of Ocean Science); and
2. Share the region's progress in integrating and implementing ocean-based adaptation solutions as part of national development plans and policies, particularly the National Adaptation Plans (NAPs) and Nationally Determined Contributions (NDCs).

To achieve these objectives, the program was split into two parts. The first part featured presentations from Cambodia, China, Japan, Philippines, RO Korea, and Singapore as PEMSEA's country partners on their respective progress towards integrating ocean-based solutions in their NAPs and NDCs. The second part of the program included presentations on the tools, mechanisms, and practices related to adaptation solutions for the coastal and marine sector. Experts from WorldFish, the Marine Science Institute of the University of the Philippines (UP-MSI), and the Institute for Global Environmental Strategies (IGES) discussed the region's progress and best practices in utilizing tools and systems to mitigate risk and enhance coastal resilience.

The program and links to relevant files (e.g., presentation materials and event recording) can be found in Annexes 1 and 2, respectively whereas the list of participants is available in Annex 3.

2. OPENING REMARKS

Mr. Arief Yuwono, Chair of the East Asian Seas Partnership Council and Concurrent Senior Advisor to the Minister for Foreign Cooperation at the Ministry of Environment and Forestry, Indonesia, opened the roundtable dialogue, welcomed the participants, and set the context of the dialogue.

He emphasized that the dialogue was framed around blue economy development, where there are evident restoration challenges but also sizeable blue economy opportunities and that the dialogue will inform the development of the SDS-SEA IP 2023-2027, which will serve as a framework for driving blue economy development in the region.

He began by explaining that the ocean is an important life support system for the planet—providing and regulating resources that are vital to sustaining life on Earth—and that it is also a vital resource for fighting climate change. As such, it is critical that coastal and marine biodiversity are protected, managed, and restored. Recognizing the key role that the ocean plays for people all over the world, the UN adopted an SDG focused on conserving the ocean, with targets for action on an array of problems. While some progress has been made, more is needed to secure a sustainable future for the ocean.

Mr. Yuwono also noted that the role of the ocean and coastal and marine ecosystems in climate change mitigation is often overlooked. For instance, protecting and restoring ocean habitats and resources such as seagrass beds, salt marshes, and mangroves and their associated food webs can sequester CO₂ from the atmosphere at rates up to five times greater than tropical forests. Choosing not to prioritize ocean protection is depriving society of the tools needed to achieve climate change adaptation and mitigation goals.

The Ocean and Climate Dialogue is East Asia's version of countries coming together as one with global meetings such as the UN Ocean Conference, which is scheduled to take place in Lisbon, Portugal, from 27 June 2022 to 1 July 2022. It offers an opportunity for countries and relevant stakeholders in the region to come together and join world leaders to present the actions and solutions that they are taking to honor their climate commitments at the global, regional, and national levels.

In closing, Mr. Yuwono calls on the members of PEMSEA to join the rest of the world in being bold in terms of ocean-based climate solutions together.

3. KEYNOTE ADDRESS: OCEAN CLIMATE - THE STATE OF MARINE ENVIRONMENT AND ECOSYSTEMS

Dr. Hyoun-Woo Kang, Director of the Ocean Climate Prediction Center (OCPC) at the Korea Institute of Ocean Science and Technology (KIOST), delivered the keynote address where he set the context for the succeeding presentations by discussing the links between ocean and climate change, historical trends and future projections of climate change manifestations on the ocean, and the relevance of the Glasgow Climate Pact in the sustainable development of the coastal and marine sector.

He introduced the term *ocean climate*, which they use at KIOST to pertain to the long-term, average state of marine environments and ecosystems, including their interactions with other components of Earth's climate system. The ocean climate has several physical components that undergo several altered states and trends due to climate change. These are brought about by key interactions between these components, including those between solid and liquid water in the Arctic and Antarctic region as well as among water, heat, and CO₂ in the interface between the atmosphere and ocean. Consequences of climate change include physical changes such as increased ocean heat content, decreased sea and land ice, increased occurrence of marine heatwaves, sea level rise as well as chemical changes such as decreased ocean pH and ocean oxygen. These changes, in turn, cause changes in the ocean currents that redistribute energy and materials within the marine environment.

These physical components of the ocean are key drivers to the earth's climate. Dr. Kang added that the ocean is the earth's climate regulator since ocean currents travel slower than air and all changes in the ocean persists longer than those over the atmosphere and land.

He then shared several figures showing how the ocean climate is changing based on historical data and model projections presented in the Sixth Assessment Report of the Intergovernmental Panel on Climate Change published in 2021. These include:

- Global energy inventory showing how majority of the energy is stored in the ocean at various depths;
- Increasing sea surface temperature with the highest change occurring in the last 40 years;
- Shifting ocean circulations, specifically water volume transport and speed of currents, due to warming;
- Accelerating rise in global mean sea levels;
- Increasing frequency, intensity, and duration of marine heat waves;
- Increasing ocean acidification in all regions of the ocean;
- Decreasing Atlantic Meridional Overturning Circulation; and
- Decreasing deoxygenation of the ocean.

All these changes in the ocean climate show how the marine environment and ecosystem are in danger of irreversible damage. To address these, the UN has included both urgent actions to combat climate change (SDG 13) and the conservation and sustainable use of ocean, seas, and marine resources (SDG 14) among the 17 SDGs towards a sustainable future. The UN has also declared the years 2021 to 2030 as the UN Decade of Ocean Science for Sustainable Development (or the "Ocean Decade"), which includes a set of decadal challenges and outcomes towards "the ocean we want."

Similarly, the Glasgow Climate Pact recognizes how marine ecosystems act as sinks and reservoirs of greenhouse gasses (GHGs) and that its biodiversity should be protected. Towards this end, actors under the UNFCCC are encouraged to conduct dialogues on how to integrate and strengthen ocean-based adaptation and mitigation actions in their mandates and workplans.

Dr. Kang also shared ongoing research initiatives on ocean climate science, including the Second Cooperative Study of the Kurushio and Adjacent Regions and the OCPC, which conducts periodic examination and prediction of ocean climate. The OCPC was established in 2021 and intends to expand its activities to large marine ecosystems in the East Asian Seas region by 2025.

To conclude his presentation, Dr. Kang reiterates the importance of the ocean as a regulator of the earth's climate systems. With the dangers that the marine environment and ecosystems are facing brought on by climate change, ocean-based solutions for climate change and international collaborations are not only imperative but indispensable.

4. PART 1: OCEAN-BASED SOLUTIONS IN NDCS AND NAPS

The next session consists of the series of presentations by senior climate change experts in six PEMSEA country partners (Cambodia, China, Japan, Philippines, RO Korea, and Singapore) who discussed their respective countries' progress towards integrating ocean-based solutions in their NDCs and NAPS.²

² Due to technical difficulties, country representatives from Lao PDR and Viet Nam were not able to present. A copy of their presentations is available in Annex 3.

a. Cambodia: Ms. Khlok Vichet Ratha, Deputy Director of the Department of Climate Change, General Directorate of Policy and Strategy, Ministry of Environment (MoE)

In her presentation, Ms. Khlok shared the potential impacts of climate change on the coastal areas of Cambodia and the country's plan, challenges, and initiatives to address climate change.

She highlighted that the Royal Government of Cambodia recognizes how climate change is a major challenge to achieving sustainable development in Cambodia. Therefore, the government commits to combatting climate change and accelerating the country's transition towards climate resilience and sustainable development. She also pointed out that despite contributing less than 0.1 percent to global GHG emissions, Cambodia is still highly vulnerable to climate change impacts due to its low adaptive capacity and high economic vulnerability. Cambodia's coastal zones are among the most vulnerable ecosystems, particularly due to rising sea levels, which has direct and indirect socio-economic impacts across various sectors including tourism, human settlements, agriculture, fresh water supply, fisheries, financial services, and human health in coastal zones. This illustrates how climate change action is imperative to Cambodia and cannot be delinked from the country's economic development and poverty alleviation efforts.

Over the years, the Royal Government of Cambodia has made progress in rolling out climate change strategies and policies, particularly in mainstreaming climate change into national and subnational planning and budgeting. The Cambodia Climate Change Strategic Plan 2014-2023 is the country's first comprehensive national policy responding to climate change. One of its strategic objectives is to ensure climate resilience of critical ecosystems, including coastal ecosystems.

Cambodia's NDC was submitted to the UNFCCC in 2015 and updated in 2020 whereas Cambodia's Long-Term Strategy for Carbon Neutrality was submitted in 2021. In the updated NDC, Cambodia targets to reduce emissions by 40 percent compared to the 2030 business-as-usual scenario. The country has also identified 33 priority mitigation actions and 58 priority adaptation actions across various sectors. Adaptation actions related to coastal zones are the following:

- 1) Protection, risk mitigation, and resilience building against marine pollution, caused by activities on land, including marine pollution from waste and aquaculture activities; and
- 2) Effective management and protection of ecological systems of marine and coastal zones to avoid adverse impacts from various factors, build their resilience, and restore the functions of a productive and healthy ocean.

Both adaptation strategies center on conservation, restoration, and protection of marine and coastal ecosystems. These are also expected to produce mitigation co-benefits through reduction of GHG emissions from ocean waste (item no. 1) and restoration of mangroves and improvement of ocean capacity to capture carbon from the atmosphere (item no. 2).

There are also three ongoing climate change projects for coastal ecosystems that are being implemented through the Climate Change Innovation Grant Facility.

- Enhancing Climate Resiliency through Strengthening the Management Effectiveness of the Marine Fisheries Management Area in Kampong Smach, Prey Nob District;
- Improving Capacity on Integrated Coastal Management (ICM) with Low Impact Development, Considering Environmental Sustainability and Climate Change in Coastal Area of Cambodia; and
- Appropriate Costing Methods of Climate Change Adaptation in Infrastructure Development: Experimental Studies for Road and Related Infrastructure Projects in Cambodia.

Ms. Khlok also shared some of the challenges in implementing policies and institutional arrangements to address the adverse effects of climate change, including limited financial means and availability of technical experts and challenges in mobilizing resources for NDC implementation. To address these challenges, she emphasized the need for participation and investments from the private sector; youth involvement; and consideration of gender in the implementation of activities.

b. China: Dr. Lu Wenhai, Chief, Division of Marine Ecology, National Marine Data and Information Service, Ministry of Natural Resources (MNR)

Dr. Lu discussed China's blue carbon restoration efforts, trading, accounting, monitoring, and evaluation, among others.

During the 75th UN General Assembly in 2020, China declared its intention to be carbon neutral by 2060. Since then, several activities have been carried out to achieve this goal, including the assessment and implementation of blue carbon initiatives.

In 2019, research on ecological classification and zoning was carried out to start the development of a blue carbon framework for China. The country has also established stations for air-sea CO₂ flux monitoring, blue carbon ecosystem status investigation, and blue carbon stock investigation. These were done in several locations to achieve accurate estimation of national carbon sink capacity. Furthermore, fourteen special studies have been carried out on blue carbon implementation and monitoring by 14 institutes of the Ministry of Natural Resources in 2021. Likewise, local governments, scientific organizations, and academic institutions are also active in carrying out research and development projects in this field.

China has also facilitated the protection of its coastal and marine ecosystems by establishing the importance of marine ecology protection. For this end, China has identified areas with significant ecosystem services or ecological vulnerability based on several indicators such as ecosystem area, vegetation coverage, biodiversity, primary productivity, and coastal erosion rate. Based on this assessment, China initiated the reassessment and readjustment of the Marine Ecological Red Line (MARL) in 2019 by delimiting extremely important ecological areas within the MARL in order to strengthen ecological protection across the country. This initiative

led to increased protection of important ecosystems such as seagrass beds, mangroves, and salt marches.

Related to MARL, China has put forward targeted control measures to protect blue carbon ecosystems such as the coordination of human activities such as coastal tourism and agriculture inside MARL. Under this initiative, the country carried out ecological impact evaluations to assess the suitability of maritime activities. They also conducted pilot delimitation of the marine "Two Spaces and One Inner Red Line" strategy. This strategy is an optimized spatial layout for marine development and protection and can guarantee further protection and restoration. The Inner Red Line pertains to the areas within the MARL that have important ecological functions and will be strictly protected. The two spaces pertain to the "Ecological Space," which are designated areas for providing ecological products or services, and the "Development and Utilization Space," which are designated areas for intensive development and construction activities.

The country has also been conducting efforts to restore its marine ecosystems. From 2016 to 2020, a total of 23,000 coastal wetlands have been restored. In addition, the Chinese government also issued, through its national action plan on ecological restoration, a plan to restore 20,000 hectares (ha) of coastal wetlands, including afforestation of 9050 ha of mangroves, in 2021 to 2025. To scientifically guide these restoration activities and ensure its effectiveness, the government also produced technical guidelines for marine and coastal ecological restoration such as the mangrove ecological restoration manual.

China has also made significant progress in terms of carbon trading initiative. For instance, the Zhanjiang Mangrove Afforestation project, which commenced in 2021, aims to restore degraded mangrove habitats to gain carbon credits. There have also been efforts to adopt internationally accepted methodologies such as the Verified Carbon Standard and the Clean Development Mechanism.

Dr. Lu also talked about further steps that the Chinese government intends to take on blue carbon development. First is to continue carrying out research and application to improve scientific knowledge in this field. He stressed the importance of improving scientific knowledge on coastal and marine ecosystems, including the development of methodologies to scientifically evaluate capacity for blue carbon development. Second is to strengthen ecological protection and management, including the expansion of ecological restoration areas, through scientific means. Third is to establish and improve diversified investment mechanisms for blue carbon development.

Dr. Lu expressed that China is looking forward to future cooperation with PEMSEA to promote ocean-based strategies that address the global climate change challenge.

c. Japan: Mr. Nobuhiro Hirashima, Director for International Ocean Affairs, Ocean Policy Division, Policy Bureau, Ministry of Land, Infrastructure, Transport and Tourism (MLIT)

Mr. Hirashima presented Japan's Green Growth Strategy and the role of the coastal and marine sector in achieving carbon neutrality in Japan.

He began his discussion by echoing their Prime Minister declaration in October 2020 of the country's intention to aim for carbon neutrality by 2050 as well as the target of reducing Japan's GHG emissions by 46 percent of 2013 levels in 2023.

To achieve a carbon neutral society, the Prime Minister emphasized the need to adjust the country's mindset and adopt a paradigm shift towards proactive climate change measures. At the same time, the country would need to accelerate research and development on the utilization of technologies for reducing and sequestering carbon emissions and to advance a more effective and efficient transformation of society towards a green economy through digital transformation.

By December 2020, Japan has established its Green Growth Strategy, which presented concrete national vision and goals as well as a reference on both the energy policy and energy outlook for 2050 Carbon Neutrality to identify industries with high potential. The strategy also identified 14 sectors with high growth potential, for which the government will provide necessary policy measures and show ambitious goals in terms of decarbonization.

Specific action plans towards green growth were established in 14 key industrial fields where future growth is expected and efforts are essential to achieve carbon neutrality. These industries can be further grouped into energy industries, transport/manufacturing industries, and home/office industries. Among these are action plans with concrete measures that are relevant to the ocean sector such as:

- Wind power generation industries, specifically the creation of an attractive domestic market, promotion of investments, and formation of relevant supply chains;
- Hydrogen and fuel ammonia industries and the shipping industry, specifically the conversion to carbon-free alternative fuels (zero-emission ships) and development of international frameworks to promote low-carbon ships;
- Logistics, people flow, and civil engineering infrastructure industries, particularly the formation of carbon neutral ports; and
- Food, agriculture, forestry, and fisheries, specifically the use of blue carbon.

Mr. Hirashima closed his presentation by stating that as natural disasters become more frequent and severe worldwide, reducing CO₂ emissions is one of the most important countermeasures against global climate change. Japan believes that the role of the ocean in addressing climate change is very important. Mr. Hirashima noted that Japan would like to continue contributing to ocean-based solutions in response to global climate change.

d. Philippines: Ms. Elenida Basug, OIC-Director, Climate Change Service, Department of Environment and Natural Resources (DENR); and Concurrent Director, DENR Gender and Development Office

Ms. Basug focused her presentation on the impacts of climate change on the Philippines, the state of the ocean in the country, the country's work on incorporating the coastal and marine

sector in the NDCs and other development policies, and examples of the country's ocean-based adaptation solutions.

She first discussed the pertinent facts and figures on the current state of the ocean in the Philippines, which is considered as a global hotspot for biodiversity conservation. The coastal and marine tourism alone contributed around USD 3 billion in gross value added with around 900,000 employed in this sector whereas capture fisheries and aquaculture contributed USD 2.37 billion in gross value added or 1.5 percent of the Gross Domestic Product in 2016 with 260,000 employed in this sector. Ports and shipping contributed USD 1.4 billion in gross value added, employing around 700,000 people.

However, the coastal and marine ecosystems of the Philippines are threatened by a host of drivers, including climate change. From 1990 to 2006, the estimated cost of damages to agriculture and fisheries is around PHP 12.43 billion on average annually, of which 70.3 percent was caused by typhoons, 17.9 percent by droughts, and 5 percent by floods. From 2007 to 2016, there were 187 significant damaging natural disasters in the Philippines, causing the death of 16,262 people and injury to 168,114 persons. They affected more than 100 million individuals in the country during this period with socioeconomic damages estimated at USD 19.16 billion.

The unsustainable use of coastal and marine resources has greatly impacted the health of the country's ocean, seas, and coast. Moreover, the COVID-19 pandemic has also exposed the vulnerability of the global waste management system, which brought on collateral damage, particularly to the ocean. Several pressures and challenges in the country's marine waters include pollution, habitat and biodiversity loss, economic cost, risks from climate change and natural hazards, and fragmented ocean governance.

Ms. Basug then shared some of the country's frameworks in incorporating blue carbon in the Philippines' NDC and climate change policies. Among them is the adoption of ICM as a national strategy to ensure the sustainable development of the country's coastal and marine environment and resources through Executive Order 533, signed in 2006. The country also established supporting mechanisms for its implementation such as integrating ICM into primary and secondary education curricula; ICM training program for local government units; environment and natural resource accounting and valuation for ICM planning; and establishment and maintenance of a coastal and marine environmental information management system and network. Another example is the creation of the Blue Carbon Steering Committee (BCSC) and the Blue Carbon Technical Working Group (BCTWG) of the Philippines. The BCSC is comprised of government agencies that set the policy direction whereas the BCTWG consists of government agencies, civil society organizations, academic institutions, and the private sector to undertake and promote research on blue carbon. Both of these support the Philippines' intention to harness the adaptation and mitigation potential of blue carbon.

In harnessing blue economy, the Philippines has identified the Coastal and Marine Ecosystems Management Program (CMEMP) as one of the climate change adaptation measures in the Philippine NDC. It aims to comprehensively manage, address, and effectively reduce the

drivers and threats of degradation of the coastal and marine ecosystems in order to achieve and promote sustainability of ecosystem services, food security, and climate change resiliency for the benefit of present and future generations.

Another climate change adaptation measure in the NDC is the Protected Areas Development and Management Program which covers the main in-situ measures to conserve biodiversity within protected areas and adjacent sites. It includes a comprehensive set of activities that are designed and being implemented to ensure sustainable management of protected areas.

Ms. Basug pointed out that many of the challenges in the conservation and sustainable use of the ocean and marine resources lie in the transboundary and highly complex nature of ocean management. This is coupled with the fragmented understanding of the interaction between ocean and human activities, insufficient global methodological development, limited country level experience in collecting ocean data, and the high cost of data collection.

To address these challenges, regional cooperation in terms of technical support is needed, especially on matters concerning the enforcement and monitoring of international conventions, frameworks, norms, and standards. Strengthening inclusive and action-oriented regional platforms such as PEMSEA offers a pathway for establishing meaningful partnerships, effective follow-up and review of enforcement, as well as inclusive sharing of relevant experiences across stakeholders and countries.

In closing, Ms. Basug shared that climate change provides us with the opportunity to rethink and reevaluate the region's direction and choices for the economy, environment, and humanity. However, actions should be viewed through a climate lens to be able to adopt transformative actions for the health and sustainability of the ocean and build back better, greener, bluer, and healthier.

e. RO Korea: Mr. Jin-Woo Ahn, Deputy Director, Marine Environment Policy Division, Marine Policy Office, Ministry of Oceans and Fisheries (MOF)

Mr. Ahn centered his discussion on the ocean-based solutions to climate change that are being promoted in RO Korea.

He shared how the Ocean and Climate Dialogue is highly important for the East Asian Seas region as the concerned countries are stewards of mangroves, salt marshes, and tidal flats, and large marine territories where ocean-based solutions are deemed exceptionally effective.

During the UNFCCC COP 26 Meeting, RO Korea committed in its NDC to reduce carbon emissions to 40 percent of 2018 level by 2030. The country also adopted a legal framework under the vision of 2050 carbon-neutrality. For this end, the government established the 2050 Carbon Neutral Roadmap for Oceans and Fisheries that focus on the reduction of GHG emissions from shipping and fisheries by using low-carbon and/or carbon-free technologies in ships/vessels powered by green fuels such as hydrogen and ammonia and establishing a proper port environment for operating eco-friendly ships.

The country also plans to make the best use of various marine energy sources such as tidal currents that will not only generate electricity efficiently but also produce hydrogen.

Mr. Ahn put forth that their most notable strategy in terms of ocean-based climate solutions is blue carbon development, specifically to expand the use of the ocean as a carbon sink. Towards this end, tidal flats in the country were selected as a world natural heritage site in July 2021. According to a study conducted by Seoul National University, carbon absorption by these tidal flats exceeds 200,000 tons on a yearly basis, revealing their high potential as a carbon sink. In the past, RO Korea has mostly focused on the recovery of tidal flats by restoring the areas within abandoned salt and aquaculture farms, but more recently, they have initiated the restoration of the vegetated areas of tidal flats, which are mainly salt marshes.

Moreover, initiatives to expand sea forests have already commenced with the goal of creating 39,000 ha of sea forest by 2030. At the same time, RO Korea aims to move toward enhancing the health of the sea by preventing sea desertification and improving the adaptability of marine ecosystems to climate change.

With 27 percent of the country's population living in coastal areas that are prone to disasters such as coastal erosion and flooding caused by climate change, the government plans to create a climate adaptive coastline at the national level by 2030. For this, they will launch research and development projects on building a coastline that applies eco-friendly construction methods starting 2022.

Although the use of ocean-based climate solutions is still at the infancy stage in Asia, research is already beginning to show a positive outlook in terms of accumulated benefits. Mr. Ahn expressed hope that the East Asian community will work together and address climate change with the help of the ocean. However, this can only happen when there is solidarity and common solutions centered on ocean-based measures are discussed.

f. Singapore: Prof. Dale Barker, Director, Centre for Climate Research Singapore (CCRS)

Prof. Barker's presentation focused on the impacts of climate change on Singapore, the role of CCRS on climate change adaptation and mitigation, and the country's research plans on climate science with respect to the coastal and marine sector

He first discussed the underpinning climate signs that should be used to inform investments in climate adaptation. He commenced with a table showing how various aspects of climate change—such as sea level rise, extreme storms, higher temperatures, and altered precipitation—impact blue carbon ecosystems such as mangroves, tidal marshes, seagrasses, and seaweeds. In the relatively small country of Singapore, mangroves are the most prevalent blue carbon ecosystems.

Mangroves have been shown to be very efficient in terms of storing carbon. Estimates from the country's 2015 studies show how the mangroves in Singapore can contain 450,571 tonnes of carbon, equivalent to 1.65 million tonnes CO₂. This is equivalent to the annual per capita emissions of about 620,000 people. Mangroves in Singapore store about 11 percent of the

carbon covered by Singapore's forests, despite covering less than 6 percent of the total forest area and only about 1 percent of the total land area in the country.

Mangroves are also being considered as one of the country's defense mechanisms against sea level rise, which, in Singapore, has accelerated from about 1.5 mm a year from 2009 to three-folds in the recent years. Models project a rise of up to one meter by 2100. Figuring in the impacts of the weather, storm surges, and other disasters, Singapore could potentially experience a four-to-five-meter rise during extreme events.

However, despite the importance of mangroves in the country, the total mangrove area in Singapore declined from 63.4 km² in 1953 to only about 8.1 km² in 2018.

Considering the carbon sink potential of the country's mangroves and the challenges they face, there has been a build-up of activities addressing mangrove development and conservation in Singapore. For example, a new center for nature-based climate solutions was established at the National University of Singapore, where the restoration of mangroves and their capacity for coastal protection are being investigated.

At the end of his presentation, Prof. Barker gave an overview of Singapore's Marine Climate Change Science Programme (MCCSP). It is a multi-stakeholder research program that seeks to advance the core sciences of marine climate change and develop solutions to help address the challenges faced by the coastal and marine environment arising from climate change. The MCCSP builds on the foundational science developed under past and ongoing programs, including the Marine Science Research and Development Programme (2016-2021). The MCCSP is part of overall efforts to transform Singapore into a city in nature as well as contribute towards a nationwide effort to build climate resilience under the Singapore Green Plan 2030.

In particular, the MCCSP aims to:

- Address current national needs and knowledge gaps that were identified by government agencies by developing scientific insights to support the creation of evidence-based interventions and solutions; and
- Leverage on synergies across local agencies, industry, and Institutes of Higher Learning in Singapore to strengthen and support national efforts to mitigate and manage climate change challenges.

Blue carbon development is one of the key climate change solutions being covered by the MCCSP.

5. MODERATED DISCUSSION ON PART 1

Following the country presentations, the floor was opened for a moderated open forum led by Dr. Antonio La Viña, Associate Director for Climate Policy and International Relations at the Manila Observatory in the Philippines and Former Chair of the East Asian Seas Partnership Council. He began the open forum by thanking the speakers for their insightful presentations. The questions and answers are summarized below.

Question 1 for Dr. Kang (KIOST): What are the opportunities provided by the Glasgow Climate Pact for us in PEMSEA and other ocean science and research communities in this region? Where are the priorities and what's the comparative advantage of our region and institutions on these issues?

Dr. Kang: The main thing about the Glasgow Climate Pact is that the marine environment and ecosystems are recognized as a very interesting and important part of climate change. This kind of recognition gives impetus on organizing, for example, the Ocean and Climate Dialogue. The ocean itself is very important in our climate and drives us to do more research or studies on ocean science, especially on the role of the ocean on climate change adaptation and mitigation and the impacts of ocean volatility induced by global change on the society and environment. According to Mr. Ahn (RO Korea), there has been an increase in marine or ocean climate research programs and projects. The important thing is that science should support modern policy makers as well as the general public in understanding how the ocean is working. Another important thing is collaborations between scientists. There are no boundaries to our ocean; therefore, scientific studies should be a matter of collaboration between all surrounding countries. Core examinations and sharing of data, information, and tools is very important to support ocean-based solutions to climate change.

Question 2 for Dr. Kang (KIOST) and Prof. Barker (Singapore): There are stories about nature getting a breather during the pandemic, including marine species being seen and water being clearer. Is this an accurate observation? And how can this be incorporated into the way we are developing our sustainable development plan for the partnership?

Dr. Kang: The pandemic definitely contributed in good ways to reduce GHG emissions at the moment. For example, RO Korea experienced lower fine dust levels than before. At the very least, this shows how human activities could change the situation, which is good news as it offers some form of evidence that we can use for development planning in the future. But waste disposal during the pandemic seems a worse than before since people use a lot of masks. At the same time, people are looking forward to doing outdoor activities. Such impacts of the pandemic may be temporary and it could be possible that we will end up worse than before. These kinds of things compel us to lean towards sustainable development like using green energy and doing something for the general people's well-being. Scientifically, it would be good to understand the impacts of the pandemic—for instance, the shutdown of fossil fuel usage and its impact on the marine environment.

Prof. Barker: The pandemic was a very significant event for the whole world and it's still here with us. It is becoming endemic and the next six to twelve months would be crucial in terms of adaptation such as people relying more on flexible work arrangements. Going back to old ways or staying with the new normal would all depend on the company or even the country. Moreover, while there are some obvious impacts (for example, the improvements in air quality, which led to reductions in mortality in certain parts of the world), we do not know if we can hold on to these improvements. There are also negative consequences. For instance, Singapore is having one of the biggest outbreaks of dengue it has ever seen. Part of the reason for that is that people were stuck in their own homes and may have not built the necessary immunity against dengue over the past couple of years. People need to be able to get out and build up their resilience against the

viruses we see in our everyday lives. The pandemic also has unexpected consequences on science. For example, our Global Weather Forecasting Systems were affected because we lost all aircraft data during the lockdown. This affected our ability to accurately predict the weather and extreme events. Therefore, global weather forecast quality went down a little because of COVID. Indirect effects like this reveal how climate and weather are linked to human activities in so many different ways, which also cause us to think of things in different ways.

Question 3 for Prof. Barker: Regarding climate model grid size, how small of a scale should projections be to become useful for climate change action?

Prof. Barker: The answer would differ depending on what information is needed and the methods being used. For example, global climate models really only provide a very broad scale estimate. This allows us to know the impact on Greenland or Antarctica and the Southern Ocean but not the detailed impacts in Singapore. In a small place like Singapore, again, there are general trends such as changes in temperature due to climate change but these don't vary that much and half a degree or one degree won't make too much of a difference on society. In fact, in places like Singapore, temperature changes are less about climate change and more about urban design. Climate change may change temperatures by a degree, but urban design can change it by four or five degrees. Big cities are dealing more with the urban heat island effect than they are with CO₂-induced temperature rises. On the other hand, for climate change projections such as coastal inundation, it's very local. If one is looking for the impacts of waves on a very small place like Singapore, then, the scale would have to go down to meters or tens of meters, and the science is very immature on that in terms of modeling observations. At the moment, what we're trying to do in Singapore is to get down to a kilometer scale where we can at least start to see the weather features that lead to rainfall, Sumatra squalls, or localized thunderstorms. We can start to see those now that we have sufficient resolutions for satellite images but having higher grid spacing is going to improve the accuracy. In fact, Global Climatology models don't even see Singapore at a 7,500 km scale. The scale should really depend on the area being considered, but I think around a kilometer scale is where the science is at. In terms of the models and to get down below that, you're really looking more at sort of statistical and empirical techniques.

Question 4 for Dr. Lu (China): What strategies work in terms of coastal restoration efforts (e.g., for wetlands) and how can they be scaled up to other parts of the world?

Dr. Lu: The technical guidelines for marine ecological restoration, which are based on several theoretical research and long-term practical experiences, have been very useful in this regard. The guidelines specified the main principles, requirements, and technical rules of restoration for mangroves, salt marshes, tidal flats, seaweed beds, coral reefs, and oyster reefs, among others. The guidelines help direct the implementation of restoration projects more quickly, guarantee their effectiveness, and avoid issues such as ecosystem harm and pollution. However, the guidelines are still limited by scientific knowledge; there is still room for improvement. Therefore, we will continue stressing the importance of basic research and technological innovation, especially regarding blue carbon ecosystems. We are also exploring synergies between theories on coastal wetland protection and restoration, biodiversity protection, and carbon sink protection.

Follow-up question for Dr. Lu (China): In testing out the technical guidelines for marine ecological restoration, were the pilot restoration efforts successful? Are there other initiatives similar to this? What can be done to scale up these efforts?

Dr. Lu: The guidelines were only published last year. These were based on the knowledge of specialists and practical experiences of scientists.

Question No. 5 for Ms. Basug/Mr. Avelino³ (Philippines): Can marine protected area (MPA) management include blue carbon efforts and have you done that in CMEMP(? And how does it help manage climate change?

Mr. Avelino: Yes, definitely. CMEMP anchors its components on the establishment of MPAs but moving forward, in order for us to contribute to climate change adaptation and mitigation, we must recognize that our coastal ecosystems sequester more carbon than our terrestrial forests. Thus, our focus here in CMEMP is to move away from the traditional approach of establishing individual MPAs towards making these MPAs more effective and efficient by building networks of MPAs, even those that cut across political borders. That way, we would be able to protect and conserve our coastal and marine habitats, particularly our seagrass beds and mangrove forests, from further degradation, limiting their loss and damage and enable them to contribute more towards the climate change mitigation efforts of the country. We also have programs (still under the CMEMP) focusing on biodiversity-friendly enterprises in MPAs. These form the social aspect of CMEMP as they provide supplemental or alternative livelihood to the communities who are otherwise putting more pressure on our coastal and marine resources through their traditional livelihood.

Follow-up question for Mr. Avelino (Philippines): You are aware that the incoming government administration has just listed down its budgetary priorities that include climate change adaptation, renewable energy, agriculture, and natural resources. There are a few things there that are related to coastal and marine resources. How does the community of practice within the DENR look at this particular development?

Mr. Avelino: We are very much eager and welcoming in terms of what our incoming administration has presented as part of the agenda moving forward. CMEMP will be running until 2028 so we're expecting more effort and resources to be allocated to the DENR in the implementation of this program, especially with regard blue economy or blue carbon development, which will help us further alleviate or mitigate climate change and support climate change adaptation.

Dr. La Viña: I just want to echo that climate change action, as a priority in terms of national budgeting, is true for all PEMSEA country partners and even other regions in the world. It is something that was also stressed in the beginning of this dialogue by the keynote speaker—that, in fact, climate change is a whole-of-nation approach and it's an ecosystem approach. It needs to be incorporated in our national budgets and into our development strategies. We pointed out

³ Mr. Avelino, the OIC-Section Chief, Biodiversity Management Bureau, DENR, represented Ms. Basug during the open forum.

earlier that one of the purposes of this dialogue is to be able to inform us better on developing the next SDS-SEA II].

Question 6 for Prof. Barker (Singapore): You mentioned that there are many potential climate change impacts that rely on the same data input like rainfall. How is data currently transmitted to those who need to use it to plan and prepare for impacts such as governments?

Prof. Barker: In terms of the regional data in this part of the world, the agency or the group that we're looking to coordinate with is Cordex. The previous generation of data was only made available to Singapore agencies for our own studies, but what we want to do now is to work with local universities who will be using it and maybe regional universities too. There is an ongoing discussion to make the data available so that we can do research as well in particular applications, such as studying the impact of flooding on dengue. It should be noted that raw data sets are huge, often taking two or three years to produce, so there's the technical issue about how we can get all data available. The V3 project, for example, won't be complete till September 2023 and it's the number one project at the national supercomputer in Singapore and it's also taking a big chunk of the Australian supercomputers as well. It's a huge amount of data so there's a technical challenge in terms of using cloud-based systems or data toolboxes and providing the analytical tools. To address this, we are currently working on agreements and in making that data available for collaboration. The Cordex Group is focused on regional climate projection data, led by Malaysia mainly for atmospheric data. However, detailed ocean data is still limited because the current models are measuring sea level rise impacts only. In terms of detailed circulation, salinity, and temperature changes within the ocean, we may have to wait a little while for that kind of data to be available.

Question 7 for Dr. Kang (KIOST): How can climate data be best shared to inform policy planning at the domestic level and beyond, including international collaboration?

Dr. Kang: There are many ocean data shared by scientists internationally and there are lots of data hubs as well as tools or methods to share the data, but the problem is that policy-makers or the general public may find it difficult to use these data given the lack of technical knowledge and skills to make use of these data. As such, the best way to share data is to convey them as secondary/processed data rather than raw data. Policy-makers or the general public or even students can understand these processed data and these data can be shared through common data platforms. In RO Korea, many people are working to make database systems, but these systems are not so useful for the general public. We need some kind of moderator or a bridge between the general public and scientific data.

Question 8 for Prof. Barker (Singapore) from Mr. James Martin Amba: How is Singapore faring in terms of being a green finance hub in the Asia Pacific?

Prof. Barker: There are a few things that Singapore is doing, including a number of activities towards increasing the carbon tax rate from the current SGD 5 per tonne of emissions to between SGD 50 and SGD 80 by 2030. Singapore is a part of the Southeast Asia Disaster Risk Insurance Facility that enables Asian countries to gain access to disaster-related financial solutions. There is

also a green finance action plan in Singapore, involving a USD 1.8 billion allocation for green investments.

Dr. La Viña: There is a meeting in Bonn right now and climate finance is a very big thing in that meeting, specifically climate finance for adaptation, mitigation, and loss and damage. Loss and damage is the third pillar now for climate financing. In the past, we've always framed climate responses as either mitigation or adaptation, both of which are long-term in nature. In the meantime, many of our countries, including the Philippines, just went through two big climate events in the last six months. One was Typhoon Odette in December 2021 and the other one is Typhoon Agaton just this April and May. They were destructive in terms of loss and damage and lives lost. The destruction was widespread, hitting some of the biggest tourism hubs in the Philippines. There was also pervasive economic damages on agriculture. Therefore, loss and damage finance is now at the center of climate change negotiations. Likewise, there's a lot of things that can be done in the marine and coastal areas to develop programs and approaches that are specific to addressing loss and damage apart from what we have in the NDC because the NDC, as we have seen in the presentations today, are mostly adaptation and mitigation in nature. PEMSEA could lead in that effort in spearheading thinking around the third pillar and including it in the SDS-SEA IP 2023-2027.

Question 9 for Mr. Ahn (RO Korea): You mentioned that there were new initiatives to ensure that coastal infrastructure was environmentally-friendly. Could you give an example of a green infrastructure project and how it improves coastline protection?

Mr. Ahn: RO Korea plans to make three testbeds to replace some artificial breakwaters with biogenic breakwaters using natural materials such as shells and seagrass beds. According to studies, restoring the natural coastline is effective in dealing with coastal erosion and flooding. It also helps improve biodiversity and the area's conducive to house coastal and marine habitats as carbon sinks. We plan on scaling this up to the national level hence the project we have on research and development.

Question 10 for the panel of speakers: What do we need to do within PEMSEA so that we can help our country partners pursue ocean-based adaptation and loss and damage solutions? Towards this end, what kind of support is needed from other national and regional organizations like WorldFish, Asian Development Bank, and Asian Infrastructure Investment Bank? Also, what is the role of an individual in addressing climate change challenges?

Mr. Avelino (Philippines): We see PEMSEA as a very important platform for pushing the establishment of meaningful partnerships, effective follow-up and review, and inclusive sharing of relevant experiences across stakeholders and countries. Right now, the Philippines is also a part of the Coral Triangle Initiative on Coral Reefs, Fisheries, and Food Security (CTI-CFF), and we are in the process of developing the CTI-CFF's Second Regional Plan of Action. We see both PEMSEA and CTI-CFF as very important means to put forward our agenda of transboundary or cross-country collaboration for the protection of our coastal and marine resources. For the second question, in terms of individual agency, they may have already heard this many times but there are different ways for us to contribute. Simply turning off appliances when not in use and the use of renewable materials or reusable materials is one. These are just some of the things that we can

do. These are small things, yes, but they add up and contribute to a greater effort not just for our country but globally to adapt to and mitigate climate change.

Prof. Barker (Singapore): As I mentioned earlier, our biggest challenge in the region is data since we can't do much science without data. There is a lot of ocean data from space observations where you can see the surface but not what is happening under the surface, so we are often not sure in terms of the status of ocean currents, salinity, biogeochemistry, and others. Perhaps PEMSEA and other groups like the Global Ocean Observing System (GOOS) or the Southeast Asia GOOS can help facilitate sharing what's already there and help in filling in the gaps for the region. At the same time, data sharing can get more complex, especially in terms of investments in new observation types. But some reports, including those coming from the World Bank, report very encouraging results in terms of the return on investment in observations in Southeast Asia. The present ratio is at 10:1 to 20:1. This brings great news for green finance since investments for ocean observing systems is a big play for the climate change community. On the individual level and what the person can do, I think climate action comes down to education first. Education helps in understanding and having a clear right of the issue of climate change.

Dr. Kang (KIOST): As Prof. Barker mentioned, getting ocean data is very difficult compared to atmospheric or land data. One of the most successful ocean data collection programs is Argo, which utilizes about four thousand profilers who observe temperature, salinity, and other biogeochemical data. The global data can be shared easily but the problem is that the local or coastal data needed at the country level is very difficult to share. For this, PEMSEA can play a role by sharing those kinds of coastal data to each country partner.

Dr. Lu (China): Our goal is to collect and share more data and evaluate the report on the world's coastal wetlands. It will be helpful for us to know more about coastal wetlands to concretely improve their management and maintain and improve our methods to better cope with the challenges of climate change.

Mr. Ahn (RO Korea): I agree with the comments on data sharing where PEMSEA could help facilitate and serve as a platform to share coastal information because, while there are differences, there are also similar cases that can be a starting point for collaboration between countries. I also suggest for PEMSEA to be the main body to encourage partnerships to co-work on research and development and other activities to implement each country's NDC.

Dr. La Viña: I agree that individuals are very important and what we do in each household are likewise important because climate change is, in fact, a global problem. At the same time, we expect governments and big corporations, which are the major drivers of both climate change impacts and potential solutions, to really step up to the plate and implement these solutions, not throw the ball to the individual and say, "That's your problem and not our problem anymore."

Ms. Aimee Gonzales, Executive Director, PEMSEA Resource Facility: Collaboration is key to create impactful actions to address climate change. I would like to thank everyone for recognizing PEMSEA as a platform for knowledge exchange, data facilitation, and bringing people together towards a common purpose. Facilitation is one of our services where we try to surface and at the same time, come up with how to get countries to talk about their programs and policies so that

we can see how development plans are informed by tools, practices, and resources and vice-versa. Even from this morning's discussion, there seems to be challenges on how to make plans more coherent and coordinated. PEMSEA is, at the moment, preparing the SDS-SEA IP 2023-2027. One of the objectives of this forum was to get information where PEMSEA could help in the preparation of this regional PLAN. In addition, one of the key services that PEMSEA provides is the translation of science to policy, especially to local actions with emphasis on local adaptation pathways. We have representatives from countries, research organizations, and think tanks who can assist us in translating data for stakeholder use. In the future, we will have more of these Ocean Roundtable Dialogue, not just on climate change but also other topics on promote sustainable coastal and marine development. This type of dialogue takes place every year. We hope that next year, we can have an in-person event because it has been challenging to have a real dialogue by only looking at each other's faces on Zoom.

6. PART 2: TOOLS/MECHANISMS/PRACTICES RELATED TO OCEAN-BASED CLIMATE SOLUTIONS

The afternoon session focused on the implementation of adaptation-based solutions for the coastal and marine sector. The presenters discussed the region's progress and examples of good practices in utilizing tools and systems to mitigate risk and enhance coastal resilience in accordance with the morning presentations. It featured speakers from WorldFish, UP-MSI, and IGES.

a. Towards a Shared Prosperity through Aquatic Food Systems under a Changing Climate (Dr. Essam Yassin Mohammed, Interim Director General, WorldFish)

Dr. Mohammed discussed the impacts of climate change on fisheries and the ocean-based adaptation solutions in the fisheries sector as a means to enable a shared prosperity for all through aquatic systems under a changing climate.

To contextualize his discussion, he explained first that aquatic foods are aquatic animals and plants grown in or harvested in the wild from the water for food or feed and that aquatic foods also cover synthetic substitutes. It is important to expand this concept to include shellfish and aquatic plants given the opportunities that arise from a sustainable aquatic resource management. Aquatic foods offer multiple benefits. From provisioning services such as provision of livelihood for billions of people as well as food and animal protein for millions of people, particularly in the developing world, aquatic foods also offer economic value as one of the most traded food commodities.

Dr. Mohammed pointed out that while majority of the people who work in the aquatic food system are primarily employed by small scale players, they nonetheless form a large section of the economy in terms of their significance to the supply of aquatic foods. More than 50 percent of the world's aquatic food supply is supplied by small scale actors.

Climate change poses a significant threat to this important sector and to the people who depend on them as well. A recent study from WorldFish looked at how climate change would

impact the sector should there be no urgent, alternative action taken. The study shows that all aquatic production systems in every country will be impacted by climate change with countries primarily in the tropical regions as the hardest hit. Likewise, their study showed how profits in this sector are projected to plummet in low-income countries due to climate change.

Dr. Mohammed shared that aquatic food systems can enable societies to pursue a low carbon pathway whilst meeting the growing demand for food. In fact, a number of scientific evidence demonstrate that aquatic food production systems emit much lower GHGs relative to their land-based counterparts. Egypt, for instance, has demonstrated up to 36 percent reduction in environmental impacts, including GHG emissions, partly due to best management practices in Tilapia production.

This poses a question on how societies can transition to a low-carbon food production system marked with equitable distribution of benefits, considering possible trade-offs. Another important consideration is having the proper tools in place to measure and monitor carbon footprint in aquatic food production systems. To fill this data gap, WorldFish is working with its partners to develop a prototype of a digital tool that can measure their ecological footprint. The prototype will also feature an advisory service on the types of intervention required to further reduce carbon footprint.

Moving forward with adaptation or resilience as the goal to realize a shared blue prosperity under a changing climate through aquatic food systems, Dr. Mohammed shared the importance of reducing vulnerability and exposure to hazards by improving/increasing the following: ability to predict or anticipate climate hazards, availability of alternative livelihood, and capacity to respond to climate change.

Examples of adaptation solutions in the aquatic food sector reveals how such actions can help increase resilience while at the same time mitigate climate change. For instance, increased fish stock through better resource management also means more GHGs that can be sunk or sequestered. A recent study found that fish help sink 1.6 billion tons of CO₂ equivalent every year in addition to bringing improved biodiversity and more employment opportunities.

Dr. Mohammed added that with aquatic food systems, it is imperative to look at the entire system: market, government structure, social and economic inclusion, and sustainable finance, among others, in lieu of treating each element in isolation.

In conclusion, WorldFish put forth the following calls for action:

- Make sustainable, nature-positive aquatic foods a key part of NDCs;
- Include aquatic food ecosystems, infrastructure, workers, and assets in the NAPs and disaster preparedness and relief strategies;
- Ensure that no one is left behind in the transition to low-carbon aquatic food-based diet; and
- Ensure that adaptation and mitigation efforts in and through aquatic food systems are underpinned by effective governance, reliable finance, social and economic inclusion,

and elimination of systemic barriers such as access to market and non-market services, and respect for ecological boundaries.

b. Reimagining our Response: Mitigating Risk and Enhancing Coastal Resilience (Dr. Laura David, Director, UP-MSI)

In her presentation, Dr. David shared the impacts of climate change in the Philippines, the importance of an adaptation-driven NDC, how to increase coastal resilience through blue carbon, and examples of tools/methodologies to support work on blue carbon development.

She stressed that every single action towards lessening carbon footprint is important. Therefore, while the Philippines contribute only 0.39 percent of global carbon emissions, the country has to do its share in reducing GHG emissions. For this, the Philippines has committed to a reduction of as much as 75 percent of its GHG emissions by 2030.

Current trends show how the Philippines is exposed to the impacts of climate change such as sea level rise and the increasing intensity of tropical storms and typhoons. These highlight the need for integrating nature-based solutions in the country's NDC as these solutions can help the country improve its capacity to jointly mitigate and adapt to these hazards. A good example that showcases the potential of nature-based solutions as a climate action response is the case of Typhoon Haiyan when it struck Tacloban City in the Philippines. While photos showed almost complete destruction in most areas, there were also areas that fared better due to the significant presence of coastal habitats. Photos revealed how a 3.6-meter storm surge was buffered by a thick stretch of mangrove forests that attenuated the strength of the storm.

However, reality shows that the carbon sequestration ability of coastal and marine ecosystems remains unappreciated and underutilized. For example, in the Philippines, about 28 percent of the budget for the NDC focuses on watershed management or forest protection. However, of that number, mangrove rehabilitation falls short at less than 10 percent despite the capability of mangroves to sequester almost five times more carbon than tropical forests. This poses the need to review how ocean-based adaptation efforts can be integrated in the NDC.

These efforts, including mangrove reforestation, also provide benefits beyond climate adaptation and mitigation. For instance, mangrove-associated fisheries can provide livelihood opportunities for the community such as tourism. Mangroves also perform water filtration and serve as a home for marine biodiversity.

Mangrove reforestation is just one example of nature-based solutions in the coastal and marine environment. Another option is seagrass planting given the carbon sink potential of this particular habitat. However, very little is being done about seagrass planting. Dr. David stressed the need to look at coastal and marine ecosystems in a holistic way.

Noting limited resources to implement nature-based solutions, especially in tropical countries in East Asia, Dr. David suggested to compensate carbon sequestration of low-emitting countries through a carbon credit system. Since the Philippines and the rest of Southeast Asia

produce very low carbon emissions, these countries can help balance out the emissions from high-emitting countries such as China, USA, and those that belong to the European Union. This can provide a win-win situation with incentives for both parties as high-emitting countries are able to offset their carbon emissions whereas countries such as the Philippines are able to focus on and implement their adaptation activities with support of high-emitting countries. Dr. David encouraged PEMSEA and all of its partners to lobby for the development of a carbon credit system.

Another example to incentivize the implementation of nature-based solutions is the Debt for Nature Swap as practiced, for example, in Brazil. These are financial transactions where debt owed by a developing country is reduced or converted by the creditor in exchange for guaranteed payments towards conservation goals by the debtor country.

There are also adaptation-mitigation partnerships where a country with natural resources can implement adaptation measures by partnering with countries with carbon deficit and co-invest in this endeavor.

c. Towards a Resilient Future: Asia-Pacific Climate Change Adaptation Information Platform (AP-PLAT) (Mr. Osamu Mizuno, Program Director, Adaptation and Water Area, IGES)

Mr. Mizuno's presentation focused on IGES' activities on developing scientific knowledge and information on climate change impacts in the region, providing decision support tools for policy formulation, and providing capacity-building support on climate change impact assessment and formulation of adaptation projects.

He began his presentation by introducing IGES, a policy research think tank based in Japan, working on various research projects with the goal of achieving sustainable development in the Asia Pacific region. IGES became PEMSEA's Regional Center of Excellence in Climate Change Adaptation and Disaster Risk Reduction in 2020 and has since been in close collaboration with PEMSEA and its partners on the sustainable development of coastal and marine areas.

Mr. Mizuno went on to introduce AP-PLAT as a key IGES activity for facilitating cooperation on climate change. AP-PLAT, established under the lead of the Japanese government in 2018, serves as a platform to create an enabling environment for climate-risk informed decision-making and practical adaptation action through synchronizing and harnessing best available efforts among partner countries and organizations.

AP-PLAT provides a variety of climate science data and tools such as:

- ClimoCast - a climate projection tool that shows climate projections up to the year 2100 in four representative GHG emission scenarios (SSP126-585) and ten major climate simulation models. It covers all countries and allows users to compare different scenarios and models as well as downscale the results to sub-national level.
- Climate Impact Viewer - shows the results of a climate change impact assessment by providing simulations of future climate impacts such as sea-level rise and

temperature changes as well as provide scenario-based predictions based on management interventions (e.g., low-carbon emissions to very high emissions) to up to the year 2100.

AP-PLAT also provides content for capacity development such as:

- An e-learning course on building resilience against disasters, climate change, and COVID-19, among others; and
- An e-learning course and website on nature-based solutions (it provides the basic concept of nature-based solutions and how to harness it for climate action by showcasing examples of good practices around the world).

AP-PLAT has the potential to contribute to regional efforts to implement ocean-based adaptation solutions in three ways:

- By capitalizing on the interactions between science and policy;
- By providing information on localized climate impacts;
- By enhancing the capacity of national and local governments in the region for adaptation actions in coastal areas; and
- By serving as a knowledge bank of good practices for reference of policy-makers.

There are ongoing talks to further develop joint knowledge-sharing between PEMSEA and IGES in terms of climate action.

7. MODERATED DISCUSSION ON PART 2

The open forum for Part 2 presentations was moderated by Ms. Aimee Gonzales, the Executive Director of PEMSEA Resource Facility. Ms. Gonzales began the open forum by thanking the panel of speakers for their excellent presentations of practical, doable, and pilot tested solutions. The questions and answers are summarized below.

Question 1 from Ms. Gonzales to all panel speakers: If we already have so many tools, resources, and mechanisms for ocean-based adaptation solutions, why are these not reaching the places where they matter (e.g., local communities, coastal committees, fisherfolk)? Where and why is there a disconnect?

Dr. Mohammed (WorldFish): I don't think there is a shortage of tools as we have seen good examples of tools in this dialogue. In rural areas in Cambodia or Bangladesh for instance, a lot of people use different social media platforms or mobile phones. However, digital tools are often designed from the perspective of a scientist—for instance, so that they can collect more data or conduct more analyses. On the other hand, intended users such as fish farmers or coastal communities often ask "What's in it for me?" One of the critical aspects in designing something fit for purpose is demonstrating its real value to end users so that they would understand its value. Therefore, effort is needed from the experts' side to assess the demand for these tools, if any, and demonstrate the value of these tools. For instance, digital tools that are utilized to enable people to predict climate risk or hazards can be demonstrated through the assistance of extension workers. In Bangladesh, for example, we were able to reach 100,000 fish farmers by mobilizing

around 100 extension workers who actively engaged with fish farmers and demonstrated how these tools work and how they can be mainstreamed in everyday life.

Dr. David (UP-MSI): I agree with Essam's point but I want to highlight a few things. First, we need to be able to give power to the communities so there has to be a national decision of prioritizing adaptation-mitigation activities over any other development. Without that, whatever the community does for climate action, if any, can be superseded by other national priorities. Second, related to Mr. Mohammed's point: There are many manuals on how to evaluate and monitor coastal resources that are still on the shelf and not being used on the ground. Science communicators have taught us a lot on what can be absorbed and be useful from the standpoint of a fisherman or the volunteers who actually guard the coast and so on. As a scientist, it is really hard to balance the needs of scientists and the public in terms of designing climate action tools. One approach is to engage local elementary and high school teachers because they're permanent fixtures in coastal communities. If we engage them and give them this information in a way that will allow them to include that in their curricula, they can make this information useful for the communities.

Mr. Mizuno (IGES): It is true that there are so many tools available in this region and beyond and that there are a lot of scientific information produced everyday. But to translate this reality into action, everybody has to understand the real threat of climate change and the need for adaptation and mitigation actions on the ground. I think, in some case, especially in the local level, there is that acknowledgement that the threat is high enough. We should not underestimate the importance of raising awareness of taking action at the local level. Another point is that there are several stakeholders in the community who are interested in doing climate action but tend to work in isolation and not necessarily systematized. We need a champion or a coordination mechanism and implementation framework that would allow several actors to work in harmony and move onto the same direction to synergize efforts.

Question No. 2 for Dr. David (UP-MSI): How do you gather baseline GHG emission data and complete the data on the contributions of mangrove protection and coastal resource management to climate action in general?

Dr. David: Basically, we do a mangrove assessment. We go through the mangroves and measure above-ground biomass such as the girths of the tree and the height of the canopy. There are also globally available references or "constants" that can be used. If there is a lot of below-ground carbon like with seagrass beds, we do coring where we core about a meter of core in the mangrove areas, which we then analyze in the laboratory to measure the amount of carbon that is there. Again, there are papers that give us figures that can be used as a first estimate, but we've really seen a huge range of numbers depending on the site. So, we would calculate the density of a certain square meter and then extrapolate that for the rest of the area. You can do that just by swimming and measuring the area yourself or by using remote sensing technologies.

Question No. 3 for Dr. Mohammed (WorldFish): How do we effectively shift to low-carbon aquatic food systems while managing the current global crisis in fish stock sustainability?

Dr. Mohammed: It is absolutely right that our fish resources are in crisis without an exaggeration, where about one in three are depleted or over-exploited. The question now is what is driving this crisis? One of them is fish subsidies. These harmful subsidies are essentially given to large fishing companies or fleets to artificially deflate the cost and make their fishing activities profitable so they can go hundreds of thousands of miles away from the coast while still making a profit. Next week, the World Trade Organization is holding an inter-ministerial meeting and one of the issues that will be discussed and hopefully finalized is to reach an agreement on ending these subsidies. Some may argue that this is given under the pretext of poverty alleviation, but data show how 86 percent of the global fisheries stocks is now given to industrial or big fleets and only 14 percent are given to small-scale operators. Therefore, one of the practical ways to restore fish stocks is to eliminate harmful subsidies. I think we have the mandate as global citizens collectively to act together to end harmful fish subsidies and address this big threat to fisheries. Second, to sustain food stocks, it is critical that we transition our food systems to a low emission pathway. Another hidden element here is the issue of food loss and waste. The paradox is that we live in a world of plenty; we waste more than a third of the fish that we catch through mishandling or lack of access to services or perhaps the lavish lifestyle in some parts of the world. This has repercussions in food security and even carbon emissions. If we were to significantly reduce and possibly eliminate food loss and waste, we can meet the food and nutrition security of millions of people around the world without excessively harvesting fish out of the sea. Reducing food loss and waste is achievable by incentivizing consumers against wasting these hard-earned resources for example.

Follow up question to Dr. Mohammed by Ms. Gonzales: Regarding food loss and ways of eliminating fish subsidies, are you advocating for the shift of the subsidies to promote lower carbon aquatic food systems?

Dr. Mohammed: I'm a former bureaucrat myself and I am so glad you mentioned that. You say eliminate subsidies is not politically palatable and I completely understand that. Therefore, the narrative should be that we need to make a transition from bad subsidies to good subsidies. If the government were to continue providing fish subsidies, they can do so, but it will be better if these subsidies are used, for example, to incentivize fishing vessels that introduce sustainable practices or fishing companies that invest in sustainable research and development or even communities. In Bangladesh, the government is subsidizing these communities to incentivize them to continue managing their fisheries in a sustainable manner.

Question No. 4 for Dr. David (UP-MSI) from Ms. Gonzales: Can you elaborate on your presentation on seagrass beds as a potential carbon storage? What is the future direction of seagrass restoration at the regional/national level? Is it making progress overall and where do you think it might have the most impact?

Dr. David: In general, seagrass restoration is at its infancy stage. There are very few papers that have actually tried seagrass restoration so we're actually pushing for more existing seagrass protection instead and the way to do that is to show the community that having a thriving seagrass meadow is actually good for them. That story needs to be told, I think, over and over again. To find where it is most applicable, you need to take a look at seagrass distribution globally. It is in our region, the Southeast Asian region, that has the most extensive and highest diversity of seagrass so it's here that we can make the most difference.

Question No. 4 for Mr. Mizuno (IGES): Do you see yourself applying the tools of IGES like AP-PLAT within an ICM program? How would the government or local government deal with lack of data at smaller scales?

Dr. Mizuno: It was a very good experience for us to work with Guimaras Province in the Philippines; their ICM implementation was a great help in introducing adaptation pathways for the community. We observed that ICM promotes multi-sectoral engagement with multi-level integration and coordination where every sector has a responsibility. It provides a venue for stakeholder consultation in addressing priority concerns, including climate change, such as by implementing nature-based solutions. Based on this experience, we explored the possibility of replicating this exercise to other sites and countries. On your second question, information on climate change impacts is usually at the country, regional, or global scale. It's not detailed enough to fit into the specific needs of a particular community. Therefore, we recommend downscaling models for analyzing potential implications of climate change at the local level.

Question No. 4 for Dr. Mizuno (IGES): Is AP-PLAT open to collaboration with other groups in the East Asian Seas region? What are the best options for collaboration?

Dr. Mizuno: We work through three channels: development of scientific data, adaptation tools, and capacity-building, but in order to make them effective, we need to take stock on who is doing what. Ideally, we should first start a joint effort exercise to find potential areas of cooperation.

Follow up question for Dr. David (UP-MSI) and Dr. Mohammed (WorldFish): Do you have anything to add regarding collaborating with other organizations in the region in terms of ocean-based adaptation? What are the best options?

Dr. David: I think it does not need to always be a formal one. Exploratory talks are always welcome and designing of activities and opportunities should also already engage the locals and link up those who have data and resources. If you link communities that we've already been working with to institutions like IGES, then I think that will have a higher potential of working.

Dr. Mohammed: I think we need to challenge our current modalities in our partnerships in such that there is geo-contextualized approach in the way we do our scientific research. More specifically, research teams should be familiar with and value the local context, particularly the locals' concerns and expertise. This way, we don't have to talk about creating demand because the creators of whatever tool or service that we generate is already being championed by the locals.

Question No. 6 for all panel speakers: Access to finance seems to be a common problem in sustaining initiatives, particularly in local communities. What should local governments consider in accessing climate finance? How can regional institutions help? For example, there's a small NGO who wants to work in a specific community but they don't have the resources. Are there means for them to access it through your organizations?

Dr. David (UP-MSI): Democratizing data and having that readily available to everyone is very important as well as making sure that the tools that can be used on the ground are appropriately

addressing what the locals need. The hypothetical NGO in your example can consult local experts or institutions such as universities that focus on the marine environment.

Mr. Mizuno (IGES): Climate finance is usually designed to facilitate actions through national governments. The biggest climate finance available is the Green Climate Fund, which is designed to be utilized by national governments. Therefore, it is essential to have a close communication or synergies between the local governments and national governments so that local interests and priorities can be well reflected by the national government in the concerned country's adaptation plan or project design.

Question No. 7 for all panel speakers: How do we, as individuals, foster climate resilience? What can individuals do to help?

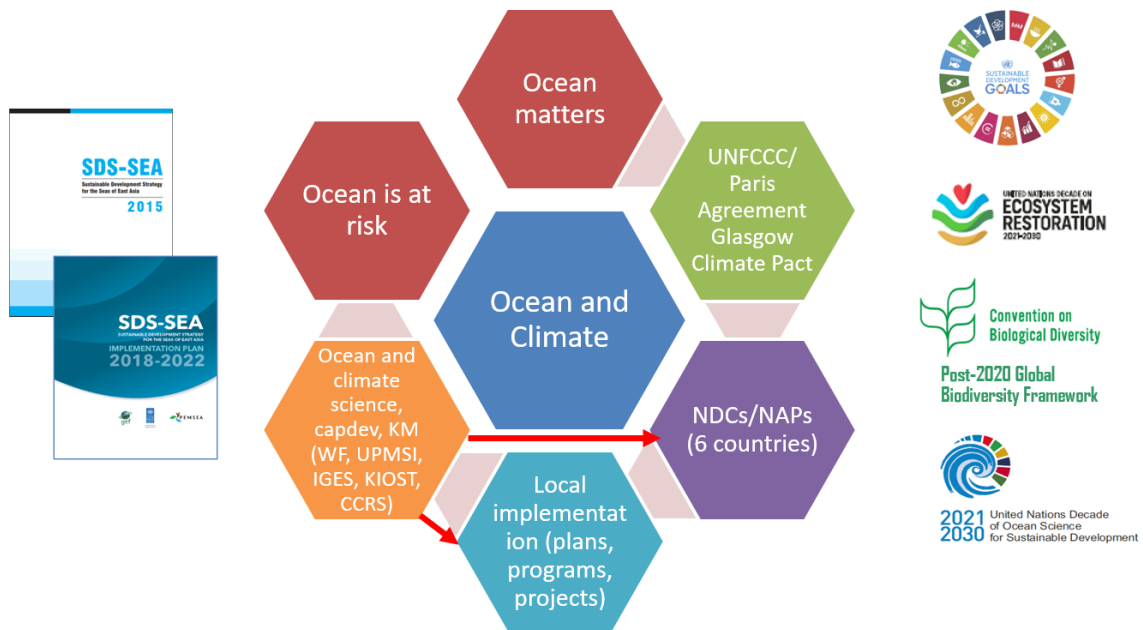
Mr. Mizuno (IGES): This is a very challenging question but there are several approaches that individuals can do. First of all, people first have to have a correct understanding of climate change. It's the foundation of any action. Everything starts with the correct understanding of climate reality. There are many people who are guided by intentional misinformation; therefore, it's very important to know exactly what is happening, including the serious implications of climate change. The second approach is having that individual affiliate himself with organizations, communities, and networks so that they can have a voice and means for action.

Dr. David (UP-MSI): You can only manage what you're familiar with so familiarize yourself with the environment. And if you are near the coastal area, drive to the coastal area, walk in the area to see what's there, and you'll be amazed of what you can gather just from doing that.

Dr. Mohammed: I agree that awareness raising is really key, but I also want to highlight that at the local level, I think it's not that communities are not aware. It's also not that communities are not already spending on climate action. We can see in their household expenditure all the expenses they have in terms of trying to insulate themselves from all the ill effects of climate change. I think the recognition of that is important, particularly as it significantly dwarfs the promise of climate finance that may or may not be felt at a local level. Therefore, it's all about enhancing the capabilities of communities at the grassroots. Let us not be overconsumed about high level stuff but also get down to the community and grassroots level.

8. CLOSING REMARKS

Ms. Nancy Bermas, Senior Programme Manager at PEMSEA Resource Facility, provided a summary of the key points raised during the dialogue as well as recommendations on the future steps towards implementing ocean-based solutions. She showed the following figure, illustrating the highlights and scope of the dialogue.



The Dialogue showed how ocean-based adaptation is integrated in development policies and action. Capacity building, access to ocean and climate science, tools, and methodologies, and knowledge management are among the important components that support ocean-based adaptation efforts.

The keynote presentation established ocean matters in climate change discourse and the ocean’s role in regulating the earth’s climate. It also established that the ocean, coastlines, and coastal communities are at risk as they are being proportionally impacted by increasing GHG emissions from human activities. Majority of the presentations actually provided information on the consequences of climate change and the ocean has the capacity for carbon storage and food and income generation.

The country presentations from Cambodia, China, Japan, Philippines, RO Korea, and Singapore revealed commonalities in terms ocean-based solutions. In summary, the six countries have emission reduction targets for 2030 and 2050 through their NDCs and NAPs and have established inter-agency and multisector mechanisms to coordinate and accelerate low carbon actions and ensure green economic recovery and blue economy development. The six countries have also enhanced the process of updating their 2015 NDCs and NAPs in alignment with current climate science and new adaptation-based knowledge and good practices. Furthermore, the countries understand the linkages between ocean, climate, biodiversity, and pollution. These linkages call for actions prioritizing the protection, conservation, and restoration of critical ocean and coastal ecosystems for blue carbon and blue economy development. These countries have also mainstreamed or began mainstreaming ocean-based adaptation solutions into their NDCs and NAPs.

On the other hand, the presentations in the afternoon covered several tools, methodologies, and innovations, including good practices on data and information management and knowledge sharing platforms, to mitigate risks and enhance coastal resilience. The following are the proposed collaborative actions that PEMSEA can consider in the formulation of the SDS-SEA IP 2023-2027:

- a. Harness opportunities provided by the Glasgow Climate Pact in accelerating ocean-based solutions by:
 - Conducting collaborative ocean-climate scientific research and studies
 - Facilitating data access and information sharing to support local policy and planning
 - Translating scientific data and information into user-friendly format
 - Facilitating the application of tools and methodologies to identify appropriate ocean-based climate solutions
 - Designing tools that are “fit for purpose” by assessing the demands and demonstrating the value of tools to be applied
 - Promoting science communication to enhance awareness and understanding of local communities on climate risks
 - Engaging the drivers of climate change (big companies) in identifying and implementing ocean-based solutions
 - Including aquatic food systems in NDCs
 - Promoting incentives for low carbon innovations and practices
 - Implementing pilot engagements on carbon crediting
 - Scaling up local experiences in co-production of local adaptation pathways
 - Facilitating the development of programs/approaches for climate financing focusing on the 3rd pillar on loss and damage in support of the current climate negotiations

- b. PEMSEA to serve as a platform to pursue the identified collaborative actions by forging partnerships at the regional, national, and subnational levels.

Concluding the event, Ms. Gonzales added that this Dialogue can help inform PEMSEA’s climate-ocean policy activities and that an article will be developed in time for the International Conference towards Net Zero Emission Policy and Practice that will take place in Ha Noi, Viet Nam on 5 October 2022. PEMSEA is also planning to echo the same dialogue with its network of local governments, focusing on strengthening coastal resilience towards building local sustainable blue economies. There is also a possibility of organizing a side event during UNFCCC COP 27 from 6 to 8 November 2022 to present the results of these dialogues as input to the ocean and climate annual dialogue of the UNFCCC.

ANNEX 1. PROGRAM.

Master of ceremonies: Ms. Daisy PADAYAO, Programme Manager, PEMSEA Resource Facility

Time (UTC+8)	Session	Speaker/s
9:00 am – 9:15 am	Opening remarks and context-setting	Mr. Arief YUWONO Chair, East Asian Seas Partnership Council
9:15 am – 9:30 am	Keynote address in support of Objective 1	Dr. Hyoun-Woo KANG Director, Ocean Climate Prediction Center, Korea Institute of Ocean Science and Technology
Part 1: Ocean-based solutions in NDCs and NAPs		
9:30 am – 10:20 am	Country presentations in line with Objective 2 10 min. per country	<p>Cambodia Ms. KHLOK Vichet Ratha Deputy Director, Department of Climate Change, General Directorate of Policy and Strategy, Ministry of Environment</p> <p>China Dr. LU Wenhai Chief, Division of Marine Ecology, National Marine Data and Information Service, Ministry of Natural Resources</p> <p>Japan Mr. Nobuhiro HIRASHIMA Director for International Ocean Affairs, Ocean Policy Division, Policy Bureau, Ministry of Land, Infrastructure, Transport and Tourism</p> <p>Lao PDR Mr. Souphasay KOMANY Director, Climate Change Policy Division, Department of Climate Change, Ministry of Natural Resources and Environment (Due to technical difficulties, Mr. Komany was not able to present during the Dialogue. A copy of his presentation is available in Annex 3.)</p>
10:20 am – 10:30 am	Break	
10:30 am – 11:20 am	Country presentations in line with Objective 2 10 min. per country	<p>Philippines Ms. Elenida BASUG OIC-Director, Climate Change Service, Department of Environment and Natural Resources (DENR); and Concurrent Director, DENR Gender and Development Office</p> <p>RO Korea Mr. Jin-Woo AHN</p>

Time (UTC+8)	Session	Speaker/s
		<p>Deputy Director, Marine Environment Policy Division, Marine Policy Office, Ministry of Oceans and Fisheries</p> <p>Singapore Prof. Dale BARKER Director, Centre for Climate Research Singapore</p> <p>Viet Nam Mr. Thanh Vu Tien (Due to technical difficulties, Mr. Thanh was not able to present during the Dialogue. A copy of his presentation is available in Annex 3.)</p>
11:20 am – 12:00 pm	Moderated discussion regarding Part 1 presentations	<p>Moderator: Dr. Antonio LA VIÑA Former Chair, East Asian Seas Partnership Council and Associate Director for Climate Policy and International Relations, Manila Observatory</p>
12:00 pm – 1:00 pm	Lunch break	
Part 2: Tools/mechanisms/practices related to ocean-based climate solutions		
1:00 pm – 1:20 pm	Towards a Shared Prosperity through Aquatic Food Systems under a Changing Climate	Dr. Essam Yassin MOHAMMED Interim Director General, WorldFish
1:20 pm – 1:40 pm	Reimagining our Response: Mitigating Risk and Enhancing Coastal Resilience	Dr. Laura DAVID Director, Marine Science Institute, University of the Philippines
1:40 pm – 2:00 pm	Towards a Resilient Future: Asia-Pacific Climate Change Adaptation Information Platform	Mr. Osamu MIZUNO Program Director, Adaptation and Water Area, Institute for Global Environmental Strategies
2:00 pm – 2:30 pm	Moderated discussion regarding Part 2 presentations	Ms. Aimee GONZALES Executive Director, PEMSEA Resource Facility
2:30 pm – 2:45 pm	<p>Closing remarks</p> <ul style="list-style-type: none"> • Summary of points raised in the presentations and discussion • Next steps 	<p>Ms. Nancy BERMAS Senior Programme Manager, PEMSEA Resource Facility</p> <p>Ms. Aimee GONZALES Executive Director, PEMSEA Resource Facility</p>

ANNEX 2. SUPPORTING FILES.

Video recording: <https://youtu.be/xJ5-aAwUCiA>

Presentation materials: <https://tinyurl.com/OceanRTD2022-Presentations>

ANNEX 3. LIST OF PARTICIPANTS.

Organizers and Resource Speakers

Country	Organization	Name	Position and Unit	Gender
Resource Persons				
Cambodia	General Directorate of Policy and Strategy	Ms. KHLOK Vichet Ratha	Deputy Director, Department of Climate Change	F
China	Ministry of Natural Resources	Dr. LU Wenhai	Chief, Division of Marine Ecology, National Marine Data and Information Service	M
Indonesia	East Asian Seas Partnership Council	Mr. Arief YUWONO	Chair	M
Japan	Ministry of Land, Infrastructure, Transport and Tourism	Mr. Nobuhiro HIRASHIMA	Director for International Ocean Affairs, Ocean Policy Division, Policy Bureau	M
	Institute for Global Environmental Strategies	Mr. Osamu MIZUNO	Program Director, Adaptation and Water Area	M
Malaysia	WorldFish	Dr. Essam Yassin MOHAMMED	Interim Director General	M
Philippines	Department of Environment and Natural Resources (DENR)	Ms. Elenida BASUG	OIC-Director, Climate Change Service, Concurrent Director, DENR Gender and Development Office	F
	University of the Philippines	Dr. Laura DAVID	Director, Marine Science Institute	F
	East Asian Seas Partnership Council	Dr. Antonio LA VIÑA	Former Chair	M
RO Korea	Korea Institute of Ocean Science and Technology	Dr. Hyoun-Woo KANG	Director, Ocean Climate Prediction Center	M
	Ministry of Oceans and Fisheries	Mr. Jin-Woo AHN	Deputy Director, Marine Environment Policy Division, Marine Policy Office	M
Singapore	Centre for Climate Research	Prof. Dale BARKER	Director	M
Organizers				
Philippines	Partnerships in Environmental Management for the Seas of East Asia	Ms. Aimee GONZALES	Executive Director	F
		Ms. Nancy BERMAS	Senior Programme Manager	F
		Ms. Karen SEE	Secretariat Coordinator	F
		Ms. Daisy PADAYAO	Programme Manager	F
		Mr. Thomas BELL	Programme Manager	M

Country	Organization	Name	Position and Unit	Gender
		Ms. Cristine Ingrid NARCISE	Policy and Result-Based Management Specialist, ATSEA-2 Project	F
		Ms. Diwata CAYABAN	Executive Assistant	F
		Mr. Rodante CORPUZ	IT Specialist	M
		Mr. Arsenio DACAYMAT, JR.	IT Assistant	M

Attendees

Country	Organization	Name	Position and Unit	Gender
Cambodia	Ministry of Environment (MOE)	Mr. Sith Roath	Deputy Director General, General Directorate of Environmental Protection (GDEP)	M
India	United Nations Development Programme	Mr. Binod Sethi	Climate Change Mobilizer	M
Indonesia	Coordinating Ministry of Maritime Affairs and Investment of the Republic of Indonesia (CMMAI-RI)	Mr. Muhammad Nur Baskoro Adi	Policy Analyst in the Office of the Assistant Deputy Minister for Navigation and Maritime Safety	M
	Kementerian Lingkungan Hidup dan Kehutanan	Mr. Yousef Rio Gunawan	Pengendalian Pencemaran dan Kerusakan Lingkungan	M
	Kementerian Lingkungan Hidup dan Kehutanan (KLHK)	Mr. Fahmi Octavialdo	Direktorat Jenderal Pengendalian Pencemaran dan Kerusakan Lingkungan	M
	Ministry of Environment and Forestry	Ms. Zulfa Rohadatul Aisy	Directorate General of Pollution Control and Coastal and Marine Damage	F
	Ministry of Environment and Forestry	Mr. Kristoforus Satya Anggara	Deputy Director of Pollution and Environmental Damage Control	M
	Ministry of Environment and Forestry	Ms. Novy Farhani	Directorate of Coastal and Marine Pollution and Degradation Control	F
	Ministry of Environment and Forestry	Ms. Nur Isna Khairunnisa	Directorate General of Pollution and Environmental Damage Control	F
	Ministry of Environment and Forestry	Mr. Iwan Nirawandi	Senior Environmental Counselor, Directorate of Coastal and Marine Pollution and Degradation Control	M

Country	Organization	Name	Position and Unit	Gender
	Ministry of Environment and Forestry	Mr. Dwiyono Yanuar Yusbawanto	Directorate of Coastal and Marine Pollution and Degradation Control	M
	Ministry of Marine Affairs and Fisheries	Ms. Cynthia Aryshandy	Directorate General of Marine & Fisheries Product Competitiveness	F
	Regional Capacity Center for Clean Seas (RC3S)	Mr. I Ketut Aditya Krisna Laharjana	Staff	M
	Regional Capacity Center for Clean Seas (RC3S)	Mr. Nidzar Muhamad Rafly	Analys Data, Monitoring and Evaluation	M
Japan	Japan Agency for Marine-Earth Science and Technology (JAMSTEC)	Dr. Yoshihisa Shirayama	Science Advisor, RIGC	F
Kenya	Coordinating Body on the Seas of East Asia (COBSEA)	Ms. Margarita Victoria Caballa	UN Volunteer	F
	Hydro Victoria Fish Hatchery Farm Ltd	Mr. Fredrick Juma	Managing Director- Aquaculture Division	M
Malaysia	Malaysian Nuclear Agency	Mr. Norfaizal Bin Mohamed	Research Officer, Waste and Environmental Technology Division	M
	Spartan Maritime (M) Sdn Bhd	Ms. Ainiz Zakirah, Mohamad Fauzi	Associate / Risk Analytics & Advisory	F
	Universiti Sains Malaysia (USM)	Professor Aileen Shau Hwai Tan	Director, Centre for Marine and Coastal Studies (CEMACS)	F
Myanmar	Environmental Consultant	Mr. Min Maw	Senior Director	M
New Zealand	N/A	Ms. Charmie Celeste G. Encarnacion	Freelance Environment and Sustainability Consultant	F
	N/A	Ms. Charmie Celeste G. Encarnacion	Freelance Environment and Sustainability Consultant	F
Philippines	Aklan State University - New Washington Campus	Ms. Beverly Jaspe	Faculty	F
	Barangay Wack-wack Greenhills East	Mr. Edwin Dona	Barangay Staff	M
	Benguet State University (BSU)	Mr. Sundoval Cortez	Lecturer; College of Natural Sciences	M
	Cansojong Youth Leaders	Mr. Zyke Daniehl Villanueva	Public Information Officer	M

Country	Organization	Name	Position and Unit	Gender
	Capiz Provincial Environment and Natural Resources Office - CaPENRO	Mr. Francis Jan Dariagan	Administrative Officer	M
	Catanduanes State University	Ms. Ma. Cecilia Arcilla	Associate Professor/ College of Arts and Sciences	F
	CDSA TAGUIG	Mr. Jimmy Cipriano Uy Jr.	Teacher	M
	CENRO San Pablo City	Ms. Juvie Reyes	Environmental Management Specialist II	F
	De La Salle Lipa	Ms. Jocelyn L. Caro	Faculty member	F
		Mr. Edward F. Gonzales	Biology department, Chemistry Courses Lecturer	M
		Prof. Richard M. Magsino	Assistant Professor, Biology Department	M
		Ms. Vivienne Rhea S. Padura	Faculty/Biology Department and Science Area	F
		Ms. Catherine M. Precioso	Faculty/ CEAS-Biology	F
		Ms. Grace C. Sanchez	Faculty / Bioscience	F
	Department of Environment and Natural Resources	Ms. Danica Lyn Bitel	Development Management Officer / Foreign-Assisted and Special Projects Service	F
		Ms. Kathleen Dominique R. Cornejo	Development Management Officer II, Climate Change Service	F
		Ms. Rolette Huelva Cortes		F
		Ms. Micah De Leon	Development Management Officer/Climate Change Service	F
		Ms. Vanessa Isabel A. De Vera	TSD - RPS	F
		Engr. Ma. Patricia O. Libo-on	PMEO - Enforcement and Monitoring Division	F
		Mr. Jello D. Ortega	Development Management Officer I	M
		Ms. Khasmer B. Marbella	Project Monitoring and Evaluation Officer/Foreign-Assisted Special Projects and Services	F
		Ms. Hannah Louise Ritual	Project Evaluation Officer II, Foreign-Assisted and Special Projects Service	F

Country	Organization	Name	Position and Unit	Gender
		Mr. Jerone Anthony R. Torres	Project Monitoring and Evaluation Officer, GIS Specialist/Manila Bay Coordinating Office	M
	Department of Environment and Natural Resources - Foreign Assisted and Special Projects Service (DENR-FASPS)	Mr. William Romeo G. Bayhon III	Project Preparation Division	M
		Ms. Noreen Eborde	Project Support Officer / Project Preparation Division - Foreign Assisted and Special Projects Service (PPD - FASPS)	F
	Department of Natural Sciences, Philippine Military Academy	Ms. Anni Salinas	Assistant Professor, Department of Natural Sciences	F
	Ecosystems and Research Development Bureau	Ms. Raneer Christina M. Telosa	Science Research Analyst MRDS/CZFERD	F
	Environmental Management Bureau XII	Ms. Jezreel D. Catedrilla, MIE, MPA	Planning Officer II, Office of the Regional Director	F
	Environmental Management Bureau - National Capital Region	Ms. Joanna Gonzales	Environmental Management Specialist - Environmental Monitoring and Enforcement Division	F
	Environmental Management Bureau	Ms. Jessica E. Sapasap	EMS I/EMED	F
	Jollibee Worldwide Services Pte Ltd	Ms. Dara Chelsie Jade Relos	Environment and Safety Specialist, Environmental Management Unit	F
	Kidapawan Doctors College, Inc.	Mr. Nestorio li D. Felerino	Research and Extension Department	M
	LGU Naic	Ms. Jesusa Vilburn	Admin Aide IV / MENRO	F
	MAMATFA	Mr. Jireh Ragas Labadan	Board Secretary	M
	McKeough Marine Center	Ms. Astrid Sinco	Director	F
	MASER ROVER SCOUT	Mr. Edwin Jhet Dona	ROVER SCOUT	M
	Mines and Geosciences Bureau	Ms. Joceroze Gatchalian	Cartographer II/MGSD	F
	Pampanga State Agricultural University	Mr. Immanuel Domingo	Department of Forestry and Agroforestry	M
	Partnership in Environmental Management for the	Ms. Aiyinna Mikaela Mape	Project Coordinator - Cavite	F
		Mr. Reagan Pangilinan	PEMSEA Project Coordinator - Cavite	M

Country	Organization	Name	Position and Unit	Gender
	Seas of East Asia (PEMSEA)			
	Philippine Institute of Environmental Planners	Mr. Elmer Mercado	Fellow	M
	Philippine Ports Authority	Mr. Suzie M. Huelgas	Port Services Division	M
	President Ramon Magsaysay State University (PRMSU)	Ms. Reymarie B. Bonilla	Student	F
		Ms. Alyanna Mariko Esconde	BS Biology Student	F
		Ms. Ime Misa	Student	F
	PrimeWater Camarines Norte (PWCN)	For. Frank Herry Sampilo	Forester/Environmental Management & Protection Section Chief/Water Quality & Environmental Management & Protection Department	M
	Provincial Environment and Natural Resources Office of Davao del Norte	Mr. Abangin Vinrad	Environmental Management Specialist 1	M
	Provincial Government of Cavite	Ms. Ronalyn Pangilinan	Environmental Management Specialist II / Provincial Government-Environment and Natural Resources Office	F
	Southern Luzon State University	Ms. Cecilia Alexis T. Endaya	Staff	F
	Southern Luzon State University-Judge Guillermo Eleazar	Ms. Manirose Lucban	Part-time Lecturer/ College of Fisheries and Aquatic Sciences	F
	Southern Luzon State University	Dr. Imelda A. Tangalin	Academic Affairs Office	F
	University of Philippines Tacloban	Ms. Ladylyn Lim Mangada	Associate Professor	F
	University of the Philippines Visayas Tacloban College (UPVTC)	Mr. Rodrigo Dejeto	Asst. Professor/ Division of Natural Sciences and Mathematics	M
	WeGen Energy Philippines	Ms. Ina Alleco R. Silverio	Manager, Social Transformation Department	F
	Xavier University - Ateneo de Cagayan	Mr. James Martin Ambat	N/A	M
	Rare	Ms. Joyce Barafon	Policy and Partnerships Adviser	F
	University of the Philippines Visayas	Mr. Aldwin Silfavan	Student - College of Fisheries and Ocean Sciences	M

Country	Organization	Name	Position and Unit	Gender
	No information provided	Ms. Hazel Sophia, Agudera		F
		Ms. Jastine Dharden Hipolito	Student/College of Arts and Sciences	F
		Mr. Mickyle Jeob Mangada		M
		Dr. Marius L. Panahon	Lecturer	M
RO Korea	Korea Marine Environment Management Corporation	Ms. Haemin Jung	International Affairs Team	F
Singapore	Centre for Climate Research Singapore (CCRS)	Mr. Dale Barker	Director	M
	Centre for International Law, National University of Singapore	Ms. Danielle Yeow	Adjunct Senior Research Fellow, Lead Climate Law and Policy	F
Timor-Leste	Sustainable Ocean Alliance Timor-Leste	Mr. Delio Da Costa	Environment & Ocean Program	M
Viet Nam	Da Nang Department of Natural Resources and Environment (DONRE)	Ms. Trang Vu Hoang LE	Official, Da Nang Agency of Sea and Islands	F
	Eco-friendly flexible film production base in Viet Nam	Mr. Dave Nguyen	Business Development	M