

**International Blue Carbon Scientific Working Group
15th Annual Meeting
3-6 October 2023
Singapore
Meeting Report**

the
**BLUE
CARBON**
initiative

Coordinating organizations:



Workshop partner organization:



Funding organizations:



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International Blue Carbon Scientific Working Group

15th Annual Meeting

3-6 October 2023

Singapore

1. Background on the Blue Carbon Initiative

The [Blue Carbon Initiative](#) (BCI) is a global program addressing climate change through the restoration and conservation of coastal and marine ecosystems, specifically mangroves, salt marshes, and seagrasses. The Initiative is coordinated by Conservation International (CI), the International Union for Conservation of Nature (IUCN), and the Intergovernmental Oceanographic Commission of the United Nations Educational, Scientific, and Cultural Organization (IOC-UNESCO).

Since February 2011, the International Blue Carbon Scientific Working Group (IBCSWG) provides the scientific foundation for the BCI by synthesizing current and emerging science on blue carbon and by providing a robust scientific basis for coastal carbon conservation, management and assessment. The IBCSWG consists of globally recognized specialists in coastal carbon science, carbon accounting, remote sensing and international climate change policy. The working group builds scientific capacity and creates networks within blue carbon priority countries by collaborating with experts and government officials.

2. About the Meeting

The overarching goals of the IBCSWG are to advance blue carbon science, particularly as needed to facilitate climate-relevant policy and management, to expand blue carbon research collaboration, and to ensure the integration of blue carbon into international climate change actions. To that end, the IBCSWG held its 15th annual meeting in Singapore on October 3-6, 2023. Participants included Singaporean, regional and global (IBCSWG) scientists, donors, and partners. A total of 105 people from 20 countries attended the meeting throughout the week (74% participants from the region and 52% women). The meeting was also live streamed, with 20 additional remote attendees.

Discussion topics included current scientific issues related to blue carbon's role in climate action and what new information is needed to integrate blue carbon science in policymaking processes worldwide. The opening day of the meeting focused on building awareness in Singapore of the BCI's expertise and leadership in blue carbon, as well as opportunities for blue carbon in Singapore and Southeast Asia based on global experiences, and highlighted the new initiatives of the newly formed International Blue Carbon Institute (IBCI) based in Singapore. The second and third days comprised of working group sessions focused on the applications of existing and future knowledge for conservation, restoration and management of Blue Carbon ecosystems, and also identified contributions from the IBCSWG to close research gaps and strengthen Blue Carbon project implementation globally. On the final day, meeting participants visited the Sungei Buloh Wetland Reserve, and the IBCSWG coordinating committee held a closed session for Working Group members.

The IBCSWG would like to recognize and express its gratitude for the financial support provided by IUCN, IOC-UNESCO, the David and Lucile Packard Foundation, AWS, NASA and MAC3 Impact Philanthropies,

which enabled us to organize and run this very successful meeting. The Working Group is also grateful for the host partner, the IBCI. This meeting would not have been possible or as successful without their generous financial contributions and technical support.



Opening Day of the International Blue Carbon Scientific Working Group Meeting, 3 October 2023

3. Meeting summary

3.1. [Opening Day 1 – Tuesday, 3 October 2023](#)

The IBCSWG co-chairs, Emily Pidgeon and Steve Crooks, started the meeting by welcoming all participants. **Leo Tan** (National University of Singapore) led the opening by sharing reflections about the significance of this meeting being convened with experts in Singapore. The meeting co-organizers, **Kirsten Isensee (IOC-UNESCO)**, **Mauve Nightingale (IUCN)**, and **Emily Pidgeon (CI)**, then shared introduction remarks. They thanked the meeting host partner, Siti Maryam Yaakub and the IBCI, and thanked meeting funders for their generous support: the David and Lucile Packard Foundation, AWS, NASA and MAC3 Impact Philanthropies. **Richard Jeo (CI)** also gave welcome remarks and an overview of CI's work in the Asia Pacific region and the Singapore regional hub.

Emily Pidgeon and **Steve Crooks** gave an overview of the IBCSWG and the evolution of the scientific working group over last 13 years. The IBCSWG held its first meeting in Paris in 2010, and there is continuity of participants joining the annual meetings since then. Last year blue carbon was the largest event at COP27 in Egypt, and we continue to witness increasing attention on the topic over the years. The IBCSWG launched science around blue carbon and focuses on addressing questions being asked by policy makers and industry. The work being done includes development of manuals, partnerships, integrating blue carbon science into policy tools, connecting blue carbon to carbon markets, and methodologies and standards. The next challenge is scaling blue carbon globally with high-quality blue carbon principles and guidance.



Siti Maryam Yaakub gave an overview of the IBCI in Singapore. To achieve the impact we want across the world, leveraging blue carbon ecosystems to implement solutions, the IBCI focuses on four conceptual elements: enabling policy conditions, scaling high quality project implementation, large scale strategic financing, and building global capacity. By championing the pivotal role of blue carbon in carbon sequestration, biodiversity conservation, and coastal resilience, the IBCI provides knowledge and tools to scale blue carbon solutions worldwide. Partnering with scientists, organizations, local communities, and governments, the IBCI develops and informs effective policy, finance and implementation strategies for blue carbon ecosystems.

Steve Crooks facilitated the next session to provide a global overview of blue carbon and further understanding of blue carbon science, project development and international implementation. The session began with **Catherine Lovelock** sharing the fundamentals of blue carbon science, which has increased in complexity and diversity over time. There is spatial and temporal variation, and advances include those related to technology, core-benefits, socio-ecological systems, barriers to implementation, climate change impacts, and restoration. **Daniel Friess** then gave an overview of the international potential of blue carbon solutions versus implementation. Up to 20% of the world's mangroves could be protected by carbon financing through site-scale avoided deforestation projects. There are opportunities for over 300,000 ha of restorable area in Southeast Asia alone. There are about a dozen blue carbon projects around the world but not all are selling credits, and over 30 projects are undergoing verification. Following the global overviews, Leah Glass and Amy Schmid shared lessons learned from local mangrove projects. **Leah Glass** gave an overview of small-scale fishers and blue carbon in Madagascar, where 2 million artisanal fishers rely on 300,000 ha of mangroves. Communities must be empowered to take a leading role in management. Good governance takes time to nurture, and a multidisciplinary team is needed, combining traditional ecological knowledge and scientific observations to support mangrove restoration. **Amy Schmid** shared details about the Vida Manglar project in Colombia. Working with local communities was challenging as they are primary resource users and can be directly impacted by the project. Creating enabling conditions (e.g., policies), while having a clear understanding of who owns land and who has land tenure ensured the communities knew who owned the carbon before it was sold. Carbon credits should not be the only source of funding for a project. Science is just one piece required for a successful project, other pieces include transparent governance, financial viability and sustainability.

The following session, facilitated by **Siti Maryam Yaakub**, highlighted the latest blue carbon science and research priorities in Southeast Asia. **Daniel Murdiyarso** gave an overview of mangrove research in Southeast Asia, where despite a growing number of studies and methodologies in recent years, there are still knowledge gaps for many countries in the region. **Severino Salmo** then gave an overview of blue carbon research in the Philippines, where considerable funding for foreign researchers and 'helicopter science' is a concern. **Udhi Eko Hernawan** gave an overview of Seagrass Blue Carbon in Indonesia, where most studies are focused on biomass quantification. While there are many studies at the national level for seagrass carbon sediment, more local studies are needed. **Samantha Lai** gave an overview of the conservation of Singapore's blue carbon habitats. Singapore has a lot of marine habitats, mangroves, and

seagrass meadows. Singapore's national plan focuses on conservation of key habitats, community stewardship, research in conservation biology, habitat enhancement, restoration, and species recovery.

Jill Hamilton facilitated Session 4 on blue carbon in international policy and finance. She gave an overview of policy tools that enable blue carbon action and shared a summary of international and national policies crucial in implementing and achieving Nationally Determined Contributions (NDCs) and National Biodiversity Strategies and Action Plans (NBSAPs). Some international policy processes that are important for blue carbon are the UNFCCC, CBD, SDGs and Ramsar. **Andreas Hutahaean** shared developments in Indonesian blue carbon science and policy. The government launched a Blue Carbon initiative, a research group, and a stakeholder group with NGOs and private sectors. Blue carbon is now included in major policies and regulatory climate actions framework. **Miguel Cifuentes-Jara** shared about blue carbon practices in Costa Rica, which has introduced NDC targets and built a National Blue Carbon Strategy encompassing over 20 policy instruments to manage mangrove ecosystems, geared towards climate mitigation and adaptation, and GHG accounting and reporting. **Melissa Low** presented the Blue Carbon Framework for Singapore's national climate change policy. In 2022 Singapore set a net-zero emissions target. Singapore's blue carbon assessment showed the importance of mangroves and the potential for contributing to the country's GHG reporting and target. **Heidi Prislán** introduced the Commonwealth Blue Charter and Project Incubator, which assists governments in their transition to ocean sustainability, through the development and support of equitable, climate resistant projects. **Gary Addison** discussed the difficulty in raising capital and made suggestions including to focus on scalable initiatives, speak in a single voice to convey clear messages, engage governments, and promote stories of successful projects.

3.2. [Working Group Day 2 – Wednesday, October 4](#)

The second day of the meeting comprised of working group sessions and was started off by **Emily Pidgeon, Steve Crooks, and Kirsten Isensee** facilitating introductions and an initial discussion to frame the meeting and expectations for the working group members and guests. The IBCSWG meeting session objectives included to synthesize the most recent advances in seagrass science globally and in Southeast Asia, identify research priorities and opportunities for collaboration, identify current science gaps needed for blue carbon standards and methodologies and national implementation, update the BCI manual, co-design a collaborative implementation platform, and share lessons learned by science implemented by working group members.



Emily Pidgeon then facilitated an *In Memoriam* session for Professor Sir Miguel Fortes celebrating the ecosystems and places that were special to him, with comments from **Siti Maryam Yaakub, Severino Salmo, Jaymar Quevedo, Amir Aldrie,** and others. Miguel Fortes started teaching in 1970 and had 50 years of research and publications that addressed the scientific and social issues in the Philippines and the region. He mentored early career scientists in Southeast Asia and had a special

interest in communities that relied on seagrass. As President of the World Seagrass Association (WSA) when it was formed in 2002, he was instrumental in drafting the Bolinao Declaration that highlighted the importance of seagrass science and conservation. He cared about community knowledge and promoted women scientists' work. He also worked on capacity building of local communities for blue carbon projects in the Philippines, and on the nexus of blue carbon with society, policy, and governance in Malaysia.



*First underwater photo ca. 1897
by: Louis Marie Auguste Boutan*

Martin Dahl facilitated the next session focused on recent advances in seagrass science globally and in Southeast Asia. Seagrass science development started in 1867. Seagrasses are present on all continents except Antarctica, and globally there are over 70 species. Improvements in the conservation of seagrasses have been made in identifying cause-effect relationships of seagrass loss from human impacts, and increased understanding of socio-economic benefits (e.g. climate regulation and coastal control). There is a lack of high-resolution seagrass area distribution on a global scale, though there are new approaches for seagrass mapping (e.g. machine learning, drones, AUVs, citizen science). There is a need to strengthen conservation and restoration efforts, including through emphasizing ecosystem co-benefits and services. **Rohani Ambo Rappe** gave an overview of seagrass research in Indonesia, where there are 15 species of

seagrass. Most publications on seagrasses in Indonesia are by foreign researchers. Indonesia has few marine science related study programs and does not have sufficient equipment for blue carbon research at the local level. **Chanta Chroeng** presented on the status of seagrass in Cambodia, where there are 12 species and 14,000 ha of seagrass found at depth of up to 5 meters. There is a need to continue monitoring, further research seagrass habitats, and contribute mapping data to improve marine management strategies. **Serina Rahman** gave an overview of the socio-ecology of seagrass meadows in Singapore coastal communities of the Western Tebrau Strait, where there are 6-9 seagrass species recorded in 45 ha at subtidal and tidal areas. Local communities should be involved for better restoration site selection and long-term monitoring and protection. **Hillary Kennedy** shared updates on sediment organic carbon stocks in Turkey's *Posidonia oceanica* meadows. The vulnerability of *Posidonia* meadows along the Turkish coastline to climate change and anthropogenic activity is high. Baseline data is still needed, as only a few countries bordering the Mediterranean have estimates for their carbon stocks. **Johannes Krause** then shared an update on the global seagrass carbon stocks database. Plant traits are important predictors of seagrass carbon stocks, and persistent and large species have traits related to higher carbon stocks. Bioregion and species identity are important predictors of carbon stocks. Johannes will continue exploring this further with the seagrass subgroup.

The next session on Blue Carbon Science Leadership was facilitated by **Kirsten Isensee** who emphasized the importance of regional collaboration for blue carbon centers to inform and build on local, regional and global capacities and research initiatives. **Guanghai Lin** shared on the Hainan International Blue Carbon Research Center, which was launched in 2022 to increase blue carbon research capacity and promote domestic and international collaboration on blue carbon science. **Virni Budi Arifanti** shared on Indonesia's World Mangrove Center, established in 2022 to align global mangrove efforts and research. **Mat Vanderklift** shared on the Indian Ocean Rim Association (IORA) Blue Carbon Hub, which aims to be a knowledge hub to generate and integrate best practices as well as capacity building and awareness,

focusing on livelihoods, mitigation, and adaptation. **Siti Maryam Yaakub** reiterated the IBCI priorities and brought attention to the 3 work pillars of the IBCI: science and innovation, capacity development, and networks and partnerships. **Elisabetta Bonotto** presented on the [International Partnership for Blue Carbon](#) (IPBC), which works at the international level (increasing global commitments), national level (translating commitments into national policies), and locally (implementing and accelerating restoration activities). The IPBC provides an open forum for government agencies, non-governmental organizations, intergovernmental organizations and research institutions to connect, share and collaborate to build solutions, take action and benefit from the experience and expertise of the global community. **Miguel Cifuentes-Jara** shared on the Global Ocean Decade Programme for Blue Carbon (GO-BC), which aims to co-design new research, coordinate capacity building, and communicate and deliver outputs to policy makers. **Steve Canty** shared on the Mangrove Breakthrough, with the goals to halt loss, restore half of recent losses, and double mangrove protection. During COP28 in December governments will be supporting and sign the Mangrove Breakthrough Declaration.

3.3. [Working Group Day 3 – Thursday, October 5](#)

Daniel Friess facilitated the morning session on scientific elements for blue carbon country implementation, identifying current science gaps needed for blue carbon standards and methodologies, and national implementation. **Catherine Lovelock** gave an overview of Australia's Blue Carbon Method and the carbon abatement from restoring wetlands. The government is investing in new remote sensing products and a new national saltmarsh map. **Leah Glass** gave an overview of sea level rise and how the VCS tidal wetland methodologies require projects to model, monitor and account for the impact of sea level rise on project carbon stocks. **Amy Schmid** led a discussion on science needs for developing methods and standards for blue carbon in other ocean ecosystems. **Dixon Gevana** gave an overview of Philippines blue carbon governance. Coastal mangroves challenges include sediment loss due to black sand mining, seawall disrupted hydrology and displacing mangroves. These challenges are mostly related to governance, which is now improving with the recognition of ecosystem values and the implementation of community-based forest management. **Frida Sidik** presented the Indonesia Blue Carbon Strategy and challenges including a lack of regulatory framework to support blue carbon incorporated into policy and national GHG accounting. **Tom Hickey** discussed Pew's Coastal wetlands and coral reefs project. Pew works in partnership with local collaborators for local-specific needs and focuses on NDCs, including in Belize and Seychelles. **Steve Crooks** gave an overview of the US Government Transparency Accelerator for GHG Inventories, the EPA capacity building initiative to help developing countries establish, maintain, and improve sustainable GHG inventory management systems that enable high-quality inventory reports, consistent with the 2006 IPCC Guidelines for National Greenhouse Gas Inventories.



The next session focused on updating the Coastal Blue Carbon Field Manual. **Mark Beeston** outlined the steps and content necessary to update the BCI methods manual for assessing carbon stocks and emissions in blue carbon ecosystems. After collecting feedback from the group over the next couple months, in 2024 Mark will review existing content and create a schedule to write and integrate new content.

The next session focused on a transformative Blue Carbon platform, and codesigning it to develop science-based, high-quality blue carbon projects to deliver benefits for people and sustainability of blue carbon ecosystems. Facilitator **Daniel Murdiyarto** began with a brief history of the Blue Carbon Transformative Partnership Platform. He provided an overview of CIFOR-ICRAF's activities, including their geographical focus, knowledge generation through capacity building, fostering a collaborative network in relevant fields, and facilitating stakeholder engagement to advance the cause of blue carbon ecosystems in mitigating and adapting to climate change. Additionally, he discussed their efforts in developing science-based, high-quality blue carbon projects. Daniel led a discussion with **Siti Maryam Yaakub, Steve Crooks, and Novi Susetyo Adi** that focused on generating knowledge on blue carbon, facilitating open science-policy dialogues, exploring community business models, and building networks and collaborations to drive positive change in blue carbon.

Frida Sidik facilitated the last session on Blue Carbon science updates to learn from examples of new research conducted globally by working group members. **Milica Stankovic** presented blue carbon assessments of seagrass and mangrove ecosystems in South and Southeast Asia. Considerable research has been done in the region on mangroves, but seagrass data is missing in most countries in the region. **Anthony Campbell** presented on the NASA Carbon Monitoring System working group research on the carbon cycle, monitoring and mapping salt marshes change and carbon emissions with earth observation and focused on salt marsh loss over time. **Virni Arifanti** shared an update on mangrove conservation and restoration in Indonesia, where total mangrove area is 3 million ha, and represents 80% of tropical mangrove species in the world. As deforestation currently exceeds reforestation, avoiding mangrove deforestation and degradation is the highest mitigation potential to achieve the NDC targets. **Richard Bellerby** presented on co-produced evidence needs and habitat-knowledge towards climate-smart blue carbon ecosystem restoration activities in Norway, focusing on coastal kelp ecosystems and mariculture. **Lindsey Smart** gave an overview of saltwater intrusion and “ghost forests”, the result of the salinization of freshwater ecosystems. Salinization can have impacts including coastal forest loss and marsh migration. Protecting this potential accommodation space adjacent to existing salt marsh is an important consideration for ‘resilient’ coastal ecosystem restoration and protection. Then **Albert Pessarrodona** presented other ‘emerging’ blue carbon ecosystems with pathways including macroalgae (kelp), ocean sediments and coastal mudflats. There are new macroalgae opportunities in temperate and polar seas, and many scientific questions to explore further. Finally, **Steve Canty** introduced the Coastal Carbon Atlas from the Coastal Carbon Research Coordination network, which aims to accelerate the pace of discovery in coastal carbon science by serving researchers and practitioners with data, tools and synthesis opportunities.

3.4. Field Visit Day 4 – Friday, October 6

The Working Group meeting participants visited the [Sungei Buloh Wetland Reserve](#) on Friday, October 6. Sungei Buloh was first opened as a Nature Park in 1993. In 2002, 130 hectares were officially gazetted as a Nature Reserve and renamed Sungei Buloh Wetland Reserve to better reflect its status. In the same year, it was recognized as a site of international importance for migratory birds and awarded a certificate by Wetlands International, marking the reserve's formal entry into the East Asian Australasian Shorebird Site Network, which includes Australia's Kakadu National Park, China's Mai Po – Inner Deep Bay and Japan's Yatsu Tidal Flats. In 2003, Sungei Buloh Wetland Reserve became Singapore's first ASEAN Heritage Park. Since then, Sungei Buloh has expanded to include 202 ha of mangroves, mudflats, ponds and forests, providing an even larger sanctuary for the flora and fauna that call it home. The working group and guests were welcomed at the Reserve by CI Singapore colleagues **Frances Loke** and **Saravanan**

Sinniah who guided the group on a tour of the reserve while sharing their knowledge about the site. **Daniel Friess** also shared examples of research conducted at the Reserve.



The IBCSWG during a field visit to the Sungei Buloh Wetland Reserve, 6 October 2023.

Following the site visit, **Emily Pidgeon** and **Steve Crooks** moderated the final session of the week on Friday afternoon, which was a closed synthesis and reflection session for IBCSWG members. There are still science gaps that need to be addressed by the group and the larger scientific community: carbonate dynamics; risk of SLR on ecosystem stability and GHG fluxes and on ecosystem latitudinal and altitudinal migration (encroaching on agricultural and urban coastal lowland areas); lateral fluxes; different areas across the social sciences; indigenous, local and ancestral knowledge. For “emerging” BC ecosystems (i.e., seagrasses and kelp, salt marshes, mudflats) we need to enhance global and local mapping efforts (remote sensing tools and techniques, expanded coverage) to better understand the dynamics behind avoided emissions, biogeochemical controls of CO² and other mass fluxes, and restoration viability. The working group discussed how to share and expand the lessons learned and policy success from specific countries more broadly, and the BCI role and level of engagement with the UNFCCC and IPCC and their different workplans (Loss & Damage, Ocean-Climate Nexus, Wetlands supplement and GHG inventories, etc.) over the next few years. The working group would like to be more strongly aligned with other blue carbon policy platforms and partners in that space, such as the IPBC and Pew, and also increase the level of collaboration between the working group and other local and regional hubs for blue carbon in different continents. The working group also discussed the need to map out new relevant actors in the field, what their priorities are and consider how to enhance greater inclusiveness and geographic scope to maximize our work. A final discussion topic was considering role of the BCI science working group and its members and partners in providing technical support to countries to accelerate blue carbon implementation through enhanced research, policy and financial enabling conditions.

4. Daily agenda

Tuesday, October 3 - Opening Day	
Audience:	Singapore based partners, donors, academics/researchers; regional scientists; IBCSWG members
Objectives:	Build awareness in Singapore of the Blue Carbon Initiative's expertise and leadership in blue carbon. Build awareness of and support for the International Blue Carbon Institute. Build awareness of options and opportunities for blue carbon in Singapore and Southeast Asia based on global experiences.

Time	Topic	Speaker(s)
Session 1 - Opening Ceremony		
Objective: Welcome the audience and provide an overview of Blue Carbon science, policy and implementation.		
Master of Ceremony: Emily Pidgeon		
9:00 - 10:40	Welcome	Prof. Dr. Leo Tan
	Welcome words by Blue Carbon Initiative partner organizations	Dr. Emily Pidgeon, Dr. Kirsten Isensee, Dr. Maeve Nightingale
	Regional vision on blue carbon science	Dr. Richard Jeo
	The evolution of blue carbon and current trends	Dr. Emily Pidgeon, Dr. Steve Crooks
	International Blue Carbon Institute overview	Dr. Siti Maryam Yaakub
10:40 - 11:00	Tea Break	
Session 2 - Global Overview of Blue Carbon		
Objective: Understand blue carbon science, project development and international implementation.		
Facilitator: Dr. Steve Crooks		
11:00 - 11:20	Science of Blue Carbon	Prof. Dr. Catherine Lovelock
11:20 - 11:50	Panel presentations:	
	Lessons learned from Vida Manglar	Ms. Amy Schmid
	Community based blue carbon credit projects in Madagascar	Ms. Leah Glass
	International Blue Carbon potential and implementation	Prof. Dr. Daniel Friess
11:50 - 12:30	Panel and public Q&A: How is Blue Carbon being applied globally? What are the next big opportunities?	Dr. Steve Crooks and session speakers
12:30 - 13:30	Lunch	
Session 3 - Blue Carbon in Southeast Asia		
Objective: Highlight the latest blue carbon science and research priorities in Southeast Asia.		
Facilitator: Dr. Siti Maryam Yaakub		

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13:30 - 14:30	Presentations Mangrove Research for Southeast Asia The state of blue carbon research in the Philippines Blue carbon in seagrass habitats in Indonesia Blue carbon science-policy links	Prof. Dr. Daniel Murdiyarto Dr. Severino Salmo Dr. Udhi Hernawan Dr. Samantha Lai
14:30 - 15:00	Panel & public Q&A: Blue carbon in Southeast Asia - status and research priorities	Dr. Siti Maryam Yaakub
15:00 - 15:30	Tea Break	
Session 4 - Blue Carbon in International Policy & Finance		
Objective: Clarify the policy and finance elements that support blue carbon implementation.		
Facilitator: Jill Hamilton		
15:30 - 15:45	Welcome remarks and introduction to blue carbon policy	Ms. Jill Hamilton
15:45 - 16:45	Panel: Remarks and discussion on blue carbon policy and/or finance work Indonesia's national plans to advance blue carbon markets and policies Policies to enable nature-based solutions Blue carbon policy and finance: Examples from the Commonwealth Financing blue carbon projects – challenges and opportunities Costa Rica's National Blue Carbon Strategy	Dr. Andreas A. Hutahaean Ms. Melissa Low Ms. Heidi Prislán Mr. Gary Addison Prof. Dr. Miguel Cifuentes-Jara
16:45 - 17:00	Summary and closing remarks	Dr. Emily Pidgeon
17:00 - 17:30	Break	
International Blue Carbon Institute - Reception and Cocktail		
17:30 - 19:30	IBCI reception Welcome words	By invitation only Dr. Richard Jeo

Working Group Days	
Audience:	Singapore, regional and global (IBCSWG) scientists, donors and partners
Objectives:	Identify the applications of existing and future knowledge for conservation, restoration and management of Blue Carbon ecosystems. Identify contributions from the IBCSWG to close research gaps and strengthen Blue Carbon project implementation globally.

Wednesday, October 4 - IBCSWG Meeting		
Time	Topic	Speaker(s)
Session 1 - Introduction and Initial Discussion		
Objective: Frame the meeting's discussions and expectations for the Working Group and guests.		
Facilitator: Drs. Emily Pidgeon, Steve Crooks, Kirsten Isensee		
9:00 - 9:25	Insights on the work and progress of the BCI Science Working Group and expectations for this meeting	Drs. Emily Pidgeon, Steve Crooks, Kirsten Isensee
Session 2 - <i>In Memoriam</i> Professor Sir Miguel Fortes		
Objective: Celebrate the ecosystems and places that were special to our friend Mike Fortes.		
Facilitator: Dr. Emily Pidgeon		
9:25 - 10:40	Professor Sir Miguel D. Fortes - a biography	Dr. Emily Pidgeon
	Ode to Seagrass	Dr. Siti Maryam Yaakub
	Professor Fortes' contributions to the development and progress of blue carbon research in the Philippines	Dr. Severino Salmo
	Capacity building of local communities for blue carbon projects	Dr. Jay Mar Quevedo
	The nexus among blue carbon-society-policy/governance in Malaysia, Southeast Asia	Dr. Amir Aldrie
	Public reflections	Dr. Emily Pidgeon
10:40 - 11:00	Tea Break	
Session 3 - Seagrass Science		
Objective: Synthesize the most recent advances in seagrass science globally and in Southeast Asia.		
Facilitator: Prof. Dr. Martin Dahl		
11:00 - 12:10	Introduction to seagrass science	Prof. Dr. Martin Dahl
	Seagrass Research Indonesia	Dr. Rohani Ambo Rappe
	Cambodia seagrass research	Ms. Chantha Choeng
	Socio-ecology of seagrass meadows in coastal communities of the West Johor Straits	Dr. Serina Rahman
	Carbon stocks in Turkey Posidonia meadows	Prof. Dr. Hilary Kennedy
12:10 - 13:00	Global seagrass database - update and discussion	Prof. Dr. Johannes Krause
13:00 - 14:00	Lunch	

Session 4 - Blue Carbon Science Leadership		
Objective: Identify the research priorities and opportunities for collaboration among Blue Carbon regional and global research initiatives.		
Facilitator: Dr. Kirsten Isensee		
14:00 - 14:40	Regional blue carbon research centers Panel discussion 1 - Regional research centers Hainan International Blue Carbon Research Center Indonesia World Mangrove Center IORA Blue Carbon Hub	Dr. Kirsten Isensee Prof. Dr. George Lin Dr. Virni Arifanti Dr. Mat Vanderklift
14:40 - 15:10	Discussion, Q&A from public	
15:10 - 15:30	Tea Break	
15:30 - 16:10	The need for regional and global collaborative efforts Panel discussion 2 - International/global research centers International Blue Carbon Institute UN Ocean Decade GO-BC International Partnership for Blue Carbon Mangrove Breakthrough	Dr. Kirsten Isensee Dr. Siti Maryam Yaakub Prof. Dr. Miguel Cifuentes-Jara Ms. Elisabetta Bonotto Steve Canty
16:10 - 16:50	Discussion: How can the IBCSWG support research capacity globally through this emerging infrastructure?	
16:50 - 17:00	Daily summary and closing remarks	TBD

Thursday, October 5 - IBCSWG Meeting		
Time	Topic	Speaker(s)
Session 5 - The scientific elements for blue carbon country implementation		
Objective: Identify current science gaps needed for blue carbon (i) standards and methodologies and (ii) national implementation		
Facilitator: Dr. Daniel Friess		
9:00 - 9:30	Science needs for building and improving blue carbon standards and methodologies - Australia case study Verra new risk tool for Sea Level Rise	Dr. Catherine Lovelock Ms. Leah Glass
9:30 - 10:05	Brainstorming: Science needs to develop methods and standards for blue carbon in other ocean ecosystems	Ms. Amy Schmid
10:05 - 10:25	Tea Break	
10:25 - 11:25	Country-level governance for blue carbon Indonesia's Blue Carbon Strategy NDC development pathways in Belize, Costa Rica, Seychelles Transparency accelerator and National GHG Inventories	Dr. Dixon Gevaña Dr. Frida Sidik Mr. Tom Hickey Dr. Steve Crooks

11:25 - 12:00	Discussion: Clarifying science needs and/or challenges for national blue carbon development and implementation	Prof. Dr. Daniel Friess
12:00 - 13:00	Lunch	
Session 6 - Coastal Blue Carbon Field Manual Update		
Objective: Outline the steps and content necessary to update the BCI methods manual for assessing carbon stocks and emissions in blue carbon ecosystems.		
Facilitator: Dr. Mark Beeston		
13:00 - 14:00	Blue Carbon Field Manual update	Dr. Mark Beeston
Session 7 - Transformative Blue Carbon Platform		
Objective: Codesign a collaborative implementation platform for blue carbon to develop science-based, high-quality blue carbon projects to deliver benefits for people and sustainability of blue carbon ecosystems.		
Facilitator: Prof. Dr. Daniel Murdiyarto		
14:00 - 15:00	Framing a "Transformative Blue Carbon Platform"	Prof. Dr. Daniel Murdiyarto Dr. Siti Maryam Yaakub Dr. Steve Crooks Dr. Novi Susetyo Adi
15:00 - 15:30	Tea Break	
Session 8 - Blue Carbon Science Updates		
Objective: Share examples of new research conducted globally by Working Group members.		
Facilitator: Dr. Frida Sidik		
15:30 - 16:40	Introductory words and context	Dr. Frida Sidik
	Blue carbon assessments of seagrass and mangrove ecosystems in South and Southeast Asia	Dr. Milica Stankovic
	Understanding Salt Marsh Change and Carbon Impacts with Earth Observation	Anthony Campbell
	Contributions of mangrove conservation and restoration to climate mitigation in Indonesia	Dr. Virni Arifanti
	Climate-smart restoration activities	Dr. Richard Bellerby
	Ghost forests	Dr. Lindsey Smart
	Macroalgae - the next Blue Carbon ecosystem?	Dr. Albert Pessarrodona
	Coastal Carbon Network and Atlas	Dr. Steve Canty
16:40 - 17:10	Group discussion to synthesize research priorities	Dr. Frida Sidik
17:10	Field day information and closing remarks	Dr. Siti Maryam Yaakub

Friday, October 6 - Field Trip & IBCSWG Closed Session		
Time	Topic	Speaker(s)
Session 9 - Field trip to local wetland		
Objective: Familiarize the IBCSWG with examples of Singapore's wetland ecosystems.		
Facilitator: Dr. Siti Maryam Yaakub and Prof. Dr. Daniel Friess		
8:00 - 12:00	Optional field trip	Dr. Siti Maryam Yaakub, Prof. Dr. Daniel Friess
12:00 - 13:30	Return to hotel and lunch	
Session 10 - IBCSWG closed session - Working Group only		
Objective: Identify and prioritize next steps in the IBCSWG work and outputs		
Facilitator: Drs. Emily Pidgeon, Steve Crooks, Kirsten Isensee		
13:30 - 15:00	Synthesis of previous days Group discussion: Priority research topics, potential products, task groups (CC + inorganic C in BC ecosystems), WG governance & membership	BCI partners Working Group members
15:00 - 15:20	Tea Break	
15:20 - 16:30	Discussion (continued) Group reflections and closing remarks	Working Group members Co-chairs and main partners



5. List of invited participants

There were 105 participants from 20 countries who joined throughout the week. The meeting was also streamed live, with 20 additional remote attendees. The following list contains the names, contact information and country of origin of IBCSWG members and meeting guests.

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