PEMSEA

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Proceedings on the 2nd Blue Carbon Meeting

05-06 June 2025

Haikou, Hainan, China

Proceedings of the 2nd Blue Carbon Technical Working Group Meeting

Haikou, Hainan Province, People's Republic of China
5-6 June 2025 | 9:00 - 17:00 GMT+8

Introduction

I. The PEMSEA Resource Facility (PRF), in partnership with the National Marine Hazard Mitigation Service, Ministry of Natural Resources (NMHMS/MNR), convened the 2nd Blue Carbon Technical Working Group Meeting on 5–6 June 2025 in Haikou, Hainan Province of China. The meeting was attended by nearly 60 experts and stakeholders on blue carbon from 11 countries in the EAS region and beyond. The PRF Secretariat served as the Secretariat for the meeting. Online participants included members of the PEMSEA Network of Learning Centers and other Blue Carbon experts from the region.

II. Supporting documents may be found in the Annexes:
   A. Annex 1 - Provisional Programme
   B. Annex 2 - Presentation, meeting documents, and photos
   C. Annex 3 - List of participants

1. Opening of the Meeting

1.1. PRF Secretariat Coordinator, Ms. Abigail Cruzada opened the 2nd Blue Carbon Technical Working Group Meeting by acknowledging all participants attending both onsite and online. She then called on Ms. Aimee Gonzales, Executive Director of the PEMSEA Resource Facility and Dr. Guodong Xu, the Director of the National Marine Hazard Mitigation Service of the Ministry of Natural Resources of China to deliver their opening remarks.

1.2. Ms. Gonzales opened the Second Meeting of the PEMSEA Blue Carbon Technical Working Group in Haikou, China, noting that it coincided with World Environment Day. She welcomed the participants from across the East Asian Seas region and acknowledged key sponsors including the China Oceanic Development Foundation and China Green Carbon Foundation.

1.3. Her opening remarks outlined the meeting's focus on developing a regional blue carbon program centered on three pillars: standardizing accounting and monitoring methodologies for mangroves, seagrass beds, and tidal marshes; testing these methodologies at pilot sites; and creating a comprehensive knowledge exchange platform to serve as a repository of regional expertise.

1.4. She emphasized that this ambitious initiative requires substantial cooperation and resources to complement existing national efforts, with future expansion planned to include certification processes, fundraising, and blue carbon trading mechanisms that will provide sustainable financing and economic incentives for coastal communities.

1.5. She concluded by reaffirming PEMSEA's commitment to facilitating these discussions and transforming the blue carbon commitments made under the Xiamen Ministerial Declaration into concrete, measurable actions for ecosystem protection and climate resilience.

1.6. Complementing Ms. Gonzales' remarks, Dr. Xu emphasized the historical significance of the location where the Haikou Partnership Agreement was signed twenty years ago, establishing PEMSEA's coordinating role in the Sustainable Development Strategy for the Seas of East Asia. He highlighted China's commitment to carbon peak and carbon neutrality goals, detailing the government's comprehensive approach through the "Guiding Opinions on Consolidating and Enhancing Marine Carbon Sink Capacity," which includes technical standards for blue carbon investigation and monitoring, assessments at over 40 sites of mangroves, seagrass beds, and salt marshes, and integration of blue carbon ecosystem protection into nationally determined contribution targets.

1.7. Dr. Xu outlined his organization's commitment as a new member of the East Asian Seas Partnership Council to actively promote regional blue carbon ecosystem protection, assist in building monitoring networks, strengthen international cooperation and personnel exchange, and enhance technical capabilities for carbon storage investigation and certification systems reliability, while expressing gratitude to the China Ocean Development Foundation, China Green Carbon Foundation, and local Hainan institutions for their support in making the meeting possible.

1.8. Following the welcome remarks, co-sponsors of the event delivered their congratulatory remarks. Dr. Xinchun Pan, Vice Council Chair and Secretary General of the China Oceanic Development Foundation delivered a comprehensive speech on advancing blue carbon initiatives to combat climate change. His speech emphasized that blue carbon work represents a crucial new endeavor for addressing global warming and ecological degradation, highlighting the ocean's role as a massive carbon reservoir that absorbs one-third of global CO_2 emissions annually.

1.9. Dr. Pan's address outlined the China Ocean Development Foundation's extensive domestic and international efforts, including support for research on marine ecosystems, eight years of national beach cleanup activities, collaboration with 20 Belt and Road coastal countries on marine spatial planning, and backing major projects like the Ocean Negative Carbon Emission International Big Science Program.

1.10. Dr. Pan concluded with a recommendation for PEMSEA to focus on seven key areas: conducting resource surveys and carbon accounting, protecting and restoring blue carbon ecosystems, advancing carbon storage technologies, developing market mechanisms for blue carbon trading, cultivating the blue carbon economy, strengthening international cooperation, and establishing supportive policy frameworks to integrate blue carbon solutions into global climate change responses.

1.11. Mr. Yuanqing Hou, Vice Secretary General of the China Green Carbon Foundation, highlighted the urgent need for international cooperation in blue carbon development to address climate change uncertainties. He highlighted the foundation's 15-year evolution since 2010 from focusing solely on terrestrial carbon sequestration to expanding into marine ecosystems following institutional reforms in 2018, and outlined three key expectations for the symposium: the need for collaborative efforts to develop standardized blue carbon measurement and monitoring systems, which would create the foundation for global carbon sequestration standards, exploring the possibility of establishing innovative blue carbon market trading systems and explore the possibility of innovative blue carbon offset mechanisms, providing high-quality, scientific, authentic, effective blue carbon sequestration quantities with ensured MRV (Measurement, Reporting, Verification) to countries, local governments, and enterprises for carbon neutrality, and creating investment and financing mechanisms to mobilize social capital for coastal ecosystem protection and restoration to ensure additionality.

1.12. He concluded by expressing the foundation's commitment to deeper collaboration with PEMSEA and East Asian Seas countries, emphasizing the need for knowledge sharing, capacity building, and both market and non-market mechanism innovations to support sustainable coastal development and contribute "Eastern wisdom" to global climate governance.

1.13. Mr. Yansheng Guo, Deputy Director General of the Hainan Ecology & Environment Bureau, highlighted Hainan's progress in ecological civilization and blue carbon development. He highlighted Hainan's strategic position as a tropical island with abundant blue carbon resources like mangrove forests and seagrass beds, noting the establishment of the Hainan International Blue Carbon Research Center, which has achieved significant advances in blue carbon surveys, pilot projects, standard development, and international cooperation with institutions across Singapore, Indonesia, Australia, and UN programs.

1.14. As Hainan prepares for its 2025 Free Trade Port customs closure and leverages its strategic location at the intersection of ASEAN and Southeast Asian economic circles, he called for enhanced regional cooperation in blue carbon monitoring networks, carbon credit accounting, and management policies to contribute to global climate governance and sustainable blue carbon development.

1.15. Ms. Cruzada thanked the speakers for their remarks and proceeded to provide a brief background on the PEMSEA Blue Carbon program and how it was developed. She then called on Ms. Maida Aguinaldo, Training and Capacity Development Officer at PEMSEA, to present the objectives and agenda of the meeting.

1.16. Ms. Aguinaldo highlighted the following expected outcomes and outputs of the meeting: The meeting aimed to:

- Draw consensus on the governance framework of an innovative Blue Carbon Ecosystem Services Management Mechanism (Draft 0) and the requirements to operationalize a regional blue carbon certification program.

- Improve understanding and consensus building among BC-TWG members on the draft regional blue carbon accounting protocol.

1.17. Expected outcomes of the meeting include:

- Refined concept of a Blue Carbon Ecosystem Services Management Mechanism, including a blue carbon stock monitoring network.

- Refined regional blue carbon accounting protocol.

- Refined workplan for 2025 and 2026 for review, guidance and/or approval at the 17th EAS PC in July 2025.

1.18. **Summary of Opening Ceremony**: The Second Meeting of the PEMSEA Blue Carbon Technical Working Group opened with acknowledgements to participants and co-sponsors, setting the tone for a collaborative and forward-looking discussion on advancing regional blue carbon initiatives. Opening remarks highlighted the importance of developing standardized methodologies, pilot testing, and establishing a knowledge-sharing platform to support climate action and coastal resilience. Co-sponsors emphasized the need for robust MRV systems, innovative financing and market mechanisms, and stronger regional cooperation. The session also outlined the meeting's objectives: to refine the draft Blue Carbon Ecosystem Services Management Mechanism and accounting protocol, and to finalize the 2025–2026 workplan for endorsement at the upcoming EAS Partnership Council meeting.

2. Session 1: PEMSEA Blue Carbon Program - setting the scene

2.1. Following the opening ceremonies, the meeting proceeded to the technical session, beginning with a scene-setting on the PEMSEA Blue Carbon (BC) Program. Mr. Yinfeng Guo, Chief Expert for International Cooperation of the National Marine Hazard Mitigation Service, and moderator of the session, contextualized the PEMSEA Blue Carbon (BC) Program within global and regional environmental frameworks,

emphasizing the strategic role of blue carbon ecosystems (BCEs) in achieving climate and biodiversity targets.

2.2. Following the introduction to Session 1, Dr. Keita Furukawa, Chair of the PEMSEA Blue Carbon Technical Working Group and Chair of the East Asian Seas Partnership Council Technical Session presented the overview of the PEMSEA Blue Carbon Ecosystem Services Management Mechanism and Roadmap (BCESMMR) and made the following points:

2.3. There is a need to align blue carbon efforts with global frameworks such as the Ramsar Convention, Paris Agreement, Sendai Framework, and the Kunming-Montreal Global Biodiversity Framework as these call for the mapping, conservation, and restoration of blue carbon ecosystems (BCEs), as well as their integration into national greenhouse gas inventories following IPCC guidelines.

2.4. The PEMSEA Blue Carbon program supports the climate and biodiversity targets outlined in PEMSEA's 2023–2027 SDS-SEA Implementation Plan and contributes to the four strategic pillars: effective governance, healthy oceans, healthy people, and healthy economies. Advancing blue carbon initiatives through standardized assessments, ecosystem restoration, and community engagement supports climate adaptation, sustainable blue economies, and access to carbon finance.

2.5. The PEMSEA Blue Carbon Ecosystem Services Management Mechanism and Roadmap (BCESMM), which was developed as a strategic framework to implement the program, outlines a voluntary, region-wide mechanism to quantify, certify, and trade ecosystem services provided by blue carbon ecosystems such as mangroves, seagrass beds, and tidal flats. It is designed to be a non-legally binding mechanism that could serve as a reference model for national laws and institutions, guide the regulation and sustainable use of BC ecosystems and align with international environmental agendas. In the long term it aims to enable the development of a cross-border blue carbon credit market through legal and institutional harmonization.

2.6. The design is grounded in core principles that aim to ensure effectiveness, equity, and sustainability. These include:

- Integrated management, recognizing that blue carbon ecosystems are interconnected with broader coastal and marine systems, requiring coordination across sectors and scales;

- Adaptive management and phased implementation, enabling countries and partners to progressively build capacity and refine approaches over time based on lessons learned and evolving science;

- Recognition and respect for national circumstances, allowing for flexibility in implementation while maintaining consistency in overall direction and goals;

- Collaborative partnership, where implementation is co-owned by PEMSEA's Country and Non-Country Partners, local governments, learning centers, and communities;

- Gender equity and inclusive societies, ensuring that blue carbon actions benefit and involve all stakeholders, particularly marginalized groups, women, and youth; and

- The precautionary principle, promoting timely action to protect blue carbon ecosystems even in the face of scientific uncertainty, recognizing that delays may result in irreversible losses.

2.7. At its core, the **goal** of the BCES Mechanism is to contribute to sustainable development in the EAS region through the **conservation and wise use of blue carbon ecosystems**, such as mangroves, seagrass beds, tidal flats, and seaweed/kelp areas.

2.8. The mechanism has four **key objectives**:

- **Support climate change mitigation and adaptation efforts** by promoting the role of blue carbon in sequestering greenhouse gases;

- **Halt biodiversity degradation** by conserving ecologically vital coastal ecosystems;

- **Reduce disaster risks** by enhancing natural buffers such as mangroves and seagrasses; and

- **Promote human well-being and equity** by ensuring inclusive benefits from ecosystem services.

2.9. Key actors who will implement the mechanism were identified:

- East Asian Seas (EAS) Partnership Council (PC) will provide oversight and guidance on the program, through the PEMSEA Blue Carbon TWG;
- PEMSEA Resource Facility (PRF) will provide secretariat functions and coordination amongst all stakeholders;
- PEMSEA Network of Learning Centers (PNLC) will supply scientific expertise and technical support;
- PEMSEA Network of Local Governments (PNLG) will implement practical conservation and restoration projects; and
- PEMSEA Network of Young Leaders (PNYL) will ensure intergenerational participation and capacity building.

2.10. To operationalize these objectives, the framework proposes a phased and flexible approach through a roadmap(Figure 1) comprising four key components: reporting (assessment of BCES), certification (peer-reviewed validation), recording (centralized

data repository), and market creation (facilitating voluntary and compliance credit trading). Dr. Furukawa emphasized that the components will be implemented in parallel.

Timeline	BCES Reporting	BCES Certification	BCES Recording	BCES Marketing
Immediate (2023-2025)	- The supply of blue carbon in PEMSEA's ICM learning sites, with the help of PNLC and PNLG members, has been assessed - Basic protocol of State of Blue Carbon Ecosystem Service Status (SOBCE) has been developed	- An outline on BC certification has been prepared for mangrove forests and seagrass beds - An outline on BC certification has been studied for seaweed/kelp bed, aquaculture, and tidal flat	- A basic database of BC ecosystem services has been designed	- A market demand study on blue carbon ecosystems has been done
Medium-term (2026-2029)	- Blue carbon in each country has been assessed - SOBCE has been implemented in each country	- BC certification process has been implemented with third-party certificate committee	- A basic database of BC ecosystem services has been implemented	- Closed market for partners has been implemented
Long-term (2030-2034)	- Blue carbon supply status and future projection have been assessed - Updates of SOBCE	- The BC certification process has been open for the global arena	- An advanced database of BC ecosystem services has been designed/implemented	- An open market for the EAS region has been implemented

Figure 1. BCES Management Roadmap

2.11. The BCES reporting system adopts a three-tiered methodology to accommodate varying national capacities and data availability:

- Tier 1: Uses default values by multiplying the area of blue carbon ecosystems and known constituent species with standardized coefficients. This provides a basic, accessible entry point for countries with limited data.

- Tier 2: Enhances assessments by incorporating species-specific growth densities, offering more refined estimates tailored to local conditions.

- Tier 3: Involves comprehensive, site-specific measurements and scientific studies for the most accurate and credible reporting. This tier is suited for countries or sites with strong technical capacity and data systems.

2.12. This tiered system allows flexibility, enabling progressive improvement over time while ensuring early participation across the region.

2.13. All reported data—particularly State of Blue Carbon Ecosystem (SOBCE) assessments—must undergo **independent third-party certification**. This peer-review process ensures scientific credibility and transparency. Only certified results can proceed to the recording and credit issuance stage.

2.14. Once certified, BCES credits will be recorded in a **centralized public database**, the main repository of which is still under discussion. This transparent system ensures traceability, credibility, and access for potential market participants and regulators.

2.15. The certified and recorded credits become eligible for trade in a structured blue carbon market, evolving from closed partner systems to a broader regional platform:

- A matching platform connects credit producers with potential buyers. Upon entering the market, participants must accept the ambition to contribute to increasing regional welfare and the responsibility of protecting BCEs.

- **Contracts** are co-developed by credit creators and purchasers.

- **Operational and management costs** are borne by market participants (e.g., through transaction-based fees), promoting long-term financial sustainability.

2.16. This market-based approach supports conservation financing and incentivizes sustainable practices, while ensuring that trading is rooted in scientifically verified and socially responsible outcomes.

2.17. To ensure the sustainability of the Mechanism, Dr. Furukawa outlined the partner roles in reporting, science support, implementation and coordination (Table 1).

Table 1. Stakeholder Roles in PEMSEA BC Program

Sector	**Role**
PEMSEA Partners (Country Partners)	Reporting National SOBCE. Using the mechanism to integrate BCEs in their respective NDCs
PEMSEA Partners (Non-Country Partners) and PNLC	Supply Scientific Knowledge
PRF	Secretariat for the mechanism
PNLG	Implementing BCE

2.18. The proposed mechanism for financially sustaining each component of the BC mechanism was also outlined in Table 2.

Table 2. Financial Sustainability

Mechanism	**Main fund bearers**
Reporting	- National governments and producers of BC ecosystem services - Technical support will be provided as a service of the PEMSEA network
Certifying	- Producers of BC ecosystem services - When credits are traded, a portion of the amount will be

		paid as certification fees
Recording	-	PEMSEA general accounting (contributions from each country)
Marketing	-	Participants in BC ecosystem services (purchasers and producers) - A portion of the credits traded will be collected as management fees

2.19. Other factors to ensure sustainability of the PEMSEA blue carbon ecosystems management mechanism including:

- Establishing transparent problem-solving methods through regular meetings and open discussions to make adjustments and amendments to rules and mechanisms as needed;
- Developing comprehensive capacity building programs that provide training and awareness-raising opportunities for market participants, potential buyers, and stakeholders, supported by independent budgets in cooperation with governments, PNLC, and non-country partners; and
- Prioritizing Gender Equality and Social Inclusion (GESI) and stakeholder engagement as emphasized in the SDS-SEA Implementation Plan 2023-2027, with a focus on driving future social transformation beyond carbon market mechanisms.

2.20. **Session 1:** The session introduced the draft PEMSEA Blue Carbon Ecosystem Services Management Mechanism and Roadmap (BCESMMR), a voluntary, region-wide framework designed to quantify, certify, and trade ecosystem services from blue carbon ecosystems in response to climate change, biodiversity loss, and disaster risks in the East Asian Seas region. The mechanism emphasizes scientific credibility, transparency, and inclusivity, featuring a tiered reporting system, independent certification, centralized data recording, and a structured credit market. It aims to align with national and international goals by supporting NDC integration, promoting sustainable livelihoods, and ensuring gender and social inclusion. Clear roles for PEMSEA partners, local governments, learning centers, and youth networks were outlined, alongside a financing model to ensure long-term sustainability.

2.21. **Recommendations (as outlined in Dr. Furukawa's presentation)**:

2.22. Develop a regionally tailored and science-based BCES management system that reflects the unique ecological and institutional contexts of the EAS region and enables credible reporting, certification, and trading of blue carbon ecosystem services.

2.23. Strengthen cooperation across PEMSEA networks to ensure coordinated implementation, enforcement, and mutual accountability for the operationalization of the BCES management system at national and local levels.

2.24. Maintain and regularly update standalone technical guidelines to support consistent application of methodologies, incorporate evolving science, and ensure alignment with international carbon accounting standards.

2.25. Promote shared financial responsibility among participating countries and stakeholders by contributing to the core functions of the mechanism, including certification, registry maintenance, and capacity building.

2.26. Institutionalize regular review meetings to assess progress, adjust roles and procedures, and ensure the BCES mechanism remains adaptive, effective, and stakeholder driven.

2.27. Embed capacity development, gender equality, and inclusive stakeholder engagement across all phases of the mechanism to ensure equitable participation and benefits, leaving no one behind.

3. Session 2: Regional planning for BC ecosystems conservation, management, restoration, and stock assessment

3.1. The session brought together key resource persons from PEMSEA's networks and partner institutions to share current efforts, case studies, and scientific updates related to the conservation, management, and assessment of blue carbon ecosystems (BCEs) in the region. Presentations were delivered by Ms. Casandra Tania (PEMSEA), Dr. Milica Stankovic (Prince of Songkla University), Dr. Maria Lourdes San Diego-McGlone (University of the Philippines – Marine Science Institute), and Dr. Yuxing Wang (NMHMS). The session was moderated by Mr. Yinfeng Guo of NMHMS.

3.2. ***Status of Blue Carbon Ecosystems in ICM Sites in the EAS Region***

3.3. Ms. Cassandra Tania presented the findings of the BC supply study in the EAS region. The study was based on a survey participated by PEMSEA Network of Local Governments (PNLG) and PEMSEA Network of Learning Centers (PNLC), as well as a desktop review of available State of the Coasts (SOC) reports which contained information on available BCE programs in the sites.

3.4. The objectives of the report were to (1) confirm the presence and condition of BCEs in ICM/PNLG sites; (2) assess current management practices and support systems in those areas; and (3) evaluate interest in developing and implementing Blue Carbon programs.

3.5. The study covered five BCE types: mangrove forests, seagrass meadows, salt marshes, seaweed beds, and tidal flats. Mangrove forests and seagrass meadows were

the most frequently reported, with area coverage ranging from small patches to tens of thousands of hectares. These ecosystems are primarily used for fishing, aquaculture, and tourism, with fisherfolk, coastal communities, and tour operators identified as the main user groups. While most BCEs are located on public lands, some sites reported overlapping claims and user conflicts.

3.6. In terms of management, most sites indicated the presence of initiatives such as marine protected areas (MPAs), locally managed marine areas (LMMAs), and integrated coastal management (ICM). Ramsar site designations also support seagrass conservation. Laws and regulations are in place in several areas, though enforcement remains inconsistent. Mangroves and seagrasses were observed as the most actively managed ecosystems. However, challenges persist, including fragmented governance, limited enforcement capacity, financial and manpower constraints, environmental pressures (e.g., pollution, climate change), and lack of data.

3.7. All surveyed sites expressed interest in advancing Blue Carbon initiatives. Many are already undertaking conservation and restoration efforts, while others are exploring opportunities in carbon crediting and trading. Proposed projects include BCE restoration, conservation, assessment, management planning, income generation, community awareness, and capacity building.

3.8. The report indicated key gaps and challenges as follows:

- On governance and enforcement, fragmented institutional arrangements, stakeholder conflicts, and lack of effective planning and law enforcement hinder sustainable BCE management;
- On capacity and resources, there is limited technical and financial capacity for monitoring and enforcement;
- On environmental pressures and climate change, impacts from invasive species, sea level rise, ocean acidification, and extreme weather events further exacerbate BCE biodiversity loss; and
- On data and knowledge gaps, there is inadequate baseline information and low public awareness on the significance of BCEs.

3.9. Recommendations from the study include:

- Conducting more detailed BCE assessments using standardized protocols, starting with PEMSEA partner sites (ICM, PNLG, and PNLC).
- Exploring the potential of underrepresented ecosystems such as salt marshes, seaweed beds, and tidal flats in the region.
- Identifying market-side needs to inform supply-side project design and implementation.
- Supporting ongoing and proposed BCE restoration, conservation, and assessment projects.
- Providing or developing local expertise in carbon crediting and trading through partnerships with established organizations.

3.10. The importance of strengthening data collection, management capacity, and stakeholder engagement to unlock the full potential of Blue Carbon ecosystems in the EAS region.

3.11. ***Status of Blue Carbon Science in the Region***

3.12. Dr. Milica Stankovic presented an overview of the current state of blue carbon science across the East Asian and South Asian regions. Her presentation focused on the availability and quality of data on key blue carbon parameters such as carbon stock, sequestration, greenhouse gas (GHG) flux, and biomass and sediment dynamics, particularly in mangrove and seagrass ecosystems.

3.13. It was indicated that despite the growing importance of blue carbon ecosystems in climate mitigation, substantial data gaps persist. Seagrass data is notably missing in majority of countries, and many lack accurate assessments of carbon stocks and GHG fluxes. Much of the existing data is sourced from a limited number of regional or global studies, and in several countries such as Timor-Leste, Bangladesh, Brunei, Cambodia, and Sri Lanka core blue carbon data remains unavailable or inconsistent. She mentioned that there are blue carbon data present in global models but not localized.

3.14. An overview was provided of spatial and temporal monitoring approaches currently used. Remote sensing technologies—particularly satellite and drone imagery—are most common, while tools such as LiDAR and SONAR remain underutilized and the most expensive. Notably, SONAR, which is effective in turbid and murky waters prevalent in the region, has not been reported in current studies. Spatial and temporal assessments are primarily conducted on mangroves, with seagrass ecosystems significantly underrepresented. Only 27 studies focused on mangroves and just 6 on seagrasses were identified in a recent systematic review, a volume insufficient for ecosystem-wide mapping.

3.15. A case study on blue carbon variability in seagrass ecosystems in Thailand was presented, highlighting the impacts of anthropogenic pressures and environmental change on carbon stocks. The presentation emphasized the importance of reassessing emissions, particularly considering of rapid seagrass degradation.

3.16. Inconsistencies in measurement methodologies for key variables such as carbon stock and sequestration rates were identified, highlighting challenges in cross-country comparisons and regional assessments.

3.17. Key findings were also shared from a regional workshop where PNLC members identified science gaps and priorities in blue carbon monitoring during the PNLC Blue Carbon Training held in Chonburi in March 2025. Priority needs were grouped into five thematic areas:

- Data Collection & Field Research: There is an urgent need for the development of regional centers and long-term training programs, especially in foundational lab and field techniques. Access to proper equipment for carbon assessment and knowledge transfer programs was highlighted.

- Capacity & Skills: Gaps remain in local technical expertise and logistics for fieldwork. Community engagement, including involvement of youth and citizen scientists, was identified as essential for improving data collection. There is also a need to standardize methodologies across sites to address inconsistencies.

- Remote Sensing & Technology: The critical equipment gap—including lack of remote sensing hardware and open-source data—was identified as a high-urgency issue. Mapping seagrass areas in particular remains difficult. The need for technical training in image interpretation and monitoring was emphasized. Dr. Stankovic proposed the development of a digital app or centralized data hub for real-time data sharing across the region.

- Collaboration & Funding: Institutional fragmentation was cited as a major barrier, with many countries lacking national or regional coordination mechanisms. A centralized data access system is urgently needed but difficult to implement. She also noted the scarcity of accessible, long-term funding for blue carbon work, as most grants are short in duration. Strengthening partnerships among universities, research agencies, and government bodies was proposed, including expanding youth involvement.

- Knowledge Base: There is a lack of consistent baseline data and challenges in mapping accuracy, particularly for seagrasses. These issues limit the ability to prove additionality, which is critical for carbon crediting mechanisms.

3.18. The following key recommendations were shared to address these persistent science and capacity gaps:

- Deliver targeted technical training programs at the local level;
- Develop integrated and accessible data systems for BCEs;
- Mobilize resources for essential equipment and secure long-term funding;
- Foster cross-sectoral and international collaborations;
- Standardize methodologies and innovate monitoring approaches through technology.

3.19. Sustained field presence and well-supported monitoring programs are essential to ensure continuity of data and local engagement. Without coordinated, well-resourced, and collaborative efforts, the region’s ability to fully harness blue carbon opportunities for climate and ecosystem benefits will remain limited.

3.20. ***Blue Carbon Networking: Lessons from the BlueCARES Project***

3.21. Dr. Maria Lourdes San Diego-McGlone of the University of the Philippines Marine Science Institute was introduced to present the case study of the BlueCARES Project, focusing on its implementation, outcomes, and lessons learned for advancing blue carbon monitoring and collaboration in the region.

3.22. The BlueCARES Project was a six-year trilateral initiative (2017–2023) among Japan, the Philippines, and Indonesia, aimed at establishing a Blue Carbon Strategy to support local conservation efforts, improve ecosystem resilience, and contribute to global climate mitigation goals. The project undertook a comprehensive assessment of blue carbon ecosystems (BCEs) in the Coral Triangle, guided by a set of core questions:

- How do we accurately assess blue carbon?
- Are blue carbon ecosystems well-preserved or degraded—and why?
- What are the consequences of inaction?
- How can BCEs be effectively conserved?
- How can blue carbon efforts be integrated with broader coastal ecosystem management?

3.23. To address these questions, the project adopted a multi-disciplinary approach that included remote sensing, geosimulation, ecosystem modeling, carbon flux measurement, behavioral economics, ecosystem services valuation, citizen science, and policy analysis.

3.24. A key innovation of the project was the establishment of the Blue Carbon Network (BCNet) through a Core and Network System (CNS), which aimed to link academic institutions, government agencies, and citizen scientists to collaborate on BCE monitoring, data generation, and policy development. This network served as a platform for partners to coordinate and share knowledge, data, and tools relevant to blue carbon research and action.

3.25. This work was further expanded through the InMSEA Project (Integrated Network-Based Management for Southeast Asia Coasts), implemented from 2022 to 2023. InMSEA aimed to scale up the CNS model across the Philippines, Indonesia, Malaysia, and partner countries such as the United Kingdom and Japan. Its objectives were to: (1) expand and accelerate CNS implementation; (2) build a comprehensive environmental and social knowledge base for blue carbon management; and (3) disseminate the Blue Carbon Strategy and tools among local and regional partners.

3.26. Several BCNet activities were highlighted as contributing to these goals:

- Nationwide mangrove mapping and validation training, including the introduction of the Mangrove Validation Index (MVI) to support assessment of biomass and carbon stocks;
- Seagrass mapping research and citizen science initiatives;

- A proposal writing workshop designed to help BCNet members secure project funding;
- Stakeholder summits and training events in Aklan and Eastern Samar, which featured demonstrations on remote sensing, drone mapping, vegetation surveys, and sediment coring;
- Development of a Data Analytic Platform to support open access and use of BCE data for research and policy.

3.27. Mangrove zonation mapping is particularly important for accurate estimation of carbon stocks. Memoranda of Understanding (MOUs) were also established with local stakeholders to institutionalize commitments and facilitate sustained collaboration.

3.28. In closing, the vital role of networks like BCNet and InMSEA in supporting long-term blue carbon monitoring and action were underscored. These platforms enable data sharing, collaborative research, and capacity building, but require formalization, consistent institutional support, and backing from national and local governments to ensure effectiveness and sustainability.

3.29. ***Blue Carbon Monitoring and Accounting in PR China and Network Creation***

3.30. Dr. Yuxing Wang delivered a presentation on the progress of blue carbon monitoring and accounting in the People's Republic of China, including initiatives to establish a blue carbon monitoring network in the East Asian Seas region under the PEMSEA framework.

3.31. The presentation began with reaffirming China's political commitment to carbon neutrality, referencing President Xi Jinping's 2020 announcement at the 75th United Nations General Assembly to peak carbon emissions by 2030 and achieve carbon neutrality by 2060. In line with this national vision, the Central Committee of the Communist Party and the State Council have introduced policies to protect and restore marine ecosystems, particularly mangroves, seagrass beds, and coastal salt marshes—to enhance their carbon sequestration capacity.

3.32. Key national and sectoral policies supporting this goal were outlined, including the Action Plan for Carbon Dioxide Peaking before 2030, the Implementation Plan for Consolidating and Enhancing Ecosystem Carbon Sink Capacity (2023), and the Guiding Opinions on Consolidating and Enhancing Marine Carbon Sequestration Capacity (2024). These policies emphasize technological innovation, sustainable aquaculture, and ecosystem restoration.

3.33. At the provincial level, initiatives have been launched to implement marine carbon development and sink enhancement activities. Internationally, blue carbon has been integrated into China's Nationally Determined Contributions (NDCs), and the

2023–2030 National Biodiversity Conservation Strategy and Action Plan targets the restoration of at least 30% of degraded marine ecosystems by 2030.

3.34. The Ministry of Natural Resources has issued technical standards for monitoring blue carbon stock and sink, including parameters such as vegetation composition, biomass, litter, and sediment carbon density. Nearly 40 pilot sites have been surveyed to establish baseline data, and post-evaluation work—carried out in locations such as Qinhuangdao, Fuzhou, and Sanya—has assessed both carbon removal and hazard mitigation effectiveness.

3.35. In discussing remaining gaps and challenges, it was observed that the data remain scattered and incomplete, technical standards are not yet unified, and most monitoring has focused on mangroves with limited research on other blue carbon ecosystems. Additionally, many countries in the region lack the capacity for comprehensive national-level blue carbon assessments.

3.36. To address these issues, Dr. Wang proposed the establishment of a voluntary and mutually beneficial East Asian Seas Blue Carbon Monitoring Network in support of the BCESMMR. The proposed network aims to facilitate data and technology exchange, conduct joint research, and support pilot activities across the region.

3.37. Three key implementation directions were identified:

- Exchange of Methodologies and Results – Establishing harmonized technical standards and facilitating the exchange of monitoring outcomes and certification systems among partners.
- Research on Sequestration and Co-benefits – Investigating the ecological and climate resilience benefits of blue carbon ecosystem conservation and restoration.
- Piloting and National Capacity Building – Supporting pilot projects in typical sites across the East Asian Seas to enhance national capabilities and align regional efforts with global climate targets.

3.38. The presentation concluded by emphasizing the need for continued regional collaboration, technical harmonization, and joint research to support blue carbon ecosystem development and climate action in the region.

3.39. Mr. Guo thanked Dr. Wang and introduced Ms. Shuguo Lyu as member of the secretariat of the Coastal Blue Carbon Observations and Studies of China (CBCC). She presented an overview of the Consortium for Coastal Blue Carbon Observations and Studies of China (CBCC), a national research and monitoring alliance aimed at advancing scientific knowledge and technical capacity related to blue carbon ecosystems in China.

3.40. The presentation began with describing the rationale behind the establishment of CBCC, which emerged from the need to expand monitoring and research efforts:

- From single-site to multi-site coverage,
- From local to regional scale,
- From one ecosystem to multiple coastal ecosystems, and
- From a single technical approach to diversified technological applications.

3.41. CBCC operates as a voluntary research collaboration network focusing on long-term observation of greenhouse gas and energy fluxes, as well as carbon stocks and sinks in mangroves, salt marshes, and seagrass beds. The primary methods include micrometeorological vorticity-related techniques and box/gas chromatography analysis.

3.42. CBCC was formally established in May 2023, following a proposal made during the 2023 Coastal Blue Carbon Science and Application International Conference. Since its formation:

- The 1st Annual Meeting was held in Haikou in 2024, where 5 new sites joined the network.
- The 2nd Annual Meeting took place in Shanghai in 2025, with 4 new institutions becoming members.
- Currently, CBCC brings together 45 representatives from 28 institutes, contributing to the development of the alliance charter and governance structure.

3.43. CBCC now includes 29+5 observation sites, equipped with 40+7 flux towers, and 9 long-term monitoring sites. These span both natural and artificial ecosystems across major coastal provinces and regions in China, including Liaoning, Tianjin, Shandong, Zhejiang, Shanghai, Guangdong, Guangxi, Fujian, and Hainan.

3.44. Key functions and operations of CBCC include:

- Establishing mechanisms for blue carbon observation technology and data sharing.
- Promoting R&D, training, and application of new observation methods for GHGs and blue carbon.
- Building a professional network of researchers, including the development of young scholars.
- Facilitating academic exchange and international scientific cooperation in blue carbon observation and research.

3.45. CBCC's cooperation model was highlighted, which includes bilateral and multilateral collaborations, working groups, and principal investigator-led initiatives. Information sharing is conducted through annual conferences and specialized meetings.

3.46. The presentation concluded by highlighting CBCC's role in advancing standardized and science-based blue carbon observation in China, and its potential contribution to regional and global coastal climate resilience efforts.

3.47. Mr. Guo thanked all the speakers for sharing their perspectives, experiences, and insights on regional planning for blue carbon ecosystem conservation, management, restoration, and stock assessment.

3.48. Mr. Guo provided a comprehensive wrap-up of the session, noting that Dr. Furukawa's presentation proposed an ambitious direction for PEMSEA. He emphasized the need to keep consistent with foundational agreements such as the Haikou Agreement (2003) and the 2009 recognition of PEMSEA's international legal personality, particularly on financial obligations, which were not mentioned in the 2009 agreement.

3.49. The feasibility of establishing the BCESMM under a regional framework needs to be revisited as far as national policy and legislation are to be developed in implementation of the mechanism. He underscored that further political commitments are needed in guiding national legislation —similar to the Barcelona Convention[1]—and the need to align this with reporting systems, including those for the post-2020 Global Biodiversity Framework and State of the Coasts reporting.

3.50. Enhanced mapping of blue carbon projects and baseline assessments were recommended, drawing on examples from China, Thailand, and the Philippines. The need to define indicators and methodologies in preparation for 2027 reporting were highlighted.

3.51. 3.51. Referring to the findings presented by Ms. Kristina Di Ticman on the Regional Blue Carbon Accounting Protocol (RBCAP) , he pointed out that only 2% of surveyed local governments have engaged in blue carbon trading, suggesting a low level of readiness and capacity. He highlighted the role of the PEMSEA Network of Learning Centers (PNLC) in supporting capacity-building efforts for local governments to better understand and engage in carbon market mechanisms.

3.52. The issue of threat reduction as a potential component of blue carbon certification was also raised and the need for continued regional networking was emphasized. The session concluded by encouraging countries to consider the additional benefits of voluntary participation in a regional certification system and to prepare for deeper engagement through clearer standards and tools.

3.53. **Session 2 Summary**: The TWG acknowledged the presentations and moderators summary on the status of Blue Carbon in the region, which emphasized strong interest across PEMSEA's networks in advancing blue carbon initiatives, with many sites already engaged in conservation and restoration efforts. However, fragmented governance, enforcement challenges, and persistent data and capacity gaps continue to constrain effective management of blue carbon ecosystems (BCEs) in the EAS region. Scientific assessments revealed that while mangroves are relatively

[1] Formerly known as the Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean

well-documented, seagrasses and other ecosystems remain under-researched, with significant variability in monitoring methods and insufficient integration of carbon data into national climate strategies. The session highlighted successful case studies—such as the BlueCARES and InMSEA projects, and China's structured monitoring and policy framework—as models for scaling collaborative, science-based, and locally anchored blue carbon actions. Regional coordination, technical standardization, and sustained investment emerged as critical enablers to operationalize blue carbon markets and ecosystem service certification across the region.

3.54. **Session 2 Recommendations (Consolidated from the presentations):**

3.55. Harmonize monitoring methodologies and protocols across countries and sites to enable standardized, comparable blue carbon assessments and support future crediting mechanisms.

3.56. Expand baseline assessments for all BCE types, especially underrepresented ecosystems such as seagrass beds, salt marshes, and tidal flats, using both remote sensing and field-based approaches.

3.57. Strengthen institutional coordination by establishing national and regional mechanisms to integrate blue carbon monitoring with climate policy, biodiversity goals, and coastal management plans.

3.58. Invest in long-term technical capacity development, including local training programs, research partnerships, citizen science, and youth engagement through the PNLC and academic institutions.

3.59. Establish an East Asian Seas Blue Carbon Network under PEMSEA to facilitate knowledge exchange, joint research, and pilot initiatives, modeled after the CBCC framework in China.

3.60. Ensure sustainable financing by mobilizing public and private resources, including support for local governments to access blue carbon markets, crediting tools, and project development services.

3.61. Promote inclusive stakeholder engagement by addressing conflicts over land use and access, ensuring gender equality, and enhancing awareness on the ecosystem and economic value of BCEs.

3.62. Incorporate threat reduction and co-benefit indicators into regional certification standards to improve the integrity and impact of blue carbon credits, especially in vulnerable coastal areas.

3.63. Formalize regional cooperation and commitments, potentially through updates to PEMSEA's legal framework or new agreements, to sustain momentum and clarify roles, responsibilities, and resource-sharing mechanisms.

4. Session 3: PEMSEA Regional Blue Carbon Accounting Protocol

4.1. Dr. Furukawa, who moderated the session, called on Ms. Kristina Di Ticman, PRF consultant, to present an overview of the PEMSEA Regional Blue Carbon Accounting Protocol Framework, emphasizing the need to develop harmonized methodologies across East and Southeast Asia to support effective, scalable blue carbon (BC) implementation.

4.2. The current regional landscape reveals significant variation in national approaches: countries such as Japan and Thailand prioritize carbon crediting for market access, whereas Indonesia, the Philippines, and the Republic of Korea focus on national greenhouse gas (GHG) inventory and climate reporting. This diversity has led to inconsistencies in the scope of ecosystem coverage, selected carbon pools, and methodological approaches, which in turn limit the comparability and aggregation of blue carbon data across the region.

4.3. One of the central challenges identified is the difficulty in applying global carbon standards—such as the Verified Carbon Standard (VERRA)—at the national and local levels. While these standards offer scientific rigor and market credibility, their complexity, data demands, and cost of implementation can be prohibitive for many countries and coastal communities. This has resulted in implementation gaps and created barriers to entry into international carbon markets for blue carbon projects in the region.

4.4. To address these issues, Ms. Ticman stressed the importance of developing a tailored **regionally harmonized protocol** that is practical, resource-appropriate, and aligned with both national priorities and international frameworks such as the Paris Agreement and countries' Nationally Determined Contributions (NDCs). Harmonization is expected to bridge national differences and improve compatibility, improve the credibility and accuracy of emissions and sequestration estimates, and enhance confidence among investors, donors, and policymakers. Additionally, harmonized protocols can support integration into national inventory systems and climate finance mechanisms.

4.5. The proposed PEMSEA framework is built on a flexible and tiered approach, designed to support countries with different levels of technical capacity and data availability. It recommends a stepwise harmonization strategy that allows project developers to:

- Clearly define the project's mitigation pathway—carbon removal (e.g., mangrove restoration), avoided emissions (e.g., protection of existing ecosystems), or emissions reduction (e.g., sustainable aquaculture).

- Identify the relevant coastal blue carbon ecosystems, such as mangroves, seagrasses, salt marshes, tidal flats, and macroalgae.

- Select the carbon pools to be assessed, including above-ground biomass (AGB), below-ground biomass (BGB), soil organic carbon (SOC), deadwood, litter, and—in applicable contexts—the water column.

- Apply measurement and estimation protocols that integrate field data, remote sensing, and modeling techniques.

- Incorporate robust uncertainty assessment tools such as error propagation and data cross-validation.

- Utilize a tiered classification system (Tiers 1–3), offering progressive levels of methodological rigor—from basic approaches requiring minimal data (Tier 1), to advanced techniques incorporating species-specific allometric equations and high-resolution spatial data (Tier 3).

4.6. The concept of three main blue carbon project types within the framework:
- Removal (sequestration through restoration or expansion), or adding new BCEs where it was not previously there, which has high additionality;
- Avoidance (protection of existing stocks); and
- Reduction (emission reduction through sustainable practices).

4.7. Each project type entails different levels of additionality and monitoring needs, which the protocol seeks to clarify and standardize.

4.8. In terms of methodological guidance, the framework allows for the use of diverse data sources—including published literature, national statistics, field measurements, and citizen science—and emphasizes methodological flexibility to ensure adaptability to different ecological and socio-economic contexts. Standardized but adaptable modules will guide carbon stock and sequestration estimation while integrating transparent uncertainty management practices to support both market-based and reporting objectives.

4.9. A key value-add of the framework is its potential to serve as a common regional reference that aligns with international standards while being grounded in the regional biophysical, institutional, and policy realities. It supports countries and coastal stakeholders in advancing from basic carbon assessments toward scientifically robust

methodologies that can unlock access to carbon markets, results-based financing, and strengthened national reporting.

4.10. It was clarified that to date, baseline carbon stock assessment and carbon sequestration potential protocols have been developed since they are the most basic and feasible for all countries. However, GHG emission measurement and net carbon flux protocols, which require more sophisticated methods and equipment, can only be currently done by select countries. She highlighted further that Measurement, Reporting and Verification (MRV) needs to be in place to ensure continuous, reliable tracking and verification of carbon. The MRV will build on the results of the different types of assessments.

4.11. As a way forward, the following recommendations were proposed:

- Further consultation and co-development of the protocol with national focal agencies and technical experts;
- Conducting pilot applications across different country contexts to test usability and scalability;
- Aligning the framework with national MRV systems and climate strategies; and
- Positioning PEMSEA as regional support hub for capacity building, validation, and knowledge exchange related to blue carbon accounting.

4.12. **Discussion:**

4.13. Dr. Furukawa opened the floor for feedback, emphasizing the need for inputs on how to further refine the draft protocols for blue carbon accounting. He clarified that in line with the BCESMM, there is a need to expand the protocol's scope beyond carbon sequestration to include co-benefits such as biodiversity, adaptation, and community resilience.

4.14. While the accounting protocol is easy to understand as it is straightforward and builds on existing methodologies of countries and IPCC recognized protocols, accounting for ecosystems poses a different challenge. He requested the TWG for inputs on how quantification of these services can be done.

4.15. Dr. Milica Stankovic shared the ongoing efforts of Prince Songkla University in supporting Conservation International and IUCN to revise the Global Coastal Blue Carbon Manual, and called for contributions from practitioners across the EAS region to share protocols, SOPs, and templates for different BCEs. She shared that this global effort aligns well with PEMSEA's regional ambitions to not only establish blue carbon accounting protocols, but also to integrate ecosystem services into a broader Blue Carbon Ecosystem Services Management Mechanism (BCESMM) and offered to provide further technical support that could help refine the accounting protocol.

4.16. Mr. John Colin (Cole) Yokingco of Conservation International Philippines raised several technical issues regarding project types, timelines, and the tiered methodology approach. A suggestion was made to change the term “project types” to “activity types” to ensure the protocol remains flexible and can accommodate hybrid approaches (e.g., combining removal and reduction). Ms. Ticman acknowledged the suggestion and clarified that the project types are intended as suggestions rather than fixed categories.

4.17. Additional points included the need for clearer guidance on baseline survey timelines, certification and MRV durations, and permanence requirements tailored to each blue carbon ecosystem type (e.g., mangroves vs. seagrass). It was cited that in the revised VERRA methodology, projects must commit to outcomes lasting 60–100 years to ensure permanence of CO_2 removal, which could be considered for inclusion.

4.18. A concern was also raised regarding the risk of project proponents opting for lower tiers to reduce costs, with a recommendation to develop measures that safeguard the integrity of the tiered approach.

4.19. On MRV duration, Ms. Ticman clarified that it is differentiated by blue carbon ecosystem (BCE) type, as mangroves, for instance, may require five or more years before measurable carbon sequestration occurs, while seagrass or tidal flats may follow shorter timelines due to different biomass and sediment dynamics. She encouraged the TWG members to provide suggestions on what would be the optimal duration for MRV to be used.

4.20. On the risk of cost-cutting, the tiered approach was designed to have incentives for higher-tier (more precise) methodologies, to encourage potential project proponents to not settle for the lowest tier.

4.21. Dr. Keita Furukawa added that in the case of J-Blue Credit, Japan does not utilize a formal tiered system for blue carbon accounting. Instead, methodologies are categorized based on their precision—from simpler approaches to more technically rigorous ones. Simpler methodologies are discounted in their credit valuation, typically receiving only 60–80% of the creditable amount. In contrast, more accurate methodologies may receive up to 90–100% of the calculated credit. This incentivizes project proponents to adopt higher-quality, science-based methods. The Japanese Blue Economy (JBE) system thus balances flexibility with quality assurance, offering a model that could inform regional discussions. Further exploration of this system was proposed for the technical session.

4.22. In addition, Mr. Brian Takeda emphasized the growing sophistication of donors and investors, noting that many now have internal expert teams to assess carbon project credibility. As a result, only high-quality, well-documented projects—particularly those using higher-tier or scientifically robust methodologies—will attract serious investment. The importance of accuracy in baseline assessments and monitoring was pointed out,

alongside the need to balance methodological rigor with cost efficiency. Drawing from Chinese and global practices, including the UNFCCC and WIRA, he called for methodologies that are both scientifically sound and practical for implementation. An updated respiration methodology is currently under development, aiming to strike this balance and provide long-term applicability.

4.23. Dr. Furukawa highlighted the need to tailor project and credit certification timeframes to specific blue carbon ecosystem types. For instance, mangroves and seagrasses exhibit different growth and carbon sequestration dynamics, which should be reflected in the protocol design. He shared that in the field, ecosystems are often spatially interconnected (e.g., mangroves backed by tidal flats and fronted by seagrass beds), raising the question of whether these should be accounted for individually or as integrated systems. In addition, human interactions—such as seaweed farming and aquaculture—must also be factored in when classifying ecosystem services, especially when practices like seaweed release into deeper waters contribute to carbon sequestration. Japan has begun recognizing these interactions in its seaweed accounting.

4.24. Dr. Furukawa reiterated the need to move beyond carbon accounting to also incorporate broader ecosystem services and co-benefits, laying the groundwork for a more holistic valuation framework. He sought inputs from the TWG on what ecosystem services need to be considered in the protocol.

4.25. Mr. Cole Yokingco pointed out that, from the Philippine perspective, critical co-benefits of blue carbon initiatives include enhancing coastal resilience and climate adaptation. Reference was made to the proposed Coastal Greenbelt Law, which promotes nature-based solutions to protect coastal communities from extreme weather, thereby linking blue carbon actions with broader local governance and disaster risk reduction strategies.

4.26. Mr. Takeda raised the importance of capturing the full range of ecosystem services provided by blue carbon ecosystems—beyond just carbon sequestration—including nutrient absorption, biodiversity, and community benefits. He asked whether PEMSEA has considered stacking these ecosystem service values within its framework, warning that failure to do so could lead to fragmented credit markets with multiple, uncoordinated credits from the same intervention.

4.27. Dr. Furukawa responded that PEMSEA's long-term ambition is to establish a broader ecosystem services crediting system, not limited to carbon. While this remains in its early stages, the technical working group is intended to serve as a platform for identifying and prioritizing co-benefits to inform the development of such a market.

4.28. Mr. Yinfeng Guo supported this expansion and referenced practices in China that integrate other ecosystem services like recreation, biodiversity enhancemenet and

community well-being into disaster risk reduction interventions. He encouraged developing methodologies and frameworks that align with nature-based solutions and international best practices. He also raised the question on how to quantify ecosystem services.

4.29. Dr. Furukawa responded that quantification doesn't need to be done first. He mentioned that the process can begin with qualitative assessments—simply identifying whether co-benefits are present in a project—rather than requiring immediate quantification. A tiered system could allow gradual progression from qualitative to quantitative assessments, making it easier for project proponents to participate while still conveying value to potential buyers.

4.30. Mr. Yuanqing Hou of the China Green Carbon Foundation recommended leveraging existing frameworks like the CCB standards to integrate co-benefits into blue carbon certification systems. Two paths were proposed: either adapting existing standards such as VERRA's to incorporate blue carbon co-benefits, or creating additional standards under PEMSEA's framework. Mr. Hou suggested that PEMSEA could consult with VERRA on how to incorporate co-benefits in accounting.

4.31. Dr. Furukawa acknowledged the suggestions and recognized that there is difficulty in quantifying benefits and that it should not necessarily be absolute. He proposed a narrative-based verification, such as inclusion of the ecosystem services co-benefits in project concept notes, which has proven effective in Japan in attracting buyers by appealing to social and ecological co-benefits.

4.32. Mr. Yokingco added that VERRA is also working on developing biodiversity standards and indicated the difficulty in standardizing biodiversity, given that it needs to be locally contextualized and is quite dynamic. He agreed to consult with VERRA on how to include it in the PEMSEA framework.

4.33. Dr. Guanqiong Ye of Zhejiang University stressed that monitoring the maintenance capacity of blue carbon ecosystems is as critical as developing the methodology for measuring their carbon sequestration. Given the dynamic nature of coastal areas, strong local stewardship is essential. Without it, environmental shifts may negate prior carbon gains, highlighting the need for robust ecosystem maintenance protocols.

4.34. Dr. Furukawa took note of the suggestion and elaborated on the challenge of managing marine ecosystems due to their inherent dynamism and seasonality—contrasting them with more stable terrestrial carbon systems. The constantly shifting conditions of ecosystems like seagrass beds demand flexible, adaptive accounting systems that can reflect these changes without compromising credibility.

4.35. Mr. Takeda added a concrete example from Japan's J-Blue Credits system, where an annual MRV process ensures that credits are only issued when the ecosystem remains

healthy. If monitoring reveals ecosystem loss in a given year, no credits are awarded—even if prior efforts were made—ensuring high integrity. This approach reflects how dynamic environmental conditions can be integrated into the crediting system, balancing scientific rigor with practical accountability.

4.36. **Session 3 Summary**: The session on the PEMSEA Regional Blue Carbon Accounting Protocol highlighted the urgent need for a harmonized, regionally tailored framework that bridges the diverse priorities, technical capacities, and blue carbon governance structures across East and Southeast Asia. Participants emphasized that while global standards like VERRA provide scientific rigor, their complexity poses accessibility barriers for many local actors. The proposed PEMSEA framework offers a flexible, tiered approach that supports both national GHG inventory needs and international market participation, while recognizing the dynamic nature of coastal ecosystems. Key discussions centered on ensuring methodological practicality, safeguarding against cost-driven compromises in quality, and integrating co-benefits such as climate adaptation, biodiversity, and community resilience. The session reaffirmed the importance of inclusive, stepwise development of a robust regional protocol, grounded in science and adaptable to real-world implementation.

4.37. **Session 3 Recommendations:**

4.38. **Continue Stakeholder Consultation and Co-development:** Engage national focal agencies, technical experts, and local practitioners in refining the protocol to ensure regional relevance, scientific integrity, and ownership.

4.39. **Pilot the Protocol Across Diverse Contexts:** Conduct test applications in countries with varying technical capacities and ecosystem types to assess usability, data needs, and scalability of the framework.

4.40. **Strengthen Integration with National MRV and NDC Systems:** Align the protocol with existing national climate strategies to support reporting obligations under the Paris Agreement and enhance policy coherence.

4.41. **Safeguard Tiered Methodology Integrity:** Incentivize higher-tier approaches through value-based crediting, and apply discounting mechanisms or eligibility limits to deter low-quality, cost-driven applications.

4.42. **Clarify Project Activity Types and Durations:** Provide guidance on defining hybrid project types, setting baseline and MRV timelines, and ensuring permanence, tailored to specific BCEs (e.g., mangroves vs. seagrass).

4.43. **Initiate Co-benefit Identification and Qualitative Assessment:** Begin documenting ecosystem services (e.g., adaptation, biodiversity, recreation) using qualitative methods, with a pathway toward quantitative valuation and credit stacking**.**

4.44. **Coordinate with Global Standards Bodies:** Engage VERRA and CCB standards to explore how blue carbon and its co-benefits can be incorporated or adapted into existing or complementary certification systems.

4.45. **Ensure Local Ecosystem Stewardship and Monitoring Capacity:** Recognize the dynamic nature of coastal ecosystems and support community-based mechanisms to maintain ecosystem health and safeguard long-term carbon integrity.

4.46. **Develop Practical Verification Narratives:** Incorporate ecosystem services narratives and qualitative co-benefit statements in project documentation to enhance market appeal and transparency.

4.47. **Position PEMSEA as a Regional Support Hub:** Leverage PEMSEA's platform to offer technical assistance, training, and knowledge exchange for blue carbon accounting and ecosystem services management in the region.

5. Session 4: Regional blue carbon certification program: essential elements of certification and refined roadmap

5.1. The session was opened by the moderator, Mr. Yinfeng Guo, who introduced Mr. Brian Takeda of the Japan Blue Economy Association (JBE) to share Japan's experience in blue carbon finance and credit systems.

5.2. Mr. Takeda presented the JBE as a state-approved independent research cooperative under the Ministry of Land, Infrastructure, Transport and Tourism (MLIT), established in 2020 to administer Japan's first ocean-based carbon credit system: J-Blue Credits. JBE's core activities include quantifying blue natural capital through research, amplifying solutions to build blue nature capital, monetizing blue natural capital flows through J-Blue credits, administering J Blue credits through a centralized market and disseminating best practices with other states and ocean stakeholders.

5.3. J-Blue Credits are the world's first state-sponsored blue carbon nature credits encompassing seaweeds, seagrasses, tidal flats, and mangroves. These credits are "stackable," allowing the integration of other ecosystem service benefits such as biodiversity, fisheries support, and coastal protection. Unlike typical voluntary market credits, J-Blue Credits are issued only for verified, measured CO_2 removals, excluding projections and avoided emissions. This strict "actuals-over-promises" approach, grounded in scientific verification, has led to significantly higher credit prices (USD 400+/tCO_2) and broader trust among buyers.

5.4. The program is anchored on a philosophy that values ecosystem service flows rather than capital stock, aiming to monetize the real-time benefits of blue natural capital. It operates on a science-led, community-driven model, where most credit creators are fishers (85%), municipalities (69%), companies (52%), NGOs (30%), and academia

(10%). This model contrasts with conventional green carbon approaches, which tend to be large-scale, developer-led, and project-centric.

5.5. The market mechanism, administered directly by JBE, is centralized, transparent, and blockchain-enabled. Each credit is assigned a unique serial number and tracked through its lifecycle—from project application, third-party scientific validation, issuance, trade, and retirement. A one-time trading rule is enforced to prevent speculation and maintain credit integrity. While JBE facilitates marketplace transactions, direct trades are also allowed under strict disclosure and regulatory requirements. A 10% consumption tax is levied on all trades, and participants contribute small fees for research and administration, helping sustain continuous methodological updates and operational integrity.

5.6. As of 2024, over 46 sites have been certified, covering nearly 3,200 hectares and resulting in more than 9,000 tons of CO_2 removals. The majority of restoration efforts focused on macroalgal beds (62%), followed by seagrass meadows, tidal flats, and macroalgae farming. These efforts not only deliver verified CO_2 removals valued at over USD 4.2 million, but also generate ecosystem services valued at USD 411.6 million, demonstrating significant co-benefits.

5.7. The Japanese government has institutionalized this progress through its Plan for Global Warming Countermeasures, passed on 18 February 2025, which integrates blue carbon ecosystems into national GHG inventories and sets explicit sequestration targets for 2035 and 2040. This policy commitment has elevated blue carbon from a niche opportunity to a mainstream component of Japan's climate strategy.

5.8. Mr. Takeda highlighted Japan's ambition to scale up blue carbon contributions from the current 10,000 tons/year to 500,000 tons/year in coastal ecosystems and eventually 50 million tons/year within its EEZ by 2050. Achieving this would require continued investment in restoration, MRV innovation, and stakeholder engagement.

5.9. A significant opportunity lies in leveraging Article 6 of the Paris Agreement, which enables international carbon trading between countries. This presents a pathway for deeper collaboration between high-emitting nations and blue natural capital-rich developing countries, including those in Southeast Asia and among Small Island Developing States (SIDS). JBE envisions the potential for bilateral crediting arrangements, where Japan could serve as a demand-side partner purchasing high-integrity blue carbon credits from regional partners.

5.10. The presentation reported that countries such as South Korea have already included seaweed forests in their GHG inventory, raising the question of how other macroalgae-rich nations—such as those in ASEAN, the EU, and North America—will respond. There is growing recognition that macroalgal ecosystems offer a scalable and cost-effective solution to enhance marine carbon sinks and diversify national mitigation

portfolios.

5.11. However, developing nations face a critical choice: whether to begin with low-integrity, low-value crediting frameworks to gain entry into markets, or to prioritize high-integrity systems—as modeled by JBE—that offer stronger long-term environmental, financial, and policy outcomes. The JBE approach advocates for starting high, investing in robust science, transparent governance, and strong local engagement to build a resilient and trustworthy crediting architecture from the outset.

5.12. To support replication and scaling, JBE offered to facilitate knowledge-sharing sessions with interested governments, technical agencies, and non-state actors. These sessions aim to help countries design and implement their own high-value blue carbon markets, tailored to their ecological contexts and institutional capacities. Governments were invited to initiate direct coordination by contacting JBE via official government channels.

5.13. The JBlue presentation was followed by a presentation of the concept and structure of the PEMSEA Blue Carbon Certification by. Mr. Renato Cardinal of PRF. The draft certification concept was developed in response to the increasing recognition of the vital role of blue carbon ecosystems in climate mitigation and coastal resilience. East Asia, as a global hotspot for mangroves, seagrasses, and tidal flats, holds significant potential for blue carbon sequestration. Building on over 30 years of experience in coastal and ocean governance, and more than a decade in implementing its Integrated Coastal Management System (ICMS) Certification, PEMSEA is well-positioned to offer a voluntary carbon certification system tailored to the coastal realities of the region.

5.14. The proposed PEMSEA certification system is envisioned as a voluntary offset mechanism, designed to complement national climate strategies and support coastal stakeholders—governments, communities, and private sector actors—in certifying and monetizing verified blue carbon removals. The system draws from global best practices in voluntary carbon markets but emphasizes contextual relevance, regional participation, and capacity building.

5.15. The structure (see Figure 2) is anchored on a multi-stakeholder ecosystem. It includes project developers (private groups or LGUs), technical experts (from academic and research institutions), auditing bodies (initially supervised by PEMSEA, later transitioning to accredited third-party verifiers), and PEMSEA as the certification program administrator. Projects—such as mangrove rehabilitation or seagrass conservation—will be assessed against regional methodologies and standards, registered in a PEMSEA-managed registry, and issued certified offset credits upon successful verification.

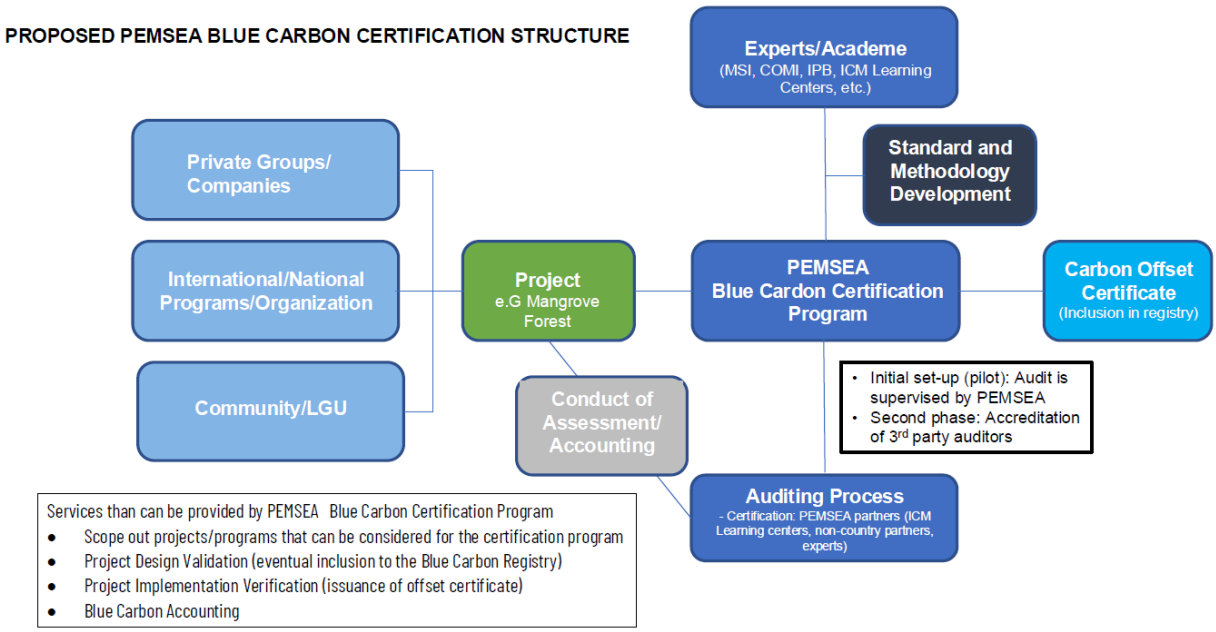

Figure 2. Proposed PEMSEA BC Certification Structure

5.16. The lifecycle of carbon offset certification under the PEMSEA BCC system follows internationally recognized steps: (1) Project design and stakeholder engagement; (2) Development and validation of project baselines, (3) Registry inclusion, marking official project approval; (4) Implementation and monitoring by developers and communities; (5) Verification and certification issuance by PEMSEA auditors; (6) Offset credit transfer and retirement, ensuring traceability and accounting for GHG reductions.

5.17. PEMSEA's role is not limited to administrative oversight. It also offers technical services, including project scoping and validation, blue carbon accounting, and verification of implementation. For the pilot phase, PEMSEA will directly supervise audits, while future phases envision an accreditation system for third-party auditors, supported by national and academic institutions such as ICM Learning Centers, the Marine Science Institute, and others.

5.18. To initiate the BCC Program, the presentation outlined the following steps:

- Conducting a detailed **market demand study** to assess regional appetite and pricing potential for blue carbon credits;
- Establishing the **governing and technical infrastructure** of the certification program (including protocols, procedures, standards, and fees);
- Developing and implementing a **business plan** and sustainability strategy;
- Building **multi-level partnerships** with national agencies, LGUs, the private sector, and NGOs;
- Piloting the certification of initial projects and issuing verified offset certificates; and
- Scaling the program and integrating **marketing and outreach activities** for long-term viability.

5.19. The session acknowledged several **key challenges**, including the need for:

- Development of regionally appropriate and scientifically robust protocols
- Greater emphasis on blue carbon in national NDC implementation
- More visibility and focused advocacy for blue carbon in future COP agendas.

5.20. The TWG members were invited to support the development of the Certification mechanism by sharing scientific knowledge, project experience, and resource leads. PEMSEA emphasized the collaborative nature of the initiative and the strategic opportunity to create a homegrown, regionally credible blue carbon market that enhances climate ambition, local livelihoods, and marine ecosystem health.

5.21. **Discussion**

5.22. Mr. Yuanqing Hou from the China Green Carbon Foundation raised two questions related to the Japanese blue carbon credit system. He inquired whether Japanese corporate buyers were donating or directly purchasing credits from the J-Blue Credits mechanism.

5.23. Mr. Brian Takeda of the Japan Blue Economy Association responded that the companies are not donating; rather, they purchase credits, and these transactions serve as a mechanism to fund restoration projects. He added that beyond the purchase of credits, the system also fosters opportunities for companies to co-create restoration projects with local communities. He noted that some companies bring unique technologies or raw materials to the table and often collaborate with municipalities and fishers directly to deploy innovative approaches. According to him, this not only creates a market but also serves as a platform for creativity and partnership –essentially becoming a “hotbed for new ideas.”

5.24. Mr. Hou agreed that the approach was similar to what is being done in China, although they currently operate primarily through donations. He explained that donor contributions are used not only to cover validation and monitoring but also to directly finance restoration activities, technical work, and innovation. He described this model as demonstrating additionality, wherein a large portion of the funds is allocated directly to on-the-ground actions. He shared that in their current green carbon work, the average cost of the entire procedure is about USD 100 per ton, and although they do not yet participate in the carbon market, they apply the credits toward carbon removal goals.

5.25. In response, Mr. Takeda expressed concerns drawn from lessons in the terrestrial carbon market, emphasizing that marine restoration is significantly more challenging and cost-intensive than land-based projects. He shared that if blue carbon credits are to be meaningful financial drivers, the current credit price must increase substantially. As an example, he cited Dr. James Kairo’s Mikoko Pamoja Project in Kenya, which

manages to sell credits at USD 30 per ton due to strong voluntary community participation. However, Mr. Takeda questioned the long-term sustainability of such models and emphasized the need for fair and durable compensation frameworks even if adapted to local contexts. He encouraged participants to explore how we can better leverage the additional, stackable ecosystem services that marine ecosystems offer and consider stacking ecosystem service values—beyond carbon—to help increase valuation and drive more resources into marine restoration projects.

5.26. Mr. Hou shared that the China Green Carbon Foundation is exploring ways to engage large corporations not only as donors but as long-term investors, potentially for periods of 60 to 100 years. This engagement would require full participation in project design, validation, and monitoring, thereby enhancing the integrity and stability of carbon credits. It was also noted that the Foundation's processes are aligned with CDM-AR and VERRA methodologies, with robust validation and verification protocols in place.

5.27. Several challenges in the auditing process were raised, particularly the lack of ecological expertise among many auditors, which creates a disconnect in accurately assessing blue carbon projects. To address this, a proposal was made to involve scientific institutions and government agencies to strengthen credibility. In China, agencies such as the Ministry of Natural Resources and the National Forestry and Grassland Administration are already engaged to ensure project authenticity and proper monitoring.

5.28. He emphasized the importance of capacity building and called for increased government involvement throughout the blue carbon project cycle. It was concluded that only through step-by-step, verifiable action can real and trustworthy credits be generated. Without this, the entire process risks falling apart.

5.29. Mr. Cole Yokingco from Conservation International Philippines posed a question regarding project scale and viability within Japan's blue carbon credit system. He asked about the minimum project size and how Japan was able to make small-scale, community-led projects viable, considering the practical challenges in management and implementation at the local level.

5.30. Mr. Takeda responded by affirming the importance of community-led initiatives and designing market mechanisms that accommodate a range of project sizes. In Japan, projects as small as one hectare are viable due to a confidence-based crediting system that adjusts for MRV rigor, supporting both large and community-led initiatives. However, long-term sustainability remains a concern.

5.31. The methodology incorporates a confidence index, which adjusts the final credit value according to the rigor of MRV applied. For instance, projects that can only afford a Tier One level of verification uses only basic tools like Google Maps instead of advanced methods (e.g., drones, satellite imagery, or underwater cameras) would receive fewer

credits due to lower confidence levels in data. The system uses multipliers (e.g., 0.2 to 0.8) to adjust total credits accordingly. It was emphasized that the framework approach of the JBE system enables both large-scale and grassroots-level projects, with the community-led projects forming the majority in Japan. He mentioned, however, that ensuring project permanence and long-term durability remains a key consideration for small-scale efforts. He emphasized that these smaller efforts need to be recognized and supported in a way that ensures they are both credible and sustainable over the long term.

5.32. Dr. Milica Stankovic added insights into the scientific, technical, and economic challenges of seagrass restoration. She shared that while interest in seagrass blue carbon credits is growing, restoration remains extremely expensive—up to ten times costlier than mangrove restoration—due to the complexity of the ecosystems and the lack of standardized, scalable restoration protocols, especially in tropical regions with diverse seagrass species.

5.33. It was emphasized that although restoration efforts may appear successful from an ecological standpoint (e.g., healthy vegetation cover), they do not always result in measurable carbon sequestration. Several recent studies have shown that restored seagrass areas may not yet accumulate carbon at the levels expected, even if other ecosystem services are restored or enhanced.

5.34. Dr. Stankovic also discussed the importance of capacity building across the blue carbon value chain. She described an initiative led by her university in Thailand, in partnership with the Thailand Greenhouse Gas Management Organization (TGO), IUCN, and other stakeholders, to develop training programs for carbon project developers, auditors, and ecosystem managers. These programs combine general and specialized modules—including coastal ecosystem science, restoration practices, spatial mapping, and carbon accounting—to ensure that all stakeholders involved in blue carbon projects have a consistent and scientifically sound understanding of the ecosystems they work with.

5.35. The science of seagrass restoration is still evolving, and even when ecological restoration succeeds, carbon accumulation may still lag behind. This underscores the importance of recognizing co-benefits—such as biodiversity enhancement and coastal protection—alongside carbon in valuation and market mechanisms.

5.36. Mr. Takeda agreed, stressing the need to integrate ecosystem services into valuation models and questioned if current carbon markets adequately support high-cost ecosystems like seagrasses.

5.37. Mr. Guo followed this discussion by addressing a question to Mr. Renato Cardinal of PEMSEA, seeking clarification on the use of terms such as carbon offset, offset

certificate, and how these relate to the removal, reduction, and sequestration terminology presented earlier in PEMSEA's BC accounting protocol.

5.38. Mr. Cardinal clarified that a carbon offset refers to a tradable unit, typically in the form of a certificate, which represents an equivalent amount of carbon removed or avoided from the atmosphere. He mentioned that this is distinct from on-the-ground results—the actual physical removal or reduction of emissions—since offsets represent those actions in a quantified and marketable form.

5.39. Ms. Kristina Ticman of PEMSEA added that removal and reduction are the underlying basis for generating offsets, which are then certified and traded in carbon markets.

5.40. Mr. Guo then asked about the monetization of ecosystem services, referencing the importance of this aspect in establishing additionality, and inquired whether methodologies are in place for valuing non-carbon ecosystem benefits.

5.41. Mr. Brian Takeda explained that carbon benefits must follow formal methodologies grounded in quantitative, scientific assessment, aligned with internationally recognized standards such as those of the IPCC. However, for other ecosystem services—such as biodiversity, cultural value, or nutrient cycling—there is currently no universal valuation standard. To address this, the JBE system allows for the flexible integration of the best available science and context-specific evidence into project documentation.

5.42. He emphasized that the JBE carbon platform is intentionally designed as a foundational structure—a "bowl"—that enables the inclusion of these other ecosystem services. While carbon remains the core unit of value and the gateway to market participation, the platform creates space for additional services, even if their methodologies vary in rigor or certainty.

5.43. For instance, although biodiversity data for seaweed forests or seagrass beds may be incomplete or regionally variable, credible scientific evidence can still be submitted and partially recognized. Cultural values—despite being difficult to quantify—can also be incorporated and noted that many corporate buyers are open to paying a premium for projects that transparently reflect these broader ecological and social values.

5.44. Mr. Guo followed up by asking if a monitoring and evaluation framework, along with indicators and parameters, are required for these ecosystem services. Mr. Takeda confirmed that proxy indicators and KPIs may be used to approximate the value of co-benefits. However, the JBE system does not mandate their inclusion due to the varying levels of scientific certainty across ecosystems. The system instead relies on a scientific advisory board to assess the credibility of claims. He indicated the importance of balancing credibility and flexibility—to take meaningful action even if science is still evolving, as long as claims are grounded in best evidence.

5.45. Dr. Shuguo from the Hainan Research Center posed a technical question regarding the LG project in Japan, asking whether it referred to artificial algae beds or aquaculture. She further inquired whether credits for artificial blue carbon (BC) ecosystems can be accounted for. Additionally he inquired about the calculability of carbon from harvested algae.

5.46. Mr. Takeda responded that in Japan's national GHG inventory, only wild seaweeds are currently included. While farmed seaweed is not yet part of the national inventory due to incomplete data mapping, he believes that it may be integrated in the future. However, within the JBE methodology, both wild and farmed seaweeds are eligible under the credit system.

5.47. It was clarified that under the current methodology, carbon stored in harvested algae that is later used (e.g., for food) is not counted, as it re-enters the carbon cycle. What is included in the calculations are the non-harvested components—such as dissolved organic carbon released during growth. He commented that in the future, improved scientific understanding might allow for more inclusive accounting, but as of now, harvested biomass is disqualified from crediting.

5.48. Mr. Guo also commented on findings presented during the ICM training in Chonburi, where a recent scientific paper was cited suggesting that carbon sinks from seaweed aquaculture—through detritus deposition and sediment embedding—could be as significant as wild seaweed. He acknowledged that formal methodologies are not yet available but noted this as an area of emerging interest and active research, reinforcing the importance of ongoing scientific development.

5.49. A Chinese expert raised a practical question regarding best practices among large Japanese enterprises, particularly in the energy and oil sectors, that have utilized blue carbon as a tool for achieving net-zero emissions or contributing to carbon removal. The expert inquired whether there are enterprise-level initiatives that could serve as models for similar efforts in China or other countries.

5.50. Mr. Brian Takeda responded by citing both a personal example and a broader national development.

5.51. He shared that in 2022, his company became the first in the world to secure Japan Blue Economy (JBE) credits for a wild kelp restoration project, conducted in partnership with ENEOS, Japan's largest energy company, which holds approximately 50% of the national market share. This initiative served as a proof of concept, demonstrating that blue carbon credits can be generated from restorative marine projects.

5.52. Expanding to the national level, he indicated that offshore wind projects in Japan—under the jurisdiction of the Ministry of Land, Infrastructure, Transport and Tourism (MLIT)—are increasingly incorporating seaweed cultivation as part of their

nature-based solutions (NbS). This trend indicates that major energy companies are beginning to leverage seaweed farming as a strategy to:

- Enhance the environmental sustainability of their infrastructure projects, and
- Support long-term carbon sequestration.

5.53. Furthermore, it was highlighted that a recent development: just two weeks prior to the conference, ENEOS, in collaboration with the Ministry of the Environment and MLIT, launched a large-scale research project to study the sequestration potential of seaweed in the deep sea. This project will utilize the Shinkai 6500, a deep-sea submersible vessel, to evaluate how large volumes of seaweed deposits might behave and sequester carbon at oceanic depths.

5.54. He emphasized that this research is aligned with the Japan Blue Economy initiative's goal of achieving 50 million tons of carbon sequestration per year, a target that cannot be met by coastal communities alone. Achieving this scale will require significant participation from large corporate actors with the operational capacity to undertake offshore cultivation at scale, especially on the continental shelf.

5.55. Mr. Takeda concluded by distinguishing between two complementary approaches:

- Community-driven coastal initiatives, which offer high ecosystem service value and benefits to local livelihoods, and
- Corporate-led offshore initiatives, which may be less rich in co-benefits but still provide valuable contributions to carbon sequestration and will be essential to scaling blue carbon markets in Japan.

5.56. Mr. Cole Yokingco followed this by raising a question to PEMSEA, specifically addressed to Mr. Renato Cardinal, on whether under the proposed carbon certification system, companies purchasing blue carbon credits would be allowed to claim 100% of the carbon sequestered, or if the certification might cap the claim (e.g., at 90% or 80%) to ensure net global reduction outcomes. He emphasized the value of withholding a portion of credit as a guarantee that some reductions are not merely offsetting emissions but contributing to broader climate mitigation.

5.57. Mr. Renato Cardinal responded that the exact percentage of allowable claims (whether 100% or partial) has not yet been finalized. PEMSEA is still in the process of developing the procedures and protocols for its regional carbon certification program and acknowledged that Mr. Yokingco's suggestion would be considered during the system's design phase.

5.58. Mr. Yokingco followed up with a personal view that not allowing 100% offset claims—unless paired with actual enterprise-level emissions reduction—can ensure that projects contribute real mitigation outcomes, counterfactually adding to climate progress rather than replacing reduction efforts.

5.59. Mr. Brian Takeda reflected on the complexity of carbon credit systems and cautioned against the use of universal claim limitations—such as applying a fixed reduction or inherent cut to all credits—which may unfairly penalize high-integrity projects. He expressed concern that blanket rules applied across the board risk undermining the efforts of actors who are genuinely trying to do the right thing.

5.60. Instead of one-size-fits-all restrictions, he suggested exploring alternative mechanisms—such as differentiated certification tiers or complementary incentive structures—that could promote responsible corporate behavior without adding excessive complexity to already intricate credit mechanisms.

5.61. While acknowledging that some corporations may misuse offsets, Mr. Takeda emphasized that the system should not be built solely on the assumption of bad faith. There must also be space to encourage and reward companies that are proactive and committed to making a positive contribution. He urged that both enforcement tools and enabling pathways be considered in system design to ensure fairness and maximize engagement from responsible actors.

5.62. Mr. Yokingco proposed a differentiated modality, wherein buyers with verified emissions reduction plans could be allowed to claim 100% of credits, while those without such plans may be limited in their claims. This could serve as a middle-ground mechanism that promotes accountability while maintaining flexibility.

5.63. Mr. Yinfeng Guo (NMHMS) posed a follow-up question to Mr. Takeda, asking for clarification on the mapping and planning aspects of the Japan Blue Economy (JBE) methodology. He referenced the terms “map, amplify, monetize, administer, disseminate” used by Mr. Takeda to describe JBE’s service cycle, and asked whether the 47 JBE-certified projects were selected based on suitability mapping—specifically identifying locations that maximize ecosystem services, community value, or biodiversity co-benefits.

5.64. Mr. Takeda responded that he could not provide a definitive answer but would seek confirmation from his director. Based on his observations, there is some correlation between corporate proximity and ecosystem selection. For instance, companies operating near seagrass meadows tend to support projects in those areas. He also cited Nippon Steel’s involvement in seaweed projects due to their capacity to contribute technological solutions that amplify seaweed growth. While not confirming a formal suitability study, he inferred that corporate engagement and value-add capabilities may influence project site selection more than mapped ecosystem value alone.

5.65. Mr. Guo then directed a question to Dr. Keita Furukawa, Technical Session Chair, asking about the institutional placement of PEMSEA’s proposed blue carbon certification system. He queried whether the certification initiative—presented earlier by Mr. Cardinal—would be submitted to the EAS Partnership Council for review or

integrated into the regional Blue Carbon Ecosystem Services Management (BCESM) mechanism being developed.

5.66. Dr. Keita Furukawa clarified that there is no final decision yet on the certification system's formal integration. This is precisely why a Technical Working Group (TWG) was formed to discuss and raise recommendations to the Partnership Council. He commented that PEMSEA has operational experience with the ICM certification process, and a similar institutional pathway may be considered for blue carbon.

5.67. It was emphasized that while certification and carbon markets are important, the priority remains on-ground implementation, especially the restoration and enhancement of blue carbon ecosystems at the community level. He highlighted the role of PNLC and PNLG members in facilitating such efforts.

5.68. Dr. Keita Furukawa also mentioned that starting with pilot projects is a practical approach, citing the Japanese pilot project (with participation from his own NPO) as an example. These pilots are testing methodologies, benefit-sharing mechanisms, and practical application models, with a view of gradual expansion. It was suggested that the framework and roadmap for broader certification and market integration would be discussed in the following day's session.

5.69. Mr. Guo concluded the discussion by emphasizing the importance of dissemination, aligning with one of the core values discussed. He noted that while many meaningful efforts have been undertaken, they are not widely shared. He proposed starting with case studies—as in the case of Yokohama Bay or another relevant site—as a practical way to promote exchange and understand how varying conditions affect carbon markets. He also stressed the need for capacity development, especially in scientific monitoring and technical expertise. While mangrove restoration may be more manageable, marine ecosystems like seagrasses present greater challenges, highlighting the need to strengthen scientific and monitoring capacity for effective implementation.

5.70. He also reflected on the importance of supporting high-integrity carbon projects, such as the community-led case in Japan, but cautioned against limiting efforts solely to premium markets. Instead, he encouraged considering complementary approaches that engage business associations and the broader private sector through voluntary or lower-cost offset markets that can still deliver credible results. He affirmed the relevance of Mr. Renato's earlier presentation, particularly regarding certification and reporting, and closed by emphasizing the need to begin planning for the next stage—translating the discussed frameworks and mechanisms into actionable and scalable initiatives.

6. Session 4: Regional blue carbon certification program: essential elements of certification and refined roadmap (Part 2)

6.1. Day 2 continued with the second part of the session, which focused on the finance and implementation mechanisms of blue carbon credits. Mr. Takeda provided global context and insights on emerging blue carbon and nature restoration strategies, focusing on the experiences of Norway, the European Union, and the United Kingdom, with reflections relevant to developing a voluntary blue carbon market in the EAS region.

6.2. Norway's case was presented as an urgent ecological challenge, with over 5,000 km² of kelp forests lost from overgrazing by sea urchins, resulting in ecosystem service losses exceeding USD 35.5 billion—more than double the revenue from Norway's fisheries and aquaculture sectors. This degradation has been termed the greatest ecological crisis in Norway's marine history.

6.3. Several restoration strategies were explored, including artificial reefs, reseeding, transplanting, and sea urchin removal. Restoration costs range from USD 1,300 to over USD 590,000 per hectare, but the potential return on investment is significant, with ecosystem services from restored kelp forests valued at USD 111,400 per hectare—an 86x return in some cases. Norway's government has responded by integrating kelp restoration into national policy agendas. Parliamentary resolutions and party platforms across the political spectrum now call for systematic and science-based restoration of nature and kelp forests, underlining their role in natural carbon storage and marine biodiversity recovery.

6.4. In parallel, the European Union's Nature Restoration Law, in force since August 2024, mandates all member states to develop national restoration plans with targets to restore 20% of degraded ecosystems by 2030, scaling to 100% by 2050. Marine habitats specifically targeted include seagrass beds, macroalgal beds, shellfish beds, and estuarine zones, highlighting a strong institutional push for marine ecosystem rehabilitation.

6.5. The presentation also highlighted emerging legislative mechanisms and financial incentives, such as Nature Credits, which resemble blue carbon credits but are broader in scope. The EU is considering the development of a regulated nature credit market to fund ecosystem restoration and avert biodiversity collapse. These credits offer a potential model for hybrid financing systems, combining compliance obligations and voluntary environmental contributions.

6.6. The United Kingdom's Biodiversity Net Gain policy, made mandatory in 2024, requires developers to deliver a minimum 10–15% increase in biodiversity as a condition for project approval. This policy reflects a shift toward embedding ecological accountability in land-use planning, with potential parallels for coastal and marine development frameworks in the EAS region.

6.7. A corporate case study from Nestlé Purina underscored private sector interest in supporting ocean restoration. The company has launched large-scale marine

ecosystem restoration programs in partnership with research foundations, demonstrating that businesses are motivated not only by compliance but also by the need for long-term resilience in their supply chains. The presentation emphasized that corporate actors are increasingly seeking authentic, science-based, and measurable restoration outcomes, creating opportunities for high-quality voluntary markets.

6.8. In conclusion, the presentation emphasized that Europe is moving rapidly toward regulation-led marine restoration, with Nature Credits and corporate-NGO partnerships emerging as powerful tools. It drew parallels between European developments and the Japan Blue Economy Association's J-Blue Credits, which already embody many of the principles now being considered in Europe, including national GHG integration, scientific rigor, and ecosystem service monetization.

6.9. The discussion highlighted the need for East Asian Seas countries to monitor and engage with these evolving frameworks, both as a source of innovation and as a benchmark for building credible, regionally adapted blue carbon markets. Mr. Takeda emphasized that Europe is developing its own legislation-centric ways to drive restoration, with Nature Credits as one tool.

6.10. Following Mr. Takeda's presentation, Dr. Mat Vanderklift of the Indian Ocean Rim Association (IORA) Blue Carbon Hub shared the various frameworks for Blue Carbon Finance in the Indo-Pacific Region.

6.11. The presentation began by situating blue carbon finance within the broader landscape of nature finance, noting that current investments are largely driven by public sector funding, while carbon markets contribute less than 1% of total finance for ecosystem restoration and conservation. Despite this, there is growing private sector interest in financing nature repair, driven by rising demand for credible, climate-positive investment options.

6.12. A key theme explored was the link between climate policy frameworks and finance, particularly the Paris Agreement's mandate to reduce emissions by 43% by 2030, and how Nationally Determined Contributions (NDCs) can serve as an anchor for blue carbon financing strategies. The presentation outlined how IPCC greenhouse gas inventory guidelines help measure carbon pools and fluxes, which are essential for both national GHG inventories and voluntary or compliance market participation.

6.13. Dr. Vanderklift highlighted the importance of bridging national inventory systems with market-based methodologies, referencing established schemes like Australia's Carbon Credit Unit Scheme and Thailand's Voluntary Emission Reduction Program as examples of how national frameworks can align with international standards to generate tradable credits. However, it was emphasized that not all blue carbon projects are suitable for market mechanisms, and that integrity, sustainability, and contextual fit should guide project selection.

6.14. Furthermore, he examined how nature markets function in the blue economy, noting parallels to climate finance and emphasizing the need for high-integrity supply and transparent governance. Several actions that governments can take to foster credible blue carbon markets include: (1) developing enabling policies and regulation, (2) strengthening demand through offtake agreements or price floors, (3) providing catalytic finance and technical support, (4) clarifying legal and tenure rights while ensuring equitable benefit sharing, and (5) funding robust national accounting systems to support accurate emissions reporting.

6.15. Dr. Vanderklift concluded by calling for a balance between carbon finance and broader ecosystem service values, cautioning against treating carbon purely as a commodity. He emphasized the need for blue carbon finance mechanisms that support climate-positive livelihoods, integrate social co-benefits, and ensure that markets contribute meaningfully to sustainable development goals.

6.16. **Discussion:**

6.17. Dr. Yonvitner raised a foundational question about how to define and price complex versus singular ecosystems within a standardized crediting system. He expressed concern over whether dominant ecosystems should be prioritized over mixed systems, and how similar ecosystems in different locations—though ecologically comparable—might differ significantly in quality and value. He questioned the feasibility of assigning equal pricing to ecosystems assessed with similar techniques, suggesting that valuation must also consider local socio-ecological dynamics.

6.18. Mr. Brian Takeda responded that nature defies strict standardization, as ecosystems often overlap and blend. While carbon can be standardized as a measurable unit (e.g., a ton of CO_2), biodiversity and other co-benefits vary greatly by context. He advocated for a dual-track approach: standardize carbon methodologies (as Japan's J-Blue Credit System does) while allowing flexibility for local stakeholders to determine which co-benefits (e.g., nutrient absorption, cultural values) to include. He emphasized the importance of preserving local choice and adaptability, noting that different bays or ecosystems—even if adjacent—can yield different value priorities.

6.19. On the issue of mixed ecosystems, he suggested that categorization into defined ecosystem types (e.g., mangrove, seagrass) is a human construct. Rather than forcing standard categories, it should be up to governments and communities to decide how to define and manage their ecosystems. He acknowledged the complexity but maintained that the current system should focus on carbon as the base metric, with other services layered based on context.

6.20. Dr. Furukawa shared an example from Japan where ecosystem valuation is handled using Integrated Eavaluation Method for Coastal Ecosystem Services (IMECES). In this approach, standardized value categories are used, but communities are consulted to

assign contextual weights to what matters most locally. This method ensures that values are customized to the region while retaining structural coherence for comparison.

6.21. Dr. Matt Vanderklift supported Takeda's points, stating that climate finance standardization is simpler because everything ties back to a carbon dioxide equivalent. However, biodiversity is far more complex. He noted that the Kunming-Montreal Global Biodiversity Framework uses area restored as a proxy metric, as species-level biodiversity measurement is often not practical or scalable. He proposed that the climate finance concept of "additionality"—rewarding restoration of degraded systems—could be adapted to nature finance but flagged that current models fail to reward good stewardship of already healthy ecosystems. He suggested introducing stewardship credits as a way to finance the continued care of intact, high-quality ecosystems.

6.22. Mr. Takeda responded with a critical distinction between stewardship and avoidance credits. He acknowledged that while avoidance credits (rewarding people for not degrading nature) were once popular, they faced scrutiny over inflated claims and integrity issues, leading to declining interest. In contrast, stewardship credits—which reward ongoing positive behavior—could serve as a credible alternative. He supported exploring this concept further within PEMSEA's framework, stating it offers a more equitable approach to rewarding conservation.

6.23. Dr. Furukawa concluded by affirming that within the PEMSEA framework, "conservation credit" is being used as a simplified term that can include stewardship-oriented mechanisms. He welcomed further contributions on how to operationalize this in the broader blue carbon ecosystem services management context and closed the session in preparation for the upcoming panel discussion.

6.24. **Panel discussion**

6.25. Dr. Furukawa opened the panel with three guide questions for the TWG members:

- How do we maintain interaction across regional, national, and local levels, especially within existing legal frameworks?
- What code of conduct should govern blue carbon ecosystem crediting and market transactions? and
- What technical challenges exist in valuing complex ecosystem services?

6.26. Mr. Cole Yokingco of Conservation International Philippines emphasized the need for a regional body like PEMSEA to serve as a communication hub between regional certification systems and national authorities, especially during implementation and validation phases. He highlighted that coordination across Article 6 mechanisms and national GHG inventories requires robust data sharing and consistency. He also raised the need for a code of conduct that accounts for varying legal interpretations (e.g.,

indigenous rights to carbon benefits) and buyer responsibilities. He questioned how ecosystem equivalencies would be assessed in a market context and suggested using carbon as the base unit while allowing market localization to avoid conflicts.

6.27. Mr. Le Dai Thang shared that Vietnam lacks foundational knowledge and capacity on coastal and marine blue carbon and is currently "starting from zero." He requested support in developing pilot sites, methodologies, and basic inventories. He stressed the need for capacity-building programs and technical guidance, including information on credit calculation, area requirements, and finance mechanisms. He also advocated for bilateral cooperation on pilots and knowledge sharing.

6.28. Dr. Nguyen My Hang echoed the call for technical support from developed countries, emphasizing the knowledge and equipment gap. She indicated the importance of building capacity from the bottom up and learning from models like Japan's JBlue. She requested assistance in accessing regulations, standards, and technical tools.

6.29. Prof. Guanghui Lin emphasized that blue carbon is still an evolving field, with ecosystem definitions expanding rapidly. He referred to international standards (e.g., IPCC Wetlands Guidelines) and noted that the creation of coastal blue carbon network could help harmonize capacity-building, science, and market development. He suggested establishing a regional knowledge platform (e.g., Asian Blue Carbon Network) and urged open collaboration, particularly between developed and developing countries.

6.30. Dr. Malou McGlone stressed that capacity building is a critical first step. She supported the idea of forming a more organized regional blue carbon network that can facilitate knowledge exchange and ensure alignment in understanding and implementation.

6.31. Dr. Yonvitner proposed that regional standards must reflect national needs and contexts, harmonized with international benchmarks. He suggested leveraging PEMSEA's coordination role to institutionalize collaboration between learning centers and governments. He highlighted recent training events (e.g., in Thailand, supported by the University of Hawaii) and recommended developing a regional competency framework to guide country-level engagement.

6.32. Mr. Brian Takeda raised the need for PEMSEA to help governments engage with multilateral funders (e.g., ADB, World Bank), noting that development banks often require official government backing to proceed with funding. He suggested PEMSEA could act as a facilitator in this regard.

6.33. Mr. Guo mentioned that funding from regional development banks such as ADB may not always be feasible, particularly for loans under sovereign credit. He implied that alternative financing models may be required, particularly ones tailored to regional

institutional settings.

6.34. Ms. Aimee Gonzales confirmed that PEMSEA, through the East Asian Seas Partnership Council, is mandated to help align regional projects with national priorities and facilitate access to donors. It was acknowledged that there are ongoing discussions with partners and expressed optimism for securing support, especially once the Blue Carbon Technical Working Group provides clearer project directions.

6.35. Mr. Yokingco added that ADB may offer off-take agreements to help de-risk carbon projects, which PEMSEA could explore as part of its pilot initiatives.

6.36. Dr. Furukawa closed by emphasizing that while carbon credit governance is a national responsibility, PEMSEA can serve as a regional mechanism for coordination and capacity building. He reiterated the importance of developing pilot projects and enhancing local capacity, and thanked both in-person and online participants for their valuable contributions.

6.37. **Session 4 Summary:** The discussion stressed the urgent need for a credible, regionally adapted blue carbon certification mechanism to unlock climate and economic benefits from coastal ecosystems in the East Asian Seas. Japan's J-Blue Credit system showcased a high-integrity model based on verified CO_2 removals, scientific rigor, and strong community participation, offering valuable lessons for PEMSEA's proposed certification approach. PEMSEA's system, grounded in its coastal governance experience, aims to provide a voluntary, inclusive, and transparent certification pathway aligned with international standards but tailored to regional realities.

6.38. Complementing these insights, the session also highlighted the growing global momentum around finance-driven ecosystem restoration, with emerging regulatory and voluntary frameworks from Europe and the Indo-Pacific informing efforts in the region. Case studies from Norway, the EU, and the UK illustrated how national policy, corporate engagement, and nature credit systems are driving marine rehabilitation. The IORA Blue Carbon Hub emphasized the need to align carbon finance with national GHG inventories and sustainable development goals.

6.39. Discussions highlighted the importance of credible methodologies, equitable benefit sharing, capacity development, and regional coordination. Stakeholders recognized PEMSEA's pivotal role in facilitating technical harmonization, knowledge exchange, and donor engagement to support credible and inclusive blue carbon markets.

6.40. With support from governments, communities, and technical institutions, PEMSEA's mechanism has strong potential to drive climate ambition, improve local livelihoods, and enhance marine ecosystem resilience.

6.41. **Session 4 Recommendations:**

6.42. **Prioritize High-Integrity Certification Systems**: Countries and stakeholders should adopt scientifically rigorous, transparent, and community-inclusive methodologies—such as those used in Japan's J-Blue Credit system—to ensure long-term credibility, higher carbon prices, and stronger investor confidence.

6.43. **Establish Regionally Tailored Certification Infrastructure**: PEMSEA should move forward with the development of its Blue Carbon Certification (BCC) system by finalizing protocols, procedures, and governance structures aligned with regional ecological realities and international standards, ensuring flexibility for both large-scale and grassroots projects.

6.44. **Integrate Co-Benefits into Valuation Frameworks**: The certification system should account not only for carbon sequestration but also for stackable ecosystem services (e.g., biodiversity, fisheries, cultural value) using best-available science and proxy indicators to enhance project value and attract broader investment. Mechanisms such as stewardship credits should also be explored to reward the long-term care of intact, high-quality ecosystems.

6.45. **Develop a Tiered Crediting and Claiming Approach**: To balance integrity and inclusivity, consider differentiated credit claiming rules (e.g., full credit for buyers with verified emissions reduction plans; partial for others) and tiered MRV methodologies that allow small-scale and low-resource projects to participate credibly.

6.46. **Strengthen Capacity Building and Scientific Expertise**: Invest in multi-level training for project developers, auditors, and technical agencies—particularly in areas such as marine ecosystem monitoring, carbon accounting, and restoration—to ensure robust implementation and long-term program sustainability. Targeted capacity-building initiatives—including pilot projects, training programs, and institutional partnerships—should be embedded in the system design to support readiness across diverse country contexts, especially for those starting from low baselines.

6.47. **Launch Pilot Projects and Knowledge Exchange Platforms**: Initiate pilot certifications across diverse ecosystems and country contexts to refine methodologies and foster shared learning. Establish regional platforms for knowledge exchange, drawing on JBE's experience and involving partners like academic institutions and national agencies. PEMSEA should operationalize a regional knowledge and coordination platform to harmonize certification standards, consolidate learning, and support consistent implementation across countries.

6.48. **Promote Public-Private Partnerships and Long-Term Investment**: Encourage corporate engagement not just as credit buyers but as co-investors in project design and restoration. Explore long-term financing models (e.g., 60–100 years) and promote partnerships that combine restoration with innovation and local value-add. PEMSEA should leverage its convening power to secure catalytic funding, facilitate engagement

with donors and development banks, and ensure that financial instruments—such as offtake agreements—are accessible to support certified projects.

6.49. **Clarify Institutional Roles and Integration with Existing Mechanisms**: Determine how the PEMSEA certification system will link with regional initiatives like the BCESM mechanism and obtain endorsement from the EAS Partnership Council to ensure coherence, legitimacy, and policy alignment.

6.50. **Ensure Transparency and Traceability in Credit Markets**: Adopt blockchain or similarly transparent systems to track credit issuance, transfer, and retirement. Consider design features such as one-time trading rules and disclosure requirements to safeguard market integrity. The system should include a clear code of conduct and governance structure to ensure transparent transactions, define legal and tenure rights, protect community interests, and guide buyer and seller responsibilities.

6.51. **Plan for Scalable Implementation**: Design the certification program for long-term scalability by developing a business plan, outreach strategy, and mechanisms for third-party verifier accreditation, ensuring wide adoption across ASEAN and other coastal regions.

7. Session 5: Planning for Next Steps

7.1. Summaries of discussions and key takeaways, particularly identification of priority activities, enabling mechanisms and timelines for the PEMSEA Blue Carbon Program were presented on the following agenda:

- Improvements to the concept of a PEMSEA Blue Carbon Program, particularly the Blue Carbon Ecosystem Services Management Mechanism and Roadmap;
- Concept note of a regional BC network
- Work-in-progress towards a refined regional blue carbon accounting protocol
- PNLG: Priority areas for conservation and restoration and the roles of the PNLG members
- PNLC: Areas for Engagement: Capacity and Skills Development
- Presentation of TWG workplan for 2025 and medium-term workplan up to 2027

7.2. ***On enhancements to the Blue Carbon Ecosystem Services Management Mechanism and Roadmap***

7.3. Dr. Keita Furukawa presented the updated “zero draft” of the Blue Carbon Ecosystem Services Management Mechanism (BCESMM), incorporating key feedback and insights from the TWG discussions. He emphasized that the framework remains under refinement and encourages continued inputs ahead of formalization.

7.4. Key feedback points from the TWG included the following:

- Clarification of ecosystem services and co-benefits: The need to better articulate the types of ecosystem services and co-benefits provided by various blue carbon ecosystems (e.g., mangroves, seagrasses, salt marshes, macroalgae). These include climate regulation, biodiversity, disaster risk reduction, and community livelihoods, among others. Future iterations of the framework will incorporate clearer typologies and valuation pathways.

- Strengthening global-to-local coherence**:** One of the key feedback points was the need to strengthen how the BCESMM links local actions with national policies (e.g., NDCs, NBSAPs) and global agendas (e.g., Paris Agreement, GBF). Dr. Furukawa noted that many countries have distinct blue carbon strategies and that the mechanism should help harmonize these efforts within a regional system.

- Roadmap refinement: The updated roadmap was structured around immediate, medium-term, and long-term actions, particularly in reporting, certification, recording, and marketing of blue carbon services. The pathway allows for gradual scaling based on readiness and capacity, rather than a one-size-fits-all approach.

- Roles in the enabling framework: Dr. Furukawa clarified the institutional architecture underpinning the BCESMM. PEMSEA will coordinate the enabling framework, leveraging its SDSC and communications strategies. National governments and partners (e.g., PNLC, PNLG, non-country partners) will contribute to project implementation, technical certification, and knowledge exchange.

- Recommendation to initiate pilot studies: A major outcome of the TWG was the agreement to launch pilot model studies to test and refine reporting, certification, and valuation methodologies. These pilots will start with Tier 1 (simpler) methods using available data and progressively adopt more robust protocols.

- Use of existing systems and networks: The presentation encouraged leveraging current data systems and networks such as those from the Blue Cares project in the Philippines and Indonesia. Localized data repositories and national registries will play a central role in early-stage implementation.

- Site selection and PEMSEA coordination: It was proposed that candidate sites for pilots be nominated based on baseline data availability and national interest. PEMSEA may coordinate site selection, mobilize funding, and support local capacity building through bilateral and multilateral channels.

- Scaling up and next steps: For the mid- to long-term, Dr. Furukawa envisioned scaling implementation through a regional learning platform, building national databases, and expanding governance models to accommodate more complex crediting systems.

7.5. Dr. Furukawa acknowledged that the current draft is not final and welcomed further technical feedback and political buy-in. The goal is to consolidate all feedback into the next version of the BCESMM, with the aim of reaching consensus prior to presenting to the 17th EAS Partnership Council Meeting in July 2025.

7.6. Additional feedback on the refined mechanism included the following:

7.7. Emphasis on Bottom-up and Stepwise Approach. Several members stressed the importance of adopting a bottom-up strategy, starting from pilot implementation at the local level (e.g., through PNLG and PNLC members), respecting local enabling conditions and legal safeguards. The framework was likewise commended for its stepwise structure—beginning with simplified pilot models and gradually expanding based on learning and success.

7.8. Balance of Top-down and Bottom-up Governance. Dr. Furukawa and others highlighted the dual role of regional organizations like PEMSEA: to provide coordination and structure (top-down), while empowering local actors and communities (bottom-up).

7.9. Support for Voluntary Credits Contributing to NDCs. A strong point was raised that if science-based verification is robust, then voluntary blue carbon credits should be eligible for contributing to national NDCs. This linkage was viewed as critical to ensure local actions align with global climate commitments.

7.10. Legal Clarity and Safeguards. It was recommended to conduct legal assessments to clarify the definition, ownership, and categorization of blue carbon credits, which vary across countries. This was seen as essential for credibility and safeguard implementation.

7.11. Voluntary Contributions from TWG Members

- Mr. Guanghui Lin (China) expressed willingness to co-lead the legal assessment, potentially coordinating with Chinese institutions such as CIAE.
- Conservation International (CI) was invited to consider co-producing the legal review and to mobilize contacts or resources in support of technical workstreams.
- Haikou City (China) was mentioned as a possible local government pilot site, with potential volunteer involvement in pilot testing.
- Additional support was requested from non-country partners and academic institutions to contribute to capacity development, technical validation, and pilot coordination.

7.12. Pilot Projects as Key Next Step

- There was consensus that pilot testing is an immediate priority to validate the framework's application on the ground. This would include model studies on: (1) Reporting, verification, and certification; (2) Local marketing strategies; and (3) use of existing data and networks (e.g., BlueCARES in the Philippines and Indonesia).

7.13. Dr. Furukawa and Ms. Aimee Gonzales reiterated that this framework remains a working document. Stakeholders are encouraged to continue providing inputs before final presentation to the EAS Partnership Council during its 17th Meeting in July 22-23, 2025. The updated BCESMM is shown in Figure 3 below.

BCESM (BCP)	BCES Reporting (BC Accounting Mech.)	BCES Certification	BCES Recording (BC Accounting Mech.)	BCES Marketing (Supply & Demand)	BCES Project Development
Immediate (2023-2025)	• Stack the supply of BCESs in PEMSEA/s ICM learning sites with the help of PNLC and PNLG members has been assessed • Basic protocol of State of Blue Carbon Ecosystem Service Status (SOBCE) has been developed	• An outline on BC certification has been prepared for mangrove forests and seagrass bed • An outline on BC certification has been studied for seaweed/kelp bed, aquaculture, tidal flats, and saltmarshes	• A basic database of BC ecosystem services has been designed based on SOC format	• A market demand study on blue carbon ecosystems has been done	• Nomination of Pilot Project site from CPs • Mining available base-line data from Global DB, NCPs, and Research Projects • Search for Funding/Voluntary commitments • Legal assessment
Medium-term (2026-2029)	• Blue carbon in each countries has been assessed • SOBCE has been implemented in each country	• BC certification process has been implemented with third party certificate committee	• A basic database of BC ecosystem services has been implemented	• Closed market for partners has been implemented	• Implementation of Pilot Project • local/National based Market exercise
Long-term (2030-2034)	• Blue carbon supply status and future projection has been assessed • Updates of SOBCE	• BC certification process has • been open for global arena	• An advanced database of BC ecosystem services has been designed/implemented	• Open market for EAS region has been implemented	• Scaling up of BCES Projects • Extended market in EAS region
PEMSEA Support Services	• Methodology Development and Capacity Building • Assessment • Monitoring Network • Support: Research, Hardware (equipment, labs, etc.)	• Protocols • Capacity-building – Assessors – Managers (project) – Auditors - Trainers • Certifying - Valuation/ credits/ projects - Assessors - Auditors - Markets	• Database/Registry – Valuation/ (BC and ecosystem services/sites) – Credits – Market • Research and information platform	• Marketing and Communications • Partnership-building • Vetting/certifying of market players • Market mechanism • Code of conduct/ manual for trade (?) • Capacity-building • (database)	• Information gathering through CPs/NCPs • Matching between candidate sites (w/PNLG) and technical support (w/PNLC)

Figure 3. Refined Blue Carbon Ecosystem Services Mechanism Roadmap

7.14. ***On establishing a Blue Carbon Monitoring Network***

7.15. Dr. Yuxing Wang of NMHMS introduced a concept note proposing the establishment of the "East Asian Seas Blue Carbon Monitoring Network" as part of or complementary to the Blue Carbon Ecosystem Services Management Mechanism (BCESMM), based on the inputs from Session 2 of the meeting.

7.16. The concept aims to establish a shared, voluntary, and mutually beneficial regional framework for blue carbon monitoring and data exchange in the EAS region. The network will respond to three pressing challenges: (1) lack of data and technical standards, (2) limited resources and restoration measures, and (3) insufficient regional capacity to meet carbon sequestration commitments.

7.17. Key roles and activities of the monitoring network include:

- Establishing unified methodologies for blue carbon measurement, monitoring, and certification;
- Creating recurrent blue carbon status assessments with synchronized camera and storage systems
- Strengthening monitoring capacity and management to support carbon trading and certification schemes; and promote innovation and exchange within the region; and
- Supporting pilot sites to test methodologies, assess sequestration potential, and inform national and regional baselines for climate commitments.

7.18. Dr. Wang outlined the following priorities to establish the network:

- Facilitate the exchange of best practices and technological innovations among regional partners.
- Identify key regions for blue carbon restoration and co-benefits, including biodiversity and community benefits.
- Enhance national capacity to fulfill global carbon commitments through targeted pilot sites and regional cooperation.

7.19. Furthermore, Dr. Wang outlined the immediate next steps:

- Prepare and circulate a refined concept paper incorporating feedback from the TWG.
- Form a core group or task force to refine the framework, solicit voluntary partners, and co-develop a work plan.
- Launch pilot projects to test the framework, collect data, and adjust strategies based on implementation learnings.

7.20. Dr. Wang emphasized the importance of collaboration, inviting TWG members and partners to contribute to co-developing the concept. She highlighted the potential for countries like the Philippines and China (drawing from existing initiatives such as Blue Cares) to play active roles in piloting and data-sharing. A regional online platform is proposed for harmonizing data access and facilitating long-term cooperation on blue carbon monitoring.

7.21. Feedback on the concept notes were as follows:

7.22. <u>On establishing a BC Monitoring Network</u>

7.23. A question was raised whether the proposed network should function as a standalone initiative or be integrated as a supporting component within the broader Blue Carbon Ecosystem Services Management Mechanism (BCESMM).

7.24. The proposed network should support operational and technical aspects of blue carbon accounting, serving as a backbone for science-based methodologies and regional standardization.

7.25. Participants supported linking the network to a broader umbrella framework that includes blue carbon accounting systems, technical guidelines, ecosystem service valuation, and implementation tools. This umbrella approach was encouraged to ensure that supporting documents—such as technical guidelines—are aligned with monitoring efforts. The monitoring network should contribute to a more comprehensive suite of tools under the BCESMM, enhancing credibility and coherence across countries.

7.26. Mr. Yuanqing Hou suggested that the term “monitoring network” may be too limited and proposed using “Blue Carbon Network” to reflect a more holistic, multidimensional approach. The revised name would better accommodate knowledge exchange, technology adoption, policy harmonization, and piloting beyond just data collection.

7.27. A recommendation was raised to leverage existing international networks such as Conservation International, The Nature Conservancy (TNC), and the Intergovernmental Oceanographic Commission (IOC), who have existing knowledge products, to contribute to the network and provide technical inputs and collaboration on methodology and monitoring standards.

7.28. On BC monitoring vis-a-vis the BCESMM

7.29. The framework was commended for its recognition of the unique ecological and socio-political contexts in the East Asian Seas, such as seaweed systems and agriculture. Several participants emphasized that methodologies must reflect local conditions, especially regarding ecosystem types, land and sea use, and community rights.

7.30. Mr. Yinfeng Guo emphasized the need to include additional information on protocols for salt marshes, and mentioned that NMHMS could coordinate with relevant experts who may be able to develop that section in the regional protocol.

7.31. Mr. John Colin Yokingco highlighted the need to collect case studies - including both success stories and attempts in BC monitoring - to be able to identify gaps and opportunities that the network may address.

7.32. Recognizing the complexity of blue carbon accounting, which varies across countries, participants agreed on the need for methodological flexibility, allowing localized calibration of parameters while still adhering to common principles for MRV (Measurement, Reporting, and Verification).

7.33. On inquiries about affordable GHG monitoring tools in China, noting the high cost of importing AD towers from the US/Germany, Prof. Guanghui Lin shared that several Chinese companies are now developing reliable, lower-cost carbon flux and GHG measurement equipment domestically. Estimated costs have been halved with the use of domestic technologies like eddy covariance systems and analyzers.Projected further price drops and commercialization in the coming years due to market competition and domestic innovation.

7.34. Prof. Lin volunteered to serve as a liaison between the network and Chinese technology manufacturers/suppliers and offered to facilitate pilot studies of new GHG monitoring technology for testing in selected sites. This gesture was welcomed as a strategic contribution to the technical foundation of the Blue Carbon Network.

7.35. ***On PNLC Area Engagement: Capacity and Skill Development***

7.36. Dr. Yonvitner, President of the PNLC presented key areas of engagement where the PEMSEA Network of Learning Centers can support the implementation of the BCESMM, namely:

7.37. The establishment of a standardized blue carbon certification system, with PEMSEA managing a regional Blue Carbon Unit to consolidate and oversee certification processes. PNLCs are encouraged to contribute to developing and delivering capacity-building components of this system.

7.38. PNLC institutions could be the core actors in rolling out blue carbon curricula, training modules, and certification programs. Universities may serve as training sites, offer introductory and advanced courses, and support field implementation.

7.39. PNLC members can undergo a tiered training system —from basic awareness to assessor and verifier levels—aligned with regional standards. PNLCs can host summer programs, integrate blue carbon into formal education, and help standardize competencies across the region.

7.40. The importance of integrating traditional and community knowledge (e.g., from Indonesia and Vietnam) into planning and capacity development. PNLCs are encouraged to facilitate local engagement and contextual adaptation of blue carbon approaches.

7.41. Collaboration among universities, governments, NGOs, and communities. The system is open to voluntary participation, with PNLCs invited to nominate members or institutions to take part in training and curriculum development.

7.42. Engagement will be on an invitation basis, but interested PNLC members are encouraged to contact PEMSEA or the PNLC secretariat. Potential contributions include training delivery, curriculum design, research, and technical validation support.

7.43. Summary of Agreements and proposed Workplan for 2025-2026 of the BC TWG

7.44. Dr. Keita Furukawa shared a brief summary of the key agreements of the meeting:

- There is consensus among participants to explore a wider ecosystem credit or "nature credit" framework that better reflects ecosystem services, recognizing that diverse terminologies and approaches can support more integrated and holistic management.

- The TWG affirmed the pursuit of voluntary blue carbon credits, provided they are grounded in robust scientific methodologies. These credits—particularly those linked to ecosystem services—should be positioned for inclusion in national climate reporting systems such as NDCs and carbon inventories, balancing scientific rigor with practical implementation feasibility.

- The TWG agreed to initiate a Blue Carbon Ecosystem pilot project to demonstrate regional capacity and leadership in nature-based climate solutions. The pilot aims to showcase how the East Asian Seas region can contribute to global blue carbon efforts and promote sustainable ocean-based development.

7.45. Dr. Furkawa concluded by requesting consensus on these three key directions before elevating them to the Partnership Council at its upcoming meeting. All TWG members agreed with the directives.

7.46. Ms. Abigail Cruzada, PEMSEA Secretariat Coordinator, then presented the proposed workplan for the BC TWG for 2025-2026 based on the inputs and refinements agreed upon in the meeting (Figure 4), emphasizing that the workplan will still be refined after all inputs are noted in the afternoon workshop on the BC Regional protocol and the development of proceedings.

Component	Target Activities
Governance	• Refining the BCESM • Regular BC TWG Meetings (TBC) • BC Core Group Meetings for specific tasks • Coordination • Present workplan on BCP for review and approval at the 17th EAS Partnership Council (July 22) and Executive Committee (October)
BCES Reporting	• Refining of the RBCAP with TWG members and partners (PNLC BC experts, other collaborators) • Present refined RBCAP to EAS PC for review/consensus • Identification of pilot sites • BC Accounting protocol pilot-testing • Assessment of current status and needs to establish a regional BC monitoring network
BCES Certification	• Review and seek consensus on BC Certification Concept note • Draft guidelines/business plan outline
BCES Recording	- Design a basic database of BC ecosystem services - Discussions on other protocol: project development, ecosystem services valuation
BCES Marketing	• Market demand study on blue carbon ecosystems **Report of the Coastal Blue Carbon Observation and Research Alliance**

Figure 4. PEMSEA BC TWG Workplan for 2025-2026 (Draft)

7.47. In addition to this, Ms. Aimee Gonzales added that the PEMSEA Network of Local Governments will be holding their annual Forum on September 16-18, 2025 in Jakarta, Indonesia, where PEMSEA will have the opportunity to market, disseminate and seek for volunteer pilot sites to implement the regional accounting protocol to our local government partners.

8. Closing of the Meeting

8.1. Dr. Suk-Jae Kwon, EAS Technical Session Co-Chair, who closed the meeting, expressed sincere appreciation to all participants, speakers, partners, and organizers for their active engagement and valuable contributions. He highlighted the meeting's significant progress in refining the Blue Carbon Ecosystem Services Management Mechanism (BCESMM), advancing regional accounting protocols, and laying the groundwork for a voluntary certification program and blue carbon network. He emphasized the importance of sustained collaboration as the group prepares for the 17th East Asian Seas Partnership Council Meeting and acknowledged the critical role of sponsors and TWG members in shaping the region's blue carbon agenda.

8.2. A closed workshop on refining the content and methodologies of the BC Regional Accounting protocol was conducted in the afternoon and participated by key technical experts from the BC TWG. Details of the workshop outputs may be viewed in the workshop report under Annex 4.

Annex

Annex 1 - Provisional Programme

Annex 2 - Presentation, meeting documents, and photos

Annex 3 - List of participants

Annex 4 - BC Protocol Workshop Report

(NOTE: If links are inaccessible, please email the PEMSEA Secretariat Coordinator at acruzada@pemsea.org to request the files)