



**IORA BLUE CARBON HUB THINK
TANK MEETING: NATURE-BASED
SOLUTIONS FOR COASTAL RISK
REDUCTION**

25 – 27 MAY 2021

VIRTUAL

FINAL REPORT

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1.1 BACKGROUND

Delegates from Member States, namely, Commonwealth of Australia, People's Republic of Bangladesh, French Republic, Republic of India, Republic of Indonesia, Republic of Kenya, Republic of Madagascar, Malaysia, Republic of Mauritius, Sultanate of Oman, Republic of Seychelles, Republic of Singapore, Republic of South Africa, Democratic Socialist Republic of Sri Lanka, Kingdom of Thailand, United Republic of Tanzania, and United Arab Emirates, as well as Dialogue Partners, namely China, Arab Republic of Egypt, Germany and Turkey, participated in the Second IORA Blue Carbon Hub 'Think Tank' on Nature-Based Solutions for Coastal Risk Reduction on 25-27 May 2021, which was jointly organised by the IORA Blue Carbon Hub and the IORA Secretariat. The meeting was co-hosted by the IORA Blue Carbon Hub (Australia) and the Government of Bangladesh (Ministry of Foreign Affairs and Institute for Water Modelling), in collaboration with the IORA Secretariat. The list of participants is annexed ([Annexure A](#)).

During the Meeting, experts presented on ecosystem-based approaches to disaster risk reduction (Eco-DRR), nature-based solutions (NbS) to disasters and blue carbon finance and insurance. The meeting also comprised of training sessions covering topics on: understanding risk; modelling risk and risk reduction; and solutions. Participants also participated in interactive sessions, including polling quizzes, voting and group discussions. The meeting resulted in recommendations on the way forward and for follow-up actions. A copy of the Agenda is annexed ([Annexure B](#)).

1.1 RECOMMENDATIONS

The following recommendations are compiled from discussions held among delegates through the meeting. They are intended to reflect suggestions that emerged from the discussions about productive avenues for future activities, including through IORA.

INDICATORS

- Review and develop indicators for disaster risk reduction benefits provided by green infrastructure, to assist Member States with reporting under frameworks such as Sendai, Convention on Biological Diversity and United Nations Framework Convention on Climate Change, and to raise awareness about how they are contributing to disaster risk reduction.
- Where possible harmonise indicators across the frameworks.
- Review activities under the IORA Blue Economy and Disaster Risk Management Focus Areas to identify actions that can address nature-based solution approaches to both.

EVIDENCE

- Use national scale datasets to show the overlap between coastal risks and the distribution of ecosystems, to explore the areas where ecosystems could be a solution for risk reduction.
- Support this with local scale studies to collect information to address key uncertainties
- Learn by doing: implement pilot studies in multiple Member States (MS) to understand risk reduction by nature-based solutions, providing evidence that can be developed into a robust evidence base across the region.

- Create a network between Member States to exchange best practices and tools within the context in which they were developed.
- Review and develop guidelines for the implementation of Marine Spatial Planning (MSP) as a best practice process that incorporates equity and inclusivity into the management of coastal ecosystems for the benefit of coastal communities
- Encourage and facilitate collaboration between Member States to develop strategies that integrate modeling, coastal engineering and remote sensing along with experience in using mangroves and other ecosystems as nature-based coastal risk reduction measures.
- Modelling reduction of wave runup and coastal inundation in conjunction with the socioeconomic impact of adverse events.

COMMUNICATION

- Develop a communication forum for IORA Member States where individuals and organisations can exchange ideas and learn from examples of successes and failures of previous efforts
- Develop a framework for knowledge sharing among institutions from different MS, coupled with bilateral visits and MoU's for joint research and applications for funds.
- Write policy briefs with recommendations to International fora
- Incorporate NbS and Eco-DRR into representation by MS at the United Nations Framework Convention on Climate Change and Convention on Biological Diversity Conferences of Parties
- Develop a platform to compile and make available a suite of spatial data relevant to implementation of coastal NbS for the Indian Ocean
- Develop frameworks for dissemination of emergency early warning information and operational modelling

FINANCE

- Open a designated call for proposals to the IORA Special Fund for activities that meet one or more of the above recommendations

1.2 INAUGURATION

Dr Mat Vanderklift welcomed the participants and provided a brief on the IORA Blue Carbon Hub. He made reference to the early career scientists from IORA Member States who have visited Australia to carry out research for a period of six weeks.

OPENING REMARKS BY H.E. DR. A. K. ABDUL MOMEN, M.P., HONORABLE FOREIGN MINISTER OF BANGLADESH

The Honorable Minister expressed his pleasure at addressing the distinguished audience virtually on a very timely topic “Nature-based solutions for coastal risk reduction” organized by Australia, Bangladesh, and IORA Blue Carbon Hub. He pointed out the adverse effects of past cyclones that have affected the coastal areas of Bangladesh and India. He mentioned that the Indian Ocean Region has been tagged as the ‘World’s Hazard Belt’, and that Bangladesh is always at the forefront of vulnerability to natural disasters, including cyclones, floods, earthquakes and tsunamis, with the intensity of natural hazards having increased by about 47% since 1970. The Honorable Minister also highlighted the importance of nature in offering solutions for reducing the impacts from disasters and climate impacts, as well as in building the resilience of coastal areas, mangroves, seagrasses, tidal marshes and communities to an ever-increasing number of disaster events around the world specially in the Indian Ocean. He also highlighted the importance of learning how to apply nature-based solutions in enhancing resilience to disasters and climate change. He added that these extreme events and disasters are known to be exacerbated by environmental changes including climate change, land-use changes and natural resource degradation, leading to substantial loss of life, livelihoods, and community assets, which not only threatens the pace of socio-economic development, but also undo hard-earned gains. Climatic and other environmental hazards and anthropogenic risks, coupled with weak and wavering capacities, severely impact the ecosystems and Nature’s Contributions to People (NCP) and, thereby, to human well-being. Therefore, he stressed that long-term resilience building through disaster risk reduction and integrated adaptive climate planning, therefore, has become a key priority for scientists and policymakers alike.

He stressed that nature-based solutions are a cost-effective approach that utilizes ecosystem and biodiversity services for disaster risk reduction and climate change adaptation, while also providing a range of co-benefits like sustainable livelihoods and food, water and energy security. He highlighted the need for this workshop to elaborate on how it can be applied to develop healthy and resilient ecosystems locally, nationally, regionally and globally. He also requested experts participating in this workshop to offer insights into understanding how implementation of sustainable development goals (SDGs) at the grass roots level can help indigenous and local communities to harness the ecosystem services. He also emphasized the need for the workshop to offer a unique, essential resource for relevant stakeholders working in various related fields. The Honorable Minister also recommended that the workshop helps provide a better understanding on how resilience is outlined from Disaster Risk Reduction perspective and how nature-based solutions can be potentially incorporated by complex systems in coastal areas. The progress made by Bangladesh in this regard were pointed out such as: the establishment of the coastal afforestation scheme; the projects by Bangladesh to establish a green belt along the coast; the “Afforestation in Coastal Region including the Newly Accreted Chars of Bay of Bengal (2018-2022)” project; the “Sustainable Forests and Livelihoods (2018 - 2023)” project; and the feasibility study project is under implementation to develop a “Climate Resilient Sustainable Coastal Forestry in Bangladesh” project.

He further mentioned that the government is playing an especially important structural role for the sustainable development in coastal areas as well as sustainable use of coastal and marine resources. There are number of national policies to support the blue economy concept in the context of mangrove forest conservation. He made reference to the Climate Change Trust Fund for climate change adaptation, mitigation and disaster risk reduction, established by the Honorable Prime Minister of Bangladesh Sheikh Hasina and the 'Mujib Climate Prosperity Plan'. Several initiatives of Bangladesh were pointed out, including: the hosting of the South Asian office of Global Centre on Adaptation; the adoption of a "Planetary Emergency Resolution"; the Bangladesh Climate Change Strategy and Action Plan; and the suggestion to expand the "greenbelt" coastal afforestation program. The Honorable Minister congratulated Australia for co-hosting with Bangladesh and arranging such a timely and important event and expressed his appreciation to the IORA Secretariat and Dr. Mat Vanderklift for continuing their admirable initiatives amid the gloomy days of pandemic. The Honorable Minister declared the workshop open and wished that this three day event would be a meaningful one and it will come up with pragmatic way forward which would serve the realities of the region. The full remarks of H.E. Dr A. K. Abdul Momen is annexed as [Annexure C](#).

OPENING REMARKS: HONORABLE SUSSAN LEY, MINISTER FOR THE ENVIRONMENT, AUSTRALIA

The Honorable Minister recognised the importance of the event in ensuring the continuous collaboration between Australia and Bangladesh on promoting the benefits of blue carbon and on improving coastal risk management for the sustainable development of our oceans. She highlighted the key role of the Blue Carbon Hub in raising awareness about the multiple benefits of protecting and restoring coastal ecosystems. She reiterated Australia's commitment to the Indian Ocean region and to the sustainable management of our precious ocean resources. She informed the participants that she recently announced, with Prime Minister Scott Morrison, a new \$100 million Ocean Leadership Package to protect our oceans while investing in their productivity, their biodiversity, and importantly, their "blue carbon" ecosystems. She further mentioned that the ocean is central to Australia's national identity. The commitment to protecting this critical habitat extends to the Indian Ocean region, with Australia planning to create two new marine parks around Australia's Indian Ocean Territories, at Christmas Island and the Cocos (Keeling) Islands. The Honorable Minister further pointed out the ocean's benefits, such as climate regulation, nutrient cycling, oxygen production and coastal protection. Australian seagrasses alone were estimated to provide \$45 billion a year in carbon-dioxide-absorption services. Therefore, she emphasized on the need to protect these habitats. Australia looks forward to continuing to work with our regional partners to protect and conserve our ocean and blue carbon ecosystems She wishes the participants success in addressing the common challenges and opportunities through this webinar. The full statement of Honorable Sussan Ley is annexed as [Annexure D](#).

OPENING REMARKS: DR GATOT GUNAWAN, IORA SECRETARY GENERAL

Dr Gunawan welcomed all the participants to the workshop and highlighted the importance of Blue carbon ecosystems in providing critical services such as coastal protection, disaster risk reduction, water filtration and fisheries habitat, as well as for climate adaptation and resilience along coasts, including protection from storm surge and sea level rise, erosion prevention along shorelines and coastal water quality regulation, and thus contributing to disaster risk reduction. However, he mentioned that despite of their great importance, blue carbon ecosystems are the most threatened ecosystems on earth, with an estimated 340,000 to 980,000 hectares being destroyed each year. To address this issue, he highlighted the importance of dedicated efforts towards conservation and restoration to ensure that coastal ecosystems continue to play their role as long-term carbon sinks. He pointed out the commitment of countries in support of sustainable development through initiatives that reduce the carbon footprint associated with the growth of their economies. He briefed the meeting about the establishment of its Blue Carbon Hub and the projects that it had been hosting, including the set of short 'think tank' meetings that will target the most promising areas for accelerated action. He further mentioned that the importance of the blue carbon is also recognised by the IORA Working Group on the Blue Economy, whereby specific activities/projects have been identified to be implemented by Member States. Dr Gunawan highlighted the need to focus on the restoration and protection of these blue carbon ecosystems, as well as the importance of Member States to join efforts for blue carbon assessment and measurements because while mangroves are fairly well mapped, large areas containing seagrasses remain largely unsurveyed. He stated that the workshop would also enable Member States to: share best practices with regard to monitoring coastal ecosystems for disaster risk reduction; exchange information about and policy frameworks to support protection and restoration of blue carbon ecosystems; and identify critical knowledge gaps that currently impede effective implementation of solutions, for subsequent collaborative efforts across IORA. He expressed his hope for the workshop to result in concrete recommendations as the way forward to further enhance Member States' capacities and experience on blue carbon and explore its potential in disaster risk reduction. He also emphasised the need for action-oriented outcomes for the future development of the Indian Ocean region. To conclude, he expressed his appreciation to delegates' participation to this workshop and thanked Bangladesh and the IORA Blue Carbon Hub for their assistance in hosting this workshop. The full statement of Dr Gunawan is annexed as [Annexure E](#).

BACKGROUND AND INTRODUCTION BY MAT VANDERKLIFT, DIRECTOR, IORA BLUE CARBON HUB

Dr Vanderklift started his presentation by providing an overview of the IORA Blue Carbon Hub and the 'think tank' meetings; the first one being held in Mauritius and this current workshop being the second. He pointed out the benefits that coastal ecosystems provide such as for enhancing livelihoods, mitigating climate change and reducing coastal risk. He mentioned that environmental risks are among the greatest and he made reference to the Global Risks Report 2021 by the World Economic Forum that focus on risks on the global economy and which have highlighted the top global risks by likelihood that the global economy is facing and the top five are: extreme weather,

climate action failure, human environmental damage, infectious disease and biodiversity loss. He referred to the map by the World Risk Index that categorises by country to what extent they face risks, including those in the Indian Ocean and that showed that the risks are higher in Southeast Asia, through South Asia and across Africa. In fact, the risks are ubiquitously high throughout the whole Indian Ocean. He further mentioned that coastal risks arise from different causes at different places, but significant risks are associated with waves and inundation. He presented the projections of global-scale extreme sea levels and resulting episodic coastal flooding over the 21st century, including in the Indian Ocean. In terms of storm surges he mentioned that almost the whole Indian Ocean will be facing events that will be at least 1.5 m above mean sea level and around one third of the Indian Ocean will be facing events that are 2.5 – 5 m extreme sea level rise. He further stated that this workshop will explore the natural assets that can help in this regard. For example, IORA Member States have about 47% of world's mangroves but they also contribute to 67% of world's mangrove loss. He mentioned that the current workshop would enable the development of a common understanding on various aspects of blue carbon, including its financing, as well as: set joint goals and map to achieve them; identify gaps and uncertainty and develop research and an implementation plan. A copy of the full presentations can be accessed at:

<https://drive.google.com/file/d/16iC3dSSCQrCrQyYaNcNEuiEPVhUnS5dL/view?usp=sharing>

A poll voting was carried out as follows:

Question 1: What are you most interested in this week?

The responses were as follows:

- Disaster reduction, biodiversity conservation;
- Looking forward to the Hub think tank on Nature-based Solutions for Coastal Risk Reduction
- International collaborations
- Modelling risk and risk reduction
- Strategic ways to upscale NbS for coastal risk reduction
- International collaboration on coastal ecosystem conservation

1.3 DAY 1

THEME 1: INTRODUCTION AND OVERVIEW

1.3.1.1 Dr Animesh Kumar: United Nations Office for Disaster Risk Reduction

In his presentation, Dr Kumar made a case for a comprehensive approach for risk management for disaster reduction and climate change adaptation (CCA) and how nature-based solutions (NbS) and ecosystem-based approaches enable such integrated approaches. He elaborated on the standard framework to better understand the levels of coherence between disaster risk reduction and climate change adaptation, which is based on five pillars: strategic coherence; conceptual coherence; operational coherence; institutional coherence; and financial coherence. He mentioned that the coherence approach has been applied in Africa and there is ongoing analysis in Asia-

Pacific and one is being planned in the Caribbean and he presented the result of these. Environmental degradation is a major risk driver, but NbS is also a major driver of resilience. He made reference to a recent publication, where the role of NbS was studied in reducing disaster risk at multiple levels. He highlighted the importance of NbS in reducing disaster and climate risk, in providing potent vehicle for disaster risk management in all its dimensions and in resilient infrastructure. In the context of coastal risk management, he pointed out the co-benefits of NbS for DRR and CCA taking the examples of mangrove restoration/plantation, wetland restoration and Integrated Coastal Zone Management (ICZM) and Integrated Resource Management (IWRM). He talked about the urban interface in the context of climate impacts and the increasing risk of the world's coastal cities that are facing sea level rise, experience a real trade-off between development and climate change. He highlighted the importance to understand the needs of these cities such as risk assessment, land-use planning, development and selective relocation away from the floodplain and preparedness mechanisms. To conclude, he presented some publications and guidelines that have been developed. A copy of the full presentation can be accessed at:

<https://drive.google.com/file/d/1LRP9XnbVycdshU2VNQluzhWs7ewxDA1E/view?usp=sharing>

1.3.1.2 Dr Nathalie Doswald: United Nations Environment Programme

Dr Doswald started her presentation by providing an overview on the tsunami disaster that hit Sri Lanka in 2014. She highlighted the importance of sand dunes in mitigating impacts in the Yala Safari when the tsunami hit the area. She provided information on the Eco-DRR and nature-based solutions that covers a wide range of approaches to deal with DRR. She pointed out the ecosystems in DRR, including: preventing or mitigating hazards; reducing exposure to hazard impacts by functioning as natural buffers; and reducing vulnerability by supporting livelihoods – before, during and after disasters. The limitations of ecosystems and the multiple benefits of ecosystem-based approaches to DRR were presented. She mentioned that nature-based solutions could be cost-effective and provided details on the green/grey hybrid solutions, green infrastructure and the Sendai Framework. She concluded by mentioning that there is a massive open online course on NbS to Disaster and Climate Resilience and encouraged participants to participate on the link provided (www.pedrr.org/mooc). A copy of the full presentation can be accessed at:

<https://drive.google.com/file/d/1ifLih8n4mxrnU-hL8xgDk84IDbKtf-rC/view?usp=sharing>

1.3.1.3 Prof Saudamini Das: Institute of Economic Growth, Delhi

Professor Das presented her research study and started her presentation by providing an overview of the storm protection by natural buffers (mangroves). Her study showed how mangroves are impacted during cyclones. She explained the confounding effect of mangroves on cyclone impact with an effect of distance from coast impacting mangrove habitat. She also presented on the importance of mangrove protection to human lives. Another study was also done to compare different habitats, including mangrove, casuarina and mixed forest. She found that casuarina in mangrove habitat aggravated damage occurrences and caused more death. However, non-mangrove habitat areas casuarina mixed forest provided better protection than casuarina monoculture. Another study also showed that mangroves can provide protection against wind damage during storms referring to a case study where house damage during super cyclone were less where there are mangroves. She also provided details on other studies, including: the role of

coastal vegetation during the cyclone Phailin; the role of coastal vegetation during the cyclone Hudhud; mangroves and the fishery in Gujarat. She pointed out the limiting factors in raising mangrove buffers for storm protection. She highlighted the importance in identifying mangrove habitats before planting mangroves. She concluded by providing a summary of the main outcomes of her studies. A copy of the full presentation can be accessed at:

<https://drive.google.com/file/d/1k8UAkeApFQyQIU3pGmlg3kx2BUiuTOM/view?usp=sharing>

1.3.1.4 Prof Dr. AKM Saiful Islam, Institute Water and Flood Management, Bangladesh University of Engineering & Technology, Dhaka

Dr Islam presented on ocean warming, storm surge and sea level rise and its threats to the coastal areas of Bangladesh. He referred to the severe cyclone "Tauktae" that hit Gujarat and the cyclone "Yaas" that will hit India on 26 May 2021 that will also effect Bangladesh. He mentioned that in 2020 the cyclone Amphan caused significant economic damage to Bangladesh and presented the model simulation. He provided an overview of the recent cyclones in the Bay of Bengal from 1970 to 2020 and stated that the Bay of Bengal is an ideal environment for storm formation due to its warmer temperature. He presented on the climate change impact on the ocean and the cryosphere and mentioned that hazards are expected to change under global warming. He referred to previous research with regard to sea level rise, subsidence and projected ice loss and stressed on the importance to implement the Paris Agreement. He further presented on: the 21st century sea level projections for RCP8.5 at tide gauge locations in the Bay of Bengal; the coastal modelling using Delft3D; the flood inundation patterns of cyclone Roanu using different boundary conditions; changes of inundation patterns or cyclone Sidr (2007), Aila (2009) and Roanu (2016). He mentioned that coastal polders (embankments) were implemented and climate resilient coastal polders are also being used to complement the existing polders. A copy of the full presentation can be accessed at:

<https://drive.google.com/file/d/1p1LcFsl9ZzxEjiY8sP4JkCvEieiDtpF0/view?usp=sharing>

1.3.1.5 Question (Q) and Answers (A):

Question by Dr Mat Vanderklift: Regarding the Sendai framework, how are Indian Ocean Member States using the indicators to leverage the Sendai framework and how can they use the indicators to raise awareness and direct investment?

Answer by Dr Nathalie Doswald: Two of the Sendai Framework indicators could be used to report on the loss of green infrastructure. This could help in planning disaster risk reduction measures if you know the existing green infrastructure in the country, and after the disaster, how much of it has been lost could help to target better measures in future. But it does involve the identification of existing green infrastructure that the country has and the economic value that it holds. There is the option to report on custom indicators to create a countries' own custom target and report on using custom indicators on green infrastructure. This could be helpful to raise awareness on what is happening and how they are contributing to disaster risk reduction.

Answer by Dr Animesh Kumar: We have the options where the Member States could report on the indicators. Through regular training of trainers and advocacy, we are encouraging Member

States to use the options, which the Sendai Monitoring Framework provides them to report on ecosystem related losses and data. There are 38 indicators of the Sendai Monitoring Framework and several are the same indicators as SDG indicators. Targets C and D and E of the Sendai Framework are in line with SDG 1, 11 and 13, and encourage Member States to develop national, local disaster risk reduction strategies. When they do so they are also supposed to self-score in terms of how the rank vis-as-vis a series of factors and one of the factors is coherence.

Question: Apart from the blue carbon ecosystems to NbS, what would be the best options for nature-based solutions for DRR in parts of the world where there are cyclones?

Answer by Dr Nathalie Doswald: The sand dunes, coral reefs, seagrasses and in certain regions there are reconstructed reefs. It depends on the exposure and how close the shoreline is to the villages and what there is in between that. A coastal forest could also be considered which can offer protection if the villages are further from the coast.

Answer by Dr Animesh Kumar: One of the problems that we have seen in some coastal areas in terms of coastal inundations is that when there is seawater flowing in, it comes with a gush and stays there because of the low lying areas and draining it back to the ocean becomes a challenge. There is a huge role for watershed management and drainage systems to ensure that water actually goes back and doesn't stay else it will lead to salinisation of the soil.

Question to Prof Saudamini Das: Can you speculate on what the characteristics are of the cashew tree that provided protection to villages?

Answer by Prof Saudamini Das: The cashew nut vegetation already existed there. This area comprised of a mixture of cashew and casuarina, and there were patches where the casuarina was in monoculture. The area that had cashew and casuarina's provided a better buffer and offer more protection. The cashew provided protection at the ground level and the taller casuarina provided protection at the top level. This contributes to both economic and risk benefits.

Question to Dr Nathalie Doswald: Based on the calamity that the resort and local community faced after the tsunami of 2004, how are they building their community now and do they incorporate NbS in their living community?

Answer by Dr Nathalie Doswald: The answer would be communicated later because her colleague is not present.

Question: What is the difference between nature-based solutions and ecosystem-based approaches? How does UNEP suggest countries to proceed with nature-based solutions in their respective policies?

Answer by Dr Nathalie Doswald: Nature-based solution is a relatively new term. There are two definitions, one by the IUCN and the other one by European Union. The one by IUCN is the one that is mostly being taken up at the global level and nature-based solution is an umbrella term and describes and explains a range of approaches. The most operational term is ecosystem-based approaches that has been defined under the Convention on Biological Diversity (CBD) and that is why there is a preference to this term such as ecosystem-based disaster risk reduction and ecosystem-based adaptation. The term nature-based solutions encompasses both DRR and

adaptation and other management approaches. It covers anything that involves any actions on the environment and that often use ecosystem-based approaches to address challenges, such as DRR, health. Fortunately, IUCN has developed a global standard for NbS, which is helpful for providing a clear definition. As such, the term NbS is helpful when we talk about a range of solutions for different things using ecosystem-based approaches but when we want to speak specifically on DRR, we will use Eco-DRR.

Answer by Dr Mat Vanderklift: NbS is a flexible term but more importantly we need to have a common understanding on some of the concepts and some of the issues. We can be fairly flexible in the application of concepts like NbS and, as far as we have a common understanding, we need to develop some of the indicators so that we can report to different matrix to those who are developing the policy.

Question: How could IORA contribute to reach the presented indicators? I would go more deeply for each IORA country member considering the fact of needs to develop local strategies for DRR-Ecosystem based adaptation (EbA) with consideration of ecological and socio-economic context. Actually, there are already these local, national and regional initiatives which have now to be upscaled and gathered to reach these global indicators and expected real impacts of efforts.

Answer by Dr Animesh Kumar: Unless we integrate ecosystem-based approaches and nature-based solutions into our policies, plans and strategies, they often either do not get implemented or when implemented they remain localised and don't get scaled-up. From a strategic point of view, it becomes a policy matter and that is where they start to get integrated. For example, for Asia-Pacific there is a study that shows how states have integrated ecosystem-based approaches and nature-based solutions into their policies and strategies. This workshop will be helpful in ensuring that the existing tools, mechanisms, guidelines and capacity building initiatives are integrated in the existing mechanisms to ensure that national and local strategies have these elements in place. The ['Words into Actions'](#) for NbS and Eco-DRR is a very good tool and many of the inputs from the workshop can also be helpful in finalising and launching that guideline. The Words into Actions Guidelines for national and local DRR strategies need to be informed by such mechanisms. We need to ensure that the climate change adaptation plans and the DRR strategies includes the elements of NbS and Eco-DRR so that they can be scaled-up and implemented across the region and the national level as well.

SESSION 2: FINANCE AND INSURANCE

1.3.1.6 *Jacqueline Wharton: Willis Towers Watson*

Ms Wharton presented on the role of financing and insurance in supporting blue carbon. She mentioned that ecosystems are at risk and blue carbon ecosystems are at risk from chronic climate pressures and climate-related events. She further talked about managing risk with innovative insurance tools. She stated that insurance can protect assets and investments, provide economic relief and increase financial resilience. She provided information on parametric insurance which is

a risk financing instrument that pays out a pre-agreed amount to a policy holder according to a pre-defined event characteristics. She mentioned that an insurance mechanism needs: a sustainable premium financing; an objective trigger; predictable and timely, good relationship to impact; robust governance and planning; and response capacities. She presented a case study and stated that parametric insurance can directly support ecosystem resilience since it protects blue carbon assets and investments in them by financing post-impact response and restoration. She provided information on the Mesoamerican Reef Insurance Programme and how insurance can increase the financial resilience. She added that insurance programme can also be designed to incentivise stewardship and increase coastal community access to insurance, building financial and environmental resilience. She highlighted the role of risk financing and insurance in supporting blue carbon. A copy of the full presentation can be accessed at:

https://drive.google.com/file/d/19djlP7nUsZ05bcC_r21jh45gQlsBEFM/view?usp=sharing

1.3.1.7 *Julieta Guanlao: Conservation International*

Ms Guanlao started her presentation by broadcasting a short video on the work of Restoration Insurance Service Company (RISCO). She highlighted the importance of mangroves for climate adaptation and mitigation. RISCO will invest in mangrove conservation and restoration. She mentioned that Conservation International (CI) has led a big-tent approach through partnerships to creating the scientific knowledge, financial mechanisms, and policy frameworks required to protect and restore mangrove forests and secure their full benefit for climate and people. She presented the RISCO mechanics and mentioned that RISCO will identify sites and invest in mangrove conservation and restorations securing revenue from insurance companies who accrue mangrove risk reductions. She provided information on the pilot project of RISCO in the Philippines and Vietnam. She provided information on criteria for a region to be eligible for a RISCO site. She pointed out the areas where work is being carried out by RISCO in the Philippines. She provided in-depth information on the different phases of the pilot projects, which comprise of four phases: Pilot skeleton and project set-up; business case development; pilot deal structuring; and pilot set-up. A copy of the full presentation can be accessed at:

<https://drive.google.com/file/d/1EUaokVpK1E4Qse1eRfgIT5UPmsxfCvV/view?usp=sharing>

1.3.1.8 *Stefanie Simpson: The Nature Conservancy*

Ms Simpson presented on blue carbon resilience credits. She provided information on coastal wetlands in the context of climate change. She mentioned that blue carbon resilience is covered under SGD13 and explained about the blue carbon resilience methodology, which quantifies coastal resilience in terms of population or people that reduce flood risk due to the presence of coastal wetland habitats like mangroves. We can also combine the existing carbon offset methodology with the coastal resilience methodology to generate blue carbon and resilience credits. She explained how the methodology works out through a step-wise standard engineering approach and a deemed estimate approach is also being provided using globally available data. She provided in-dept information on the project development process. Regarding the market appetite, a small market study was conducted, which showed that all respondents have some level of interest in the products; those who answered "maybe" had a follow-up question on product price, availability, and the resilience credit. It was also shown that there was no consensus about the resilience credit's

benefits: community resilience was the leader, but all benefits were rank ordered either highest or lowest by a respondent. Regarding the pricing for standalone offset and stacked credits, the survey showed that respondents' premium for resilience credit was as high as 60% and respondents indicated willingness to pay premium 72% of the time. She provided an overview of the current blue carbon resilience credits pilot sites. She concluded her presentation by requesting Member States to indicate their willingness to carry out projects in this regard, which would then be taken into consideration. A copy of the full presentation can be accessed at:

<https://drive.google.com/file/d/17yhibF4bvSlmstoebq9GLbOtKsZolZVN/view?usp=sharing>

1.3.1.9 Questions (Q) and Answers (A)

Question to Jacqueline Wharton: The issue of risk financing in relation to blue carbon is relatively new. What is the pickup rate and level of acceptance and awareness amongst the rural and local communities on the issues of risk financing and insurance? With one of the slides Jac mentioned long term pay out of about 50 years. How would they foresee a long period and management of risk policy?

Answer by Jacqueline Wharton: This is the key question here. When you are looking at co-variant climate risk that effects entire communities at the same time and at the same the risk awareness and willingness moves to pay for that risk most of the time communities especially the most vulnerable communities are only paying for it once the event happens. This is when the scramble sets in and economic activity dives off a cliff after those events mainly because the take up of pre-positioned finance mechanism is really low. However, what has increasingly been the case of the public policy and international development financing realm is this idea especially around vulnerable communities, part of the risk responsibility lies outside the community itself especially when we are talking about these extreme co-variant risks. For example, COVID – the risk sharing, and risk responsibility is really front and center and the same case goes for the blue carbon assets. First, they are providing global public goods, second they are providing local benefits of risk reduction but also underpinning economic activity nationwide. There is clearly risk that is shared at the international, national and local levels and the key to unlocking uptake, making the economic and policy case clear, which beneficiary has which interest and pre-positioning the risk financing to respond and creating some sort of innovative mechanisms to share the risk to share across the three levels. This is an interesting space of development at the moment, especially if you look at some of the mechanisms that are being tested to connect community level projects to international climate finance such as the Green Climate Fund. Those same mechanisms are the key to unlocking take up for these risk financing mechanisms for blue carbon. Vulnerable communities are not and should not be the sole people responsible to pre-fund finance and the covariant risk, so it's how we can get a risk sharing mechanism that works and how to create an economic case for all of the various participants.

Question to Julieta Guanlao: In regard to the sale of blue carbon credits: what the issue of permanence in terms of NbS is (such as planting mangroves). One of the slides mentioned the recent loss rate of mangroves – unsure if that ties in with permanence and if this rate of loss is due to natural or anthropogenic loss.

Answer by Julieta Guanlao: Before a carbon credit can be sold, it goes through a long assessment process and based on what Stephanie stated in her presentation, Conservation International will be using the Verra classification and assessment. It must be accredited and certified. To be able to generate a blue carbon credit the carbon abatement should come from mangroves that has undergone a loss, meaning that it has been destroyed for whatever reason. We have to conserve and restore these mangroves. So, anything that has been generated as blue carbon credits from these destroyed mangroves are the ones that can have a good certainty that they will be accepted and certified for carbon sale. In terms our of criteria for selecting which sites will qualify as a RISCO project for us to be able to generate the blue carbon and blue carbon credits to be able sell them, one of our major criteria that the mangrove has suffered a loss. How long it has suffered and how long it has been destroyed is a criterion to be determined to pass the Verra certification. In regard to the permanency, we don't know at this stage how long (how many years) it has been destroyed for it to qualify as a site that will be part of our assessment in our study, but for the blue carbon credits we will be generating, it has to pass through those assessments and for an assessment to be done, it should come from a mangrove that has recently suffered damage.

Questions in the chat: Most of the participants here are from research community and agencies, a better understanding is needed on how we work more closely with insurance and finance industry What are the key gaps for example around parametric insurance? This will be covered in the main section.

SESSION 3: EXAMPLES AND KNOWLEDGE NEEDS

1.3.1.10 Dr Borja Reguero: University of California, Santa Cruz

Dr Reguero started his presentation by providing a brief summary on how the coastal vegetation provide coastal protection, reduce disaster and influence coastal processes. Vegetation dissipates the waves and storm surge as a function of different features such as the type of vegetation, vegetation field, submergence and storm properties. Another benefit of the vegetation is for soil stabilisation and erosion control. He referred to the example of coral reefs that are natural barriers and help to attenuate waves, which depend on factors such as depth, roughness, that contribute to the health of the reef. He explained about the framework to value the flood risk reduction benefits of ecosystems and NbS. The benefits were measured by comparing the scenario of the coastal region, for example the presence of mangrove forest, the offshore dynamics, and the assessment of these coastal processes on the coastal hazards. Impacts and consequences are assessed (e.g. flooding, erosion) following a standard risk-based evaluation. He pointed out the flood protection benefits from mangroves and mentioned that the framework has been applied in various areas. He made reference to the flood assessment that was made for the value of US coral reefs for flood risk reduction, where this influenced policy in different ways, and which contributed to economic benefits, as well as protect socially vulnerable communities. He also referred to the example of the Oahu's reefs, whereby each kilometre of identified reef areas provide over one million dollars in flood protection benefits each year. He highlighted the opportunities in climate risk finance, including in insuring nature and resilience insurance and pointed out the challenges and knowledge needs such as: effectiveness of new nature-based designs and hybrid designs; erosion and

sedimentation benefits; fragility (storm damage and recovery); multi-benefits frameworks in design and project evaluation; costs and maintenance; multiple scales and dimensions involved; and funding (beyond environmental programs). He concluded in mentioning that there are increasing international momentum to address these challenges. A copy of the full presentation can be accessed at:

<https://drive.google.com/file/d/1yhB7eSvJNbK1vryQCCSMvz5bBX8QqOqX/view?usp=sharing>

1.3.1.11 Dr Bregje Van Wesenbeeck. Deltares

Dr Van Wesenbeeck presented on how to move from science to implementation in the context of NbS for managing coastal erosion and flooding. She mentioned that US\$1 trillion in yearly damages are caused from flooding and erosion, including impacts of climate change and subsidence. She mentioned that prior to constructing and investing in grey infrastructure, it is importance to look identify the risks present, include natural system and socio-economic system. She explained how to integrate grey infrastructure in NbS and provided information on the performance of ecosystems under extreme conditions. Detailed information was provided on how to test for NbS performance, testing forests under extremes and presented the results of the test. She referred to the case of the Netherlands where this test is being implemented. She pointed out the future and on-going research that is being carried out. She also explained how to reach scale with NbS, which is not about single stand-alone solutions and requires a landscape perspective. In designed NbS, she mentioned that it is important to combine green and grey infrastructure but it is most important to know where to place these grey infrastructures because, for example if we use a levy in a mangrove forest, placing it in front of the mangrove forest will not perform the function of wave attenuation. She highlighted the need to work on conservation in finding solutions to reach scale, as well as to use science-based restoration focusing on ameliorating abiotic conditions. A copy of the full presentation can be accessed at:

<https://drive.google.com/file/d/1Y3J9Dy63e7NznDN76oSxL0K5TBpwUZo7/view?usp=sharing>

1.3.1.12 Apri Susanto: Building with Nature Indonesia

Mr Susanto started his presentation by providing an overview of the project site in Indonesia, which is Demak district, where factors under study, including physico-chemical factors, are inter-related. He highlighted the importance of building with nature. Building with Nature (BwN) is an approach that integrates ecosystem restoration into water and marine engineering practice to provide benefits to nature and people around the site. He provided an overview of the pilot project that is being applied in various areas, and the strategies being adopted, which comprise of several stages, as well as the ongoing work and measures that is being implemented in Demak. To involve community in the project, the BioRights concept is being applied, whereby loans/funding are being provided to the community, which in turn provide support in environmental conservation. He pointed out the key enablers of BwN, including: technology and system knowledge; multi-stakeholder approach; management, monitoring and maintenance; institutional embedding; business case; and capacity building. He provided information on the hybrid engineering or hybrid structure programme and since 2019 it has been implemented in 13 districts/cities with a total structure length of 23.5 km. Apart from Ministry of Marine Affairs and Fisheries, he presented other

government support. He mentioned that there has been cross-sectoral collaboration by BwN Asia Platform, with the implementation of 15 landscape scale projects started by multi-sectoral consortia. BwN Asia has also contributed to the development of a regional platform. To conclude, he pointed out the challenges and lesson-learned in terms of maintenance, community support, government support, social and extreme weather. A copy of the full presentation can be accessed at:

<https://drive.google.com/file/d/10Sp8mkJpswSYrmYnVykWDiZ8CKEGW-F8/view?usp=sharing>

1.3.1.13 Question and Answers:

Question to Dr Borja Reguero: Bangladesh faces the issue of erosion every year impacting on infrastructure along the river. How could erosion and sedimentation benefit for the case of Bangladesh?

Answer by Dr Borja Reguero: The risk industry have a standard technique, method and approach to assess flood risk. However, we need to look at erosion control benefits. How to use nature-based science to protect the shoreline and maintain the sediment. One of the benefits that we widely acknowledge, but we have still do not include, the terms of how we evaluate the socio-economic effects and how to use nature-based science on protecting the shoreline and accrete sediment. One example is to build soil but maintain the shoreline. In terms of regional analysis and technical analysis, we still have to advance in terms on how much we measure and what matrices we use for socio-economic value. The ocean impacts on coastal engineering are well studied and they are very complex processes and depends on a number of physics, inter-relationship factors but one of the best principles to apply is to know what is there in the ocean and what does it consist of and then explore how to address the issue.

Question to Dr Borja Reguero: Bangladesh encounters two issues: 1. The river is deep, around 60 ft. What are the natural infrastructure that we can create that doesn't take the villages into the river; 2. Some of the upstream sediment is not coming to the delta, especially in the mangrove area resulting in more waves coming in, increase in salinity, and so on. Is there any solution to that?

Answer by Dr Borja Reguero: There may be a disbalance in the sediment or lack of sediment downstream in the delta, but the main issue is the dynamic nature of river shorelines. To manage that we need to know the natural variability and therefore planning should be done accordingly. Solutions such as shoreline protection, protection of mangrove belts, have been helpful for other delta areas but obviously that will depend on the local specifics.

Question from Madagascar: Actually, there is a science policy interface that is relevant and is one of the successful research activities and it is also a bridges between science and policy. In terms of implementation, we are designing the implementation of a conservation programme in terms of blue carbon markets and other programmes. How to set-up countries like Madagascar, to boost up and to know the progress in terms of science-policy interface and to translate the scientific knowledge in terms of the key element for policy design and also for designing of conservation programme. Not only knowledge on ecological but also on social and economic issues, which are very important for countries like Madagascar. So, in terms of capacity building and transfer of

technology, how can the think-tank can move forward and enable the implementation of such approach for mangrove forest restoration and so on?

Answer by Dr Bregje Van Wesenbeeck, Deltares: As a scientist we can only make the science available but how to translate it, we have had several capacity building initiatives in Indonesia, which help in increasing capacity in the local universities and others including local farmers and the local government. This is needed for the translation of science into the socio-economic context, which is different for each country. This poses difficulty if institutional and legislation recommendations are being used for NbS, which depend on what fits the socio-ecological system that is present.

1.4 DAY 2: TRAINING

SESSION 1: UNDERSTANDING RISK

Trainers: Nathalie Doswald (United Nations Environment Programme), Simone Sandholz (United Nations University – Institute for Environment and Human Security)

Modules:

- Elements of risk
- Environment and disaster linkages
- What does this mean in terms of data one might need to understand risk?

1.4.1.1 Simone Sandholz - United Nations University – Institute for Environment and Human Security

Simone started her presentation by providing the definition of risks which she defines as: risk expresses the potential for harm and the expected levels of loss and damage that result from the interaction of hazards with vulnerable and exposed elements. She mentioned that this definition already gives an indication of the different components of risks, as well as the features. She referred to the IPCC figure that shows that disaster risk has sub-components such as hazard, vulnerability and exposure and thus disaster risk is expressed as the product of hazard, vulnerability and exposure. She mentioned that the sub-components all together account for a disaster impact. She provided detailed information on each component, referring to concrete examples. In the ecosystem-environment context, she mentioned that ecosystem and environment features can help us in reducing vulnerability, exposure and reduce the hazard impacts. A copy of the full presentation can be accessed at:

<https://drive.google.com/file/d/1ttPi9FrR-ykl0oZRN1IZshUWDrztTzes/view?usp=sharing>

This session comprised of an interactive session whereby participants were divided into 3 groups and were requested to:

- Think about the ecosystem-environment linkages of each risk component;

- How do they influence hazard, exposure, and vulnerability; and
- Compile a list for each component, participants could base it on different hazards (e.g. heat, flood).

Participants were then requested to identify hazard, exposure and vulnerability and a virtual whiteboard was used by the subgroups to provide their answers and inputs. Table 1 presents the results of the interactive session.

Table 1. Result of the interactive session

	Hazard	Exposure	Vulnerability
Subgroup 1	Storm surges causing beach erosion, as well as causing buildings collapse; degraded forests can put additional stress; thunderstorms and lightning – tree plantation could support;	NbS to reduce sea level rise impacts; Urban heat: negative impact on biodiversity and human health can be reduced by greenery; saltmarshes as a buffer but could be eroded; Non-structural intervention can reduce exposure; restoration activities could help	Coral bleaching and collapsed- livelihoods of fishermen; informal settlements built on salt marshes; people are displaced- impacting on health; social and environmental vulnerability link
Subgroup 2	Cyclones can uproot trees; beach erosion; pollution; illnesses; flash floods; landslides; salinisation of freshwater	Mangroves buffer coral reefs and attenuate waves; tourism brings more people; wave attenuation function of seagrass	Degraded ecosystem; tourism can damage reefs; tourism and income reduced for polluted and degraded environments; sedimentation impact seagrass; women not being consulted about resource management
Subgroup 3	Cyclones and strong storm surge; salinity intrusions in mangroves and wetlands; temperature variations; sea level rise. Ocean acidification effects mangroves; lowering of oxygen that is coastal hypoxia; land-driven debris and discharges accumulated in the roots of mangroves; nutrients; tidal fluxes that affect mangrove ecosystems; heavy rainfall events; tsunami; Ballast water discharge; giant waves; earthquakes; coastal flooding; coastal erosion; effluent run-off; poor water	Mangroves, being exposed and helping to reduce exposure; plants and animals are exposed; aquatic and terrestrial biodiversity is affected by natural hazards; coastal infrastructure is exposed; ecosystems are affected; wetlands degradation, salinity affects mangroves; people and infrastructure; how ecosystems help reduce exposure; help	Physical and social vulnerabilities; endangered mangroves are vulnerable in the Sundarbans; communities are saying local species are locally extinct from salinity; social vulnerability results from impacts on ecosystems; coastal population including socio-economic condition

	<p>quality. Hazards associated with cyclones include wave impacts; inundations from rainfall and storm surges; saline water intrusions; wind.</p>	<p>reduce wind, waves, storm surge; mangroves protect shoreline</p>	
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SESSION 2: MODELLING RISK AND RISK REDUCTION

Moderator: Abu Saleh Khan, Institute of Water Modelling, Dhaka

1.4.1.2 Dr. Upal Mahmud (Coast Port & Estuary Management Division, Institute of Water Modelling, Dhaka): Nature-based Solution for Erosion Protection at Cox’s Bazar Sea Beach

Dr Upal presented a case study from Bangladesh. He started his presentation by providing an overview on the study areas and existing situation in Cox’s Bazaar. He mentioned that there is existing natural dunes in the study area, which protect the coast against surges. He provided an overview of the existing protective measures however, he mentioned that long-term mitigation measures are needed given that the existing one may not last long. He further provided information on the shoreline shifting characteristics, the numerical modelling of coastal erosion risk and presented the spectral wave field near the study area. He presented the simulation of the coastline in the next nine years and mentioned that the modelling and simulation enabled them to identify vulnerable locations, as well as potential measures for coastal erosion protection. Nature-based solutions were identified such as sand engines, dune strengthening and afforestation. A copy of the full presentation can be accessed at:

<https://drive.google.com/file/d/1nTUQsYvLbNj5IJHHQxxY1SFMoS2NnKfr/view?usp=sharing>

Question: What happened to the sand dune along the coast?

Answer: This area is outside the study area.

1.4.1.3 Farhana Akhter Kamal (Coast Port & Estuary Management Division, Institute of Water Modelling, Dhaka): Impact of climate change on salinity intrusion and its consequences on natural ecosystem

Ms Kamal started her presentation by providing a geographical setting of Bangladesh and mentioned that salinity intrusions are among the problems affecting Bangladesh. She pointed out the external drivers that cause saline intrusion such as climate change and sea level rise, decrease in upstream flow, polderisation; population increase and subsidence. There are a lot of ecological resources along the coast of Bangladesh such as Sundarbans, Hilsa fish and Halda River which is a natural spawning ground of Indian Carp in Bangladesh. There are more than 30 measurement stations in coastal Bangladesh where salinity measurements are recorded. She presented the salinity measurements in the coastal areas of Bangladesh which is higher during the month of April and May, which drops during monsoon season. She presented modelling of salinity intrusion in the coastal river system. She presented the maximum salinity variation in the river system for the month of April and the simulations of salinity in future conditions including climate change, which showed

that the salinity will be higher in 2050. Due to the salinity increase, the species which are more adapted to high salinity, sundari trees, are being used to replace the ones that are adapted to low salinity, that is the gewa trees. She provided information on the effect of freshwater flow on salinity, where there will be depletion and loss of freshwater pockets in 2050 due to sea level rise. She mentioned that if freshwater flow in Gorai River could be increased and, that it will push the salinity downwards. She pointed out the ways to increase upstream flow namely: ensuring flow from upper catchment (Nepal, India and Bangladesh); preservation of water during the monsoon to flush water into rivers during the dry season (Barrage); and augmentation of flow by dredging of Gorai River. Another measure could be a salinity barrier downstream of the rivers to prevent salinity intrusion. She mentioned that a salinity simulation model is needed for planning coastal erosion risk reduction and land reclamation. To conclude, she stated that salinity modelling and mapping is crucial for planning and designing of nature-based solutions for coastal risk reduction. It is important in: preserving ecosystems on the coast; ensuring freshwater availability; erosion protection works; and land reclamation by building with nature. A copy of the full presentation can be accessed at:

https://drive.google.com/file/d/16kLyaji1ycZi_q2SA5JgKtZN_So0-jA/view?usp=sharing

Question by Dr Mat Vanderklift: In the previous session we discussed about salinity and the natural system. The salinity is the hazard and the mangroves are vulnerable. Do they also have a role in reducing exposure? Do the roots of the mangroves have a role in slowing down salinity intrusion?

Answer by Ms Farhana Akhter Kamal: They might have a role in slowing down the tide which may have a positive impact.

Question: Is there any impact on groundwater salinity in the study area?

Answer by Ms Farhana Akhter Kamal: Another institution has worked on the groundwater. The groundwater salinity is linked to the river. When we have high salinity, within 2 km with the river, it interacts with the river water and ground water. If we have high salinity due to sea level rise, the ground water will also be affected.

Question: Did you observe the extent natural vegetation and the salinity?

Answer by Ms Farhana Akhter Kamal: We have observed that where there is Sundarbans, the salinity level is not that much.

Question from Bangladesh: In most of the areas, we have observed that 500 m land to 1000 m, the trees have gone may be because of less water flow and less sedimentation. I do not know whether this study have found or compared why the delta and the coastland of Sundarbans is receding inside the land. Has there been any connection that this study has found out?

Answer by Ms Farhana Akhter Kamal: Salinity is increasing in the coast which is causing depletion of certain species. The answer to the above question will be provided separately.

1.4.1.4 Md. Raqubul Hasib (Coast Port & Estuary Management Division, Institute of Water Modelling, Dhaka): Mangrove Afforestation for Coastal Protection against Cyclonic Storm Surge; Bangladesh

Mr Hasib started his presentation by providing an overview of the study area. Several locations were identified for afforestation, which comprise of several mangrove species. For afforestation purpose, three mangrove species were chosen. The resistance of the mangrove was calculated. He provided information on the modelling risk assessment and risk reduction of storm surge and the development of two scenarios of mangrove afforestation: different width of mangrove afforestation and species/spacing of mangrove afforestation. After simulation of two different scenarios, the results were compared in terms of reduction in storm surge height. The Keora tree was more effective in reducing surge. He pointed out the benefits of afforestation, including economic benefits and preservation of coastal livelihoods. He presented the research findings of the study which showed that suitability of mangrove afforestation programs should be location-specific, contribute to reduction of surge height and velocity. He further mentioned that mangrove afforestation at the embankment reduce flow, thereby can increase embankment stability and durability. He also provided information on the benefits of afforestation, including economic benefits. He provided a way forward in building on the existing research such as to conduct a study for sediment trapping with mangrove afforestation and performance of mangroves against large wave-related damage during storm surges. To conclude he presented the existing mangrove afforestation initiatives. A copy of the full presentation can be accessed at:

<https://drive.google.com/file/d/1Jlb3B7IDkqoHoRgQrXp9BfBGQo7KfWlg/view?usp=sharing>

Question from Bangladesh: From Poshur River up to Raimangal, 40 kms area, we carried out a study and found that we lost accretion inside, would you suggest the depth of the mangrove is significant for a few trees are also important?

Answer by Md. Raqubul Hasib: The mangrove can trap the sediment. If we have afforestation at the bank of the river, it will attract river sediment. Hard structure instead of mangroves will not be effective because the sediment will be eroded at the structures.

SESSION 3: SOLUTIONS

Modules: Coastal ecosystems and approaches

1.4.1.5 Udo Nehren (THKöln – University of Applied Sciences)

Mr Udo presented on ecosystems for coastal hazard mitigation and provided examples regarding the same. He talked about linking nature-based solutions and ecosystems-based disaster risk reduction (Eco-DRR), which is defined as the sustainable management, conservation and restoration of ecosystems to reduce disaster risk with the aim of achieving sustainable and resilient development. He pointed out the different types of coastal ecosystems and the associated hazard mitigation functions. He presented the Eco-DRR target which is to conserve, restore and sustainably use coastal ecosystems. He presented case studies of central Vietnam, Demak in Indonesia, Dune management and restoration in the Netherlands. He made comparisons between coastal dunes and dikes in terms of hazard mitigation in Netherlands. He also talked about another

case study on hybrid solutions in Chile and Japan using grey and green infrastructure, as well as the case study of the New York City on coastal flood risk mitigation whereby there has been the implementation of the NYC green infrastructure plan, to reduce flooding and which focuses on improving infiltration and water storage in urban areas through green and blue infrastructure. He pointed out the principles for implementing Eco-DRR in coastal areas and coastal ecosystem services for Eco-DRR highlighting the need to identify the risks, limitations and obstacles. As lesson-learned he mentioned that good ecosystem management for hazard mitigation and disaster risk reduction has great potential and follows principles that ensure successful implementation. However, he mentioned that there are limitations and risks planners must keep in mind to prevent maladaptation. A copy of the full presentation can be accessed at:

https://drive.google.com/file/d/1sDqLillrSdec79zmpWdNPZ1AmC-S2S_T/view?usp=sharing

1.4.1.6 Karen Sudmeier (United Nations Environment Programme)

Karen started by carrying out a quiz through mentimeter and the question and the result is as follows:

Poll Question 1: To what extent have you already incorporated Nature-based Solutions in coastal protection measures and planning?

The Poll responses were as follows:

Very large extent - 0

Large extent - 5

Little extent - 4

Very little extent - 0

Neutral - 7

Karen presented in the opportunity mapping for Eco-DRR. She provided an overview of the objectives of the opportunity mapping, the methodology used and the data that are generally generated. A global map displaying the combination of flood exposure and forest coverage was presented. Reference was made to the case of Indonesia, using higher resolution datasets at the national scale that showed risk reduction services show potential areas for conservation and further conserved and the case of the Philippines where ecosystems could be a solution for risk reduction? And provide opportunities for conservation and restoration. She pointed out the hazard exposure in the Philippines. She concluded by inviting participants for an online programme (www.pedrr.org/mooc) and expressed interest in assisting countries for opportunity mapping. A copy of the full presentation can be accessed at:

https://drive.google.com/file/d/1SXwlJ6hLAWDIFOm5CyCvxLly_Wab_D8o/view?usp=sharing

Poll Question 2: What are your top three “needs” to fully incorporate NbS in coastal measures and planning?

The Poll responses were as follows:



1.4.1.7 Questions and Answers

Question: Can the introduced dunes and mangrove impact negatively on the ecosystem?

Answer by Udo Nehren: Introducing sand dunes can have a negative impact because we get the sand from the seafloor. That means that when we pump sand from the seafloor, from the shelf to the shore, we are disturbing the shelf ecology. In the case of mangroves, if we select the appropriate mangrove species, it may work well.

Question from Bangladesh: The coastline of Bangladesh and Netherland are different. What is your idea on the delta project that we have formulated in consultation with experts? Would it help in stabilising our coastline?

Answer by Udo Nehren: With regard to the climate change project, particularly the sea level rise whereby the salinity is entering more and more in the mangrove. The question can go to a Bangladesh expert because I do not have much information on the coastline of Bangladesh.

Answer by Karen Sudmeier: It is very important to work with local ecologists who can provide the proper guidelines with disaster management authorities. We cannot work on this alone. There are many certainties with ecosystems but there are many uncertainties that need to be answered with locally adapted solutions.

1.5 DAY 3: TRAINING

SESSION 4: SOLUTIONS (CONTINUED)

1.5.1.1 Trainers: Patrick Bolte, Sally Moore. Banyaneer Consulting

Modules: The Blue Guide to Coastal Resilience Solution Finder

Resources for this session are available at:

www.banyaneer.com/iora

Mr Bolte carried out a short interactive quiz that comprised of three questions. The questions and the result are as follows:

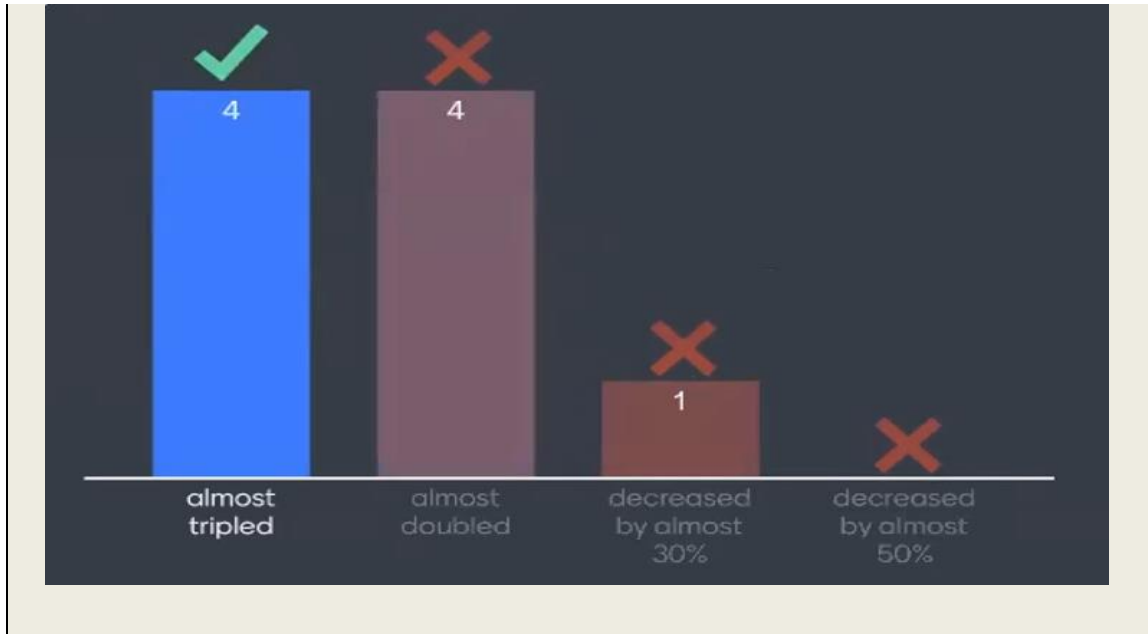
Poll Question 3: Between the 1900's and the 2100s, worldwide fatalities from storms (inc. cyclones, typhoons, hurricanes) have:

The Poll responses were as follows:



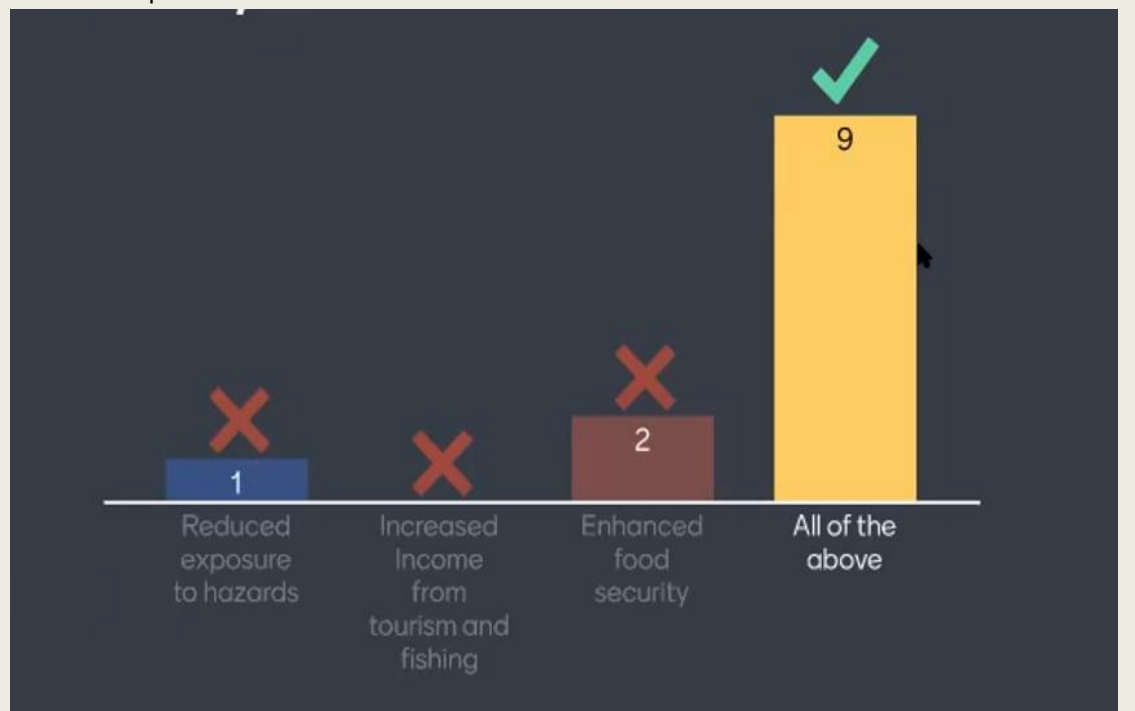
Poll Question 4: Between the 1990's and the 2100s, worldwide economic losses from tropical storms have:

The Poll responses were as follows:



Poll Question 5: what are the possible benefits of intact coastal ecosystems to nearby communities?

The Poll responses were as follows:



He started his presentation by providing an overview of the Blue Guide, including its background, objective and outline. Ms Moore presented the structure of the Blue Guide and pointed out the 8 stages that are linked and these include: 1. Ideate and Scope; 2. Engage others; 3. Assess context; 4. Identify solutions; 5. Make a plan; 6. Implement and monitor; 7. Analyse and learn; and 8. Share and expand. The Guide includes step-by-step guides, case studies, literature, glossary and key

resources. Reference was made to the case of Banyanpura, whereby information on the situation of the area, including the people, the nature and the hazards and observations that the area has faced over the past 10 years, such as cyclone, coastal erosion. He mentioned that the community conducted a community risk assessment and ecosystem assessment and presented the result of the same that showed that there has been inhibition of natural regeneration of mangrove, degradation of seagrass ecosystems and coral reefs. There was also an external context assessment that showed that department of environment has no experience in restoration, among others. Detailed information was provided on the solution finder and stage 4 on "identify solutions", highlighting the line of defence to reduce hazard impacts. A copy of the full presentation can be accessed at:

<https://drive.google.com/file/d/1pDhE2vSAC8ErVkuGUUKMA1U4BHTOKiZP/view?usp=sharing>

1.5.1.2 Questions and Answers:

Question to Patrick Bolte: How to reduce hazards? Some recommendations are to make a solid structure, move communities inside and try to cope with the capacity. The problem in Bangladesh is that we have a land starved country – we do not have enough land. What land that we do have is below the sea level and much of it is in the delta which is deforested, for us we have seen the mangroves have reduced the impact of cyclones on the coastal populations as far as 50-60 nm from the coastline. But tidal waves are as high as 10 – 15 ft. During the full moon the tide was very high and this could not be prevented by the mangroves, it would take out the embankment into the housing area, not killing many people but it has previously destroyed the local economy and the ability of the people to start again such as fishing areas and fields destroyed. How can you cope in such a situation when it is happening year long, every year which has increased by 47% since 1917 in this area?

We have 15,000 or more shelters stations close to the sea after 1970 cyclone where 500,000 died and in 1991 where approximately 138,000 people died. People now understand and they take shelter with the cattle, but the economic effects remain on these people for quite some time.

Answer by Patrick Bolte: Bangladesh is a case that has lots of successes for preparedness. For example, the Bhola cyclone killed 500,000 people in 1970 compared with 82 last year. But the damages to livelihoods are significant and the mangroves cannot protect communities from everything so some difficult decisions for Bangladesh moving forward. There is a net migration of the people away from the coastline due to the challenges they are facing. I cannot say what the best solution is but making sure that the mangroves are protected and that there is no further degradation, but in addition maybe it is required to add further features to add a protective aspect and make sure the tidal waves do not cause the harm that they do.

Question to Patrick Bolte: Following the questions on the lines of defence, Madagascar are still on the first line reducing exposure. Nature-based solutions are ideal and successful. With your experience and the experience of other countries what are the main conditions and the delay that is expected? I am sure it has a political and social economic context.

Answer by Patrick Bolte: This was broken down and we created these lines of defence. Often, we talk about vulnerability and this is a useful concept, but it doesn't show us much on what we

can do about it. What I see is typical DRR focus on preparedness aspect, they focus on early warnings and response capacities and have been successful at doing this. But I cannot answer to the point made about Madagascar but looking at the different lines of defence and thinking about what we can do in our context such as heatwaves, drought and cyclones. It has also been used for bushfires here in South Australia. Please see the [resources](#) for more information.

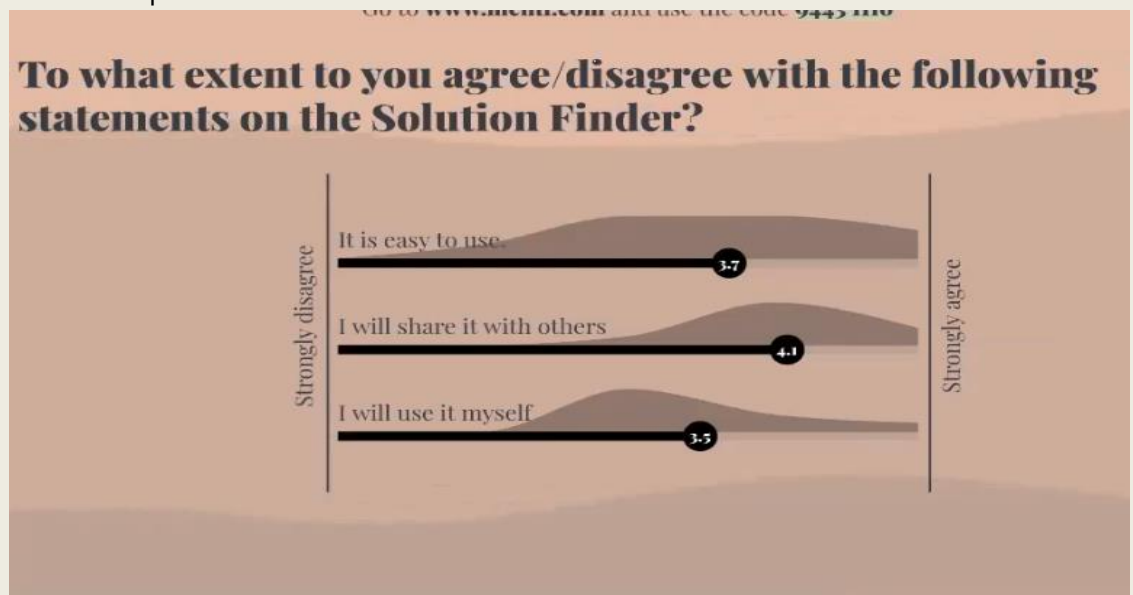
Question to Patrick Bolte: Step 4.2 in the flow chart. The flow chart asked if you can determine the causal factor for degradation of the ecosystem can be eliminated if the answer is no the flow stops. Does this mean that in this scenario the Nbs is not practical to be put in place as a measure?

Answer by Patrick Bolte: If you cannot address the causal factors then you invest in restoring then it is hard. Basically, you run the risk of investing in something that might not be sustained as it will be degraded again. So, you need to explore ways to address causal factors first. So, if you have seagrass meadows, even though it was degraded it would be a shame to invest if people continue to moor their boats there, make turbulent water and throw anchors on there if the fertiliser continues to harm the seagrass this is a lot of investment to not much return. This will frustrate the community. Knowing what harms the ecosystems and then addressing that is better,

Answer by Sally Moore: I also suggest that it doesn't stop there, but it does need a re-think and go back to look for willingness to change, capacity to do that re engagement and conversation is needed before proceeding before wasting a lot of effort.

Poll Question 6 : To what extent do you agree/disagree with the following statement on the solution finder?

The Poll responses were as follows:



There is more time to delve into this as a three-week course by The Nature Conservancy. Go to <https://www.nature.org/en-us/> for further announcements

Video walkthroughs are available here - www.banyaneer.com/iora

OPEN DISCUSSION

Moderator: Dr Andy Steven

Panelists:

- Mr Zahirul Haque Khan, Institute of Water Modelling, Bangladesh
- Dr Jacqueline Uku, Kenya Marine and Fisheries Research Institute
- Dr Jacqueline Raw, Nelson Mandela University, South Africa

This open session engaged everyone who wish to put forward issues related to Eco-DRR and NbS. Dr Steven identified four key topics.

Dr Andy Steven: What are the approaches to NbS and DRR? What are the opportunities for aligning these with the Blue Economy and DRR? As a region, how can we work together? At the IORA level, can the Blue Economy more integrated and include NbS and Eco-DRR?

Answer by Dr Jacqueline Uku: With the Kenyan experience, we have developed the Blue Economy and we are involved with the High Level Panel on blue economy and ocean protection, and ocean science. When we looked at the Blue Economy, we looked in our region in terms of economy and people. So, we looked at livelihoods and how to advance exploitation for our gains. There is little focus on habitat and nature, but we are trying to propel forward to tell policy-makers that a Blue Economy without healthy ecosystems, habitats is an economy that may not move very far. It is important for science to stand and begin to champion the discussion on NbS. We are doing some work in Kenya on mangroves.

Dr Andy Steven: Is there any other initiatives in the context of IORA that the panellists would like to share?

Dr Jacqueline Raw: We have Operation Phakisa that are economy focused and from the science side we are also trying to push forward that message. For national initiatives, there are some existing strategic framework and implementation plans but it seems that South Africa prefers the terminology of ecosystem-based assessment and not NbS. There are also key strategies and the projects that have been implemented to-date that have mostly focused on terrestrial ecosystems or water catchments and there is nothing on blue carbon, yet while there is some work going on for coastal protection this is mainly on sandy beaches. There is room for integration and most countries have national strategies that could be linked with IORA strategies.

Dr Andy Steven: As a region, how do we effectively work together in terms of those approaches?

Malaysia had started nationwide mangrove and other suitable species planting since 2005 (just after Indian Ocean Tsunami) and currently more Rhizophora and casuarina are being planted due to abundant supply of seeds. However, how about other species in other regions?

Dr Andy Steven: There are a number of species, but Rhizophora is the key species that are being used.

Mr Zahirul Haque Khan: Regarding other species in other regions, the species depend on factors such as salinity, tidal fluxes, turbidity, nutrient, which usually characterise the species. In Bangladesh, in the Sundarban areas there are three species, which are location specific based on the ocean environment.

Dr Andy Steven: We need to ensure that the species that are being used for restoration are appropriate to that environment.

Mr Zahirul Haque Khan: The selection of the species to be used is based on multiple criteria.

Question by Bangladesh: In Bangladesh, we have in fact, three scenarios: 1. there is a normal period of the year where there is no hazard, the sea is calm but the coastal areas are always affected; 2. Few times in a year there are cyclones that destroy the gain that we have got during the 8-9 months of quiet period; 3. the human suffering along with socio-economic conditions and also the suffering of farmed animals. How do you think that a NbS could help, especially in terms of these socio-economics conditions, what would be the best NbS for Bangladesh apart from mangroves that we have already discussed?

Dr Jacqueline Raw: The coastline in South Africa is different from Bangladesh because we do not experience seasonal monsoons and the coastline also is high energy. So, mangroves, saltmarshes and other coastal wetlands are all in estuaries and we do not have any large deltas. However, there are some similarities between the coasts in terms of other associated effects such as flooding, erosion and salinity intrusions. It is important to manage these things by looking not only at the hazards that have big impacts, but also the additional effects that come alongside the hazards. It may be that where the NbS comes in we need to manage not only the major events but the other associated hazards that are taking place.

Dr Andy Steven: What are currently being done in Bangladesh and what are the challenges?

Mr Zahirul Haque Khan: We have coastal policies, development strategies and disaster management policies. We also have a definite organisation to address the different disasters such as Bangladesh water development board takes care of coastal erosion, flooding and salinity intrusions. When planning for disaster management solutions, they do it in a holistic and integrated way involving multi-disciplinary team. For example, there is a robust plan for fisheries, agriculture, infrastructure, but it is not solely nature-based plans but is mainly engineering structures but to some extent we try to include some natural features such as for flood and storm surge protection, we also involve mangrove afforestation in front of the engineering structures to reduce the strong waves. Along the coastal belt, we also have the green belt. The Bangladesh Meteorological Department forecasts the origin of the cyclones, its propagation time and so on. We also have about 40-45,000 volunteers who disseminate these forecasts to the coastal communities. There is also plenty of cyclone shelters in the coastal areas. The Department of Disaster Management also coordinate disaster management activities and there is the National Committee headed by the Minister and another Committee headed by the Prime Minister. The main challenge for the future

is to ensure we consider the impact of climate change and, the strong surges. So, the challenge is to make sure these infrastructures are climate resilient considering the natural features. It could be a hybrid approach that comprises of engineering structures and NbS. Another challenge is the mindset of policymakers, managers and engineers to have a paradigm shift from engineering solutions to NbS or combination of both. To forecast the disasters is also a challenge because the impacts of disasters for example, on the house and commodities of the coastal communities are not taken into account.

Answer by Patrick Bolte: Bangladesh has a lot of innovation and progress. Regarding the challenges to integrate DRR and NbS. There are four main challenges: 1. Time mismatch: many DRR projects are much shorter than NbS require and this need to be reconciled either from perspective of DRR projects or by having longer projects; 2. Funding: any projects tend to be too narrowly defined and this is often based also on the donor calls; 3. Diffusion of partnerships: at the global level and higher regional level, there are great partnerships in terms of humanitarian and DRR oriented organisations and more eco-conservation organisations but at the local level these are not that common as they need to upscale the integration of NbS and DRR; and 4. Lack of sufficient local evidence: evidence that shows to local government that NbS actually protects. It is hard to find good convincing local studies for many countries that can actually be taken to government to show that there has been a reduction of damages and losses due to the work that is being done. This is important to show to government that NbS is more effective than grey infrastructures.

Mr Zahirul Haque Khan: It is important to have evidence that the natural features are effective in protecting against coastal erosion. There is a lack of knowledge, for example which coastal features have benefits for DRR or which natural features can be effective in which location for which hazards. There is a knowledge gap. Our policy-makers do not have that much confidence on NbS that they are an effective, long-term sustainable solution. The grey infrastructure is not cost-effective but it is still being used because of lack of knowledge on other alternatives such as NbS. We can carry out research and demonstration projects and one approach is learning by doing.

Dr Andy Steven: There was a session on financing on Day 1 and we heard about various finance mechanisms and the tools towards implementing the mechanisms but the financial literacy that is required to engage with the World Bank or the Asian Development Bank and the requirement to do that are quite considerable if you come from a local community in terms to try to understand this. How do we lift the financial literacy? The donors often have narrowly defined requirements, and the finance community are looking for large projects and there are no shortages of funds but they are not seeing projects of a scale and that are de-risked enough for them to invest in. There is a shortfall of projects that they want to fund, and I think IORA could sponsor this sort of capacity building in lifting the financial literacy and how do we get in front of finance deals, insurance industry projects that are at scale that allow us to test and provide empirical evidence that this works or not. What further capacity do we need to develop financing literacy?

Dr Jacqueline Uku: I indicated before that the Blue Economy and one of the opportunities that I see is bringing the economist into this dialogue because that is pulling them towards NbS.

Regarding financing, one aspect that is forgotten is to help us to get traditional knowledge to the table. Some disasters had happened and how people have dealt with them traditionally is important. So, funding traditional knowledge hubs and harnessing that knowledge could provide us with a lot of information from the past that could inform the future.

Dr Andy Steven: For the research community, there was discussion toward developing parametric insurance methods based on an understanding and qualification on what the hazards are and then ascribe a cost, but we all know that this is different at local and regional scales, depending on the hazard situation and vulnerability. What might be the opportunity to work with finance and insurance industry to better develop some of the relationships they need in terms of developing some of the parametric tools to recognise the value of the ecosystem or the loss of particular function of the ecosystem and livelihood?

Dr Jacqueline Raw: I think the difficulty comes in quantifying hazards from a scientific perspective when it comes to determine in what measurable range or error is acceptable to quantify. We lack high resolution data and something that could be measured as a high wave height or wind speed in one location of the coast is not considered high for another coastal area even within the same country. We need to first develop a standard for evaluating those parameters. We normally grade estuaries with a health index. So, maybe developing a grading scale that features in different aspects that helps toward that. Then you do not need to have an absolute value indicator. If that might be an option, it would be easier to approach from a conceptual standpoint before measurements are taken.

Bangladesh: We discussed on physical issues such as sand dunes and mangroves but we have not discussed much on the cost/finance of the projects. Could there be a focus on that? How can IORA Member States come together and generate some fund to help the poor countries in the region to focus not specifically on NbS but on some specific areas where financial support could be provided? In UNCLOS there is a huge chapter on capacity building and technology transfer but nothing has happened in the last 14 – 15 years. Do you see a future for some sort of funding? For example, the European Union has allocated funds for the African continent to stop immigrants from Africa to Europe and other countries, but Asia is left out of that fund. Do you foresee a chance for some countries to focus on the Blue Bond, insurance which will help in mitigating or elevating the institutions of these poor countries in the Asian region which include Bangladesh and other LDC countries?

Dr Andy Steven: There is a lot of energy among the insurance industry but they want to see upscale projects. I think the strength of IORA, in terms of the range of hazards and the vulnerability of some of those people, could provide an opportunity, as a community, in lifting their financing literacy so that we can have that conversation with some of the donors. We can think about upscaled pilot studies that can be taken up more broadly through the region.

Dr Andy Steven: Coming back to the examples of evidence, there are no good examples at a national or sub-national level, how do we make that more available and how do we share the information across the region? Is there an opportunity for IORA where people can go to and

continue a dialogue about challenges that we might face and find example on what might work and what might not? There may be other systems internationally, but I haven't seen anything in the Indian Ocean. There may be views that could be shared on this?

Dr Jacqueline Raw: This would be extremely useful because often when we are trying to do work and we can see that once something has become successful and the report is published 3-5 years after the project has completed. I think lots of people are trying to get off the ground without communicating and working individually without interacting. If we can have some sort of platform where you can ask for ideas and share opportunities, look for collaboration between partners.

Dr Jacqueline Uku: A lot is happening in our region, we have started a project known as Mikoko Pamoja that is in Kenya and is being expanded in Tanzania to reinforce conservation of mangroves and to include seagrasses. The information though it goes to publication but does not go out strongly. So, the need for a network that can connect us across the Indian Ocean Rim would be absolutely much needed. In the region, we have just registered a WIO Mangrove Network that brings all mangrove practitioners together on one platform, which can be useful for the WIO region.

Patrick Bolte: About the lack of locally relevant evidence, there are few things that we can do. The first thing is already in the Blue Guide, that is a post-hazard event tool where project teams or communities can do a simple analysis of the extent to which the ecosystem reduces damages and losses. The other thing is a longer-term research project that identifies places that are likely to be impacted. It, looks at conditions and the protective elements and the actual impacts in case of the hazard. For floods, we have the flood resilience measurement initiative funded by Zurich insurance and there are several NGOs and universities in it. This is also work in progress, long-term initiative for coastal areas as such with a particular focus on storms. This to my knowledge does not exist but I think it would be something that could fill that gap.

Bangladesh: Since 2003 and 2004, we have been talking about Biological Diversity Of Areas Beyond National Jurisdiction (BBNJ). There was a UN conference that had been called to have an international law/ international convention. We need to take care of the oceans because beyond three nautical miles, there are 54% of the sea still remained unseen. There has to be some sort of regulation or international law that would make everybody comply with it. I have seen this sort of enthusiasm that is still going on but what is contrasting is that the people who are in the coastal areas suffer the most. However, people are not really interested about this suffering and the socio-economic conditions. Why does this dichotomy still exist among us and whether there is a way out for it? Whether we can probably employ more of our energy to look after the poor people of the coastal belt, the 80% of the fishing community that do have not facilities like the big countries.

Dr Andy Steven: There is one issue when you were talking about BBNJ. In fact, IORA has a Maritime Security track as well as blue economy and DRR and again the relationship between some of those issues that are addressed in that one does extend to BBNJ. How we better manage those areas beyond national jurisdictions is another intersection that we really need to think about what the alignment is and also understanding what is happening in those sorts of areas and how that affects the coastal areas whether it is weather or fisheries production. The greater aspects around greater consideration of the socio-economic aspects, I think the information is patchy and there is a strong move towards thinking about those greater socio-economic impacts, thinking

particularly about the livelihoods of small-scale fishermen. I think one of the great synergies of IORA is that most nations have a variable population of small-scale coastal fishermen. How do we think about their experiences what are the challenges that they are facing, how do we develop more effective tool that allow them both in terms of being able to continue to fish but to participate in conversations such as the Blue Economy and there is quite an active dialogue in the blue economy conversation at the moment about inequities that the blue economy should not just only be about a large industry, it needs to be equitable, it need to be inclusive and transparent.

Dr Jacqueline Uku: Bringing it back to Kenya and our region, there is a lot going on in regards to Marine Spatial Planning (MSP) and we are looking at this process, we have started it and we are in the pre-planning process. We are looking at it to be able to be equitable, inclusive, and to look at the issues that we have discussed in this meeting in terms of protection of hotspots, protection of areas that are acting as barriers to natural disasters. I see the opportunity for us and those countries that are undertaking MSP to begin picking up the dialogue and integrating these issues because MSP process is mandated to address equity and ensuring that we are looking at restrictions that come out of this planning process and how to ensure communities benefit. This is a tool and an opportunity, at least we are looking at this as an opportunity. We have had a lot of zoning in the past that has been very restrictive and so we are looking at this as a new process that supports the blue economy but becomes a bit more inclusive.

Dr Andy Steven: How scalable is that to other Member States for example to take some of the methodology that you are developing, it is underpinned by MSP but it sounds like there is other data sets you need around communities, their livelihoods, what they value?

Dr Jacqueline Uku: One thing that we are doing in our region is looking what has been done in Seychelles and South Africa.. Seychelles has pioneered MSP and we are looking at their lessons. As I indicated for Kenya, we are right at the beginning, at the pre-planning stage. We are following the best practices and guidelines provided by IOC-UNESCO. One thing that we are looking at is social state in the process and ensuring that whatever we do in terms of the plan has integrated social safeguards and we believe that there are other countries coming on board. So, when we talk about scale, we are seeing Tanzania following with some dialogue for Mauritius as well as enquiries from Madagascar. So, the lessons we have learnt in Kenya will definitely advise how best to move this, especially for mainland states. Seychelles is an island with very special relationship with the sea and we are a mainland state where a majority of our population may not see the sea, may not be ocean literate. So, this also gives us an opportunity to enhance knowledge about the sea.

Madagascar: We have to state that Madagascar is not in an advanced stage like the other countries but Madagascar though its Environment Ministry is prioritising Blue Economy and is keen to benefit from the technical, scientific and financial support to be able to move on this implementation of effective and sustainable Blue Economy. The processes will compound ongoing efforts and initiatives with the willing of pushing the upscale of any local initiatives. And that will include all actions on research (ecological and socio-economic ones) with consideration of existing tools, financial issues mainly on private sector mobilisation and all capacity building. We have to say also that existing opportunities should not be missed for IORA following current international

initiatives offering findings to implement blue carbon and works on mangrove ecosystems restoration. All opportunities where IORA members could gather initiatives.

Dr Andy Steven: there is tremendous opportunity for us to work more closely together in partnership in terms of addressing knowledge gaps and in terms of developing capability and capacity building to really engage more broadly with the international community including the financial and insurance industries who are really looking to see some of this work go forward but they need to see it at scale. So, I think that really nicely summarises the whole range of issues.

THE WAY FORWARD

Host: Dr Paul Branson, CSIRO

Additional facilitators: Md. Golam Rabbani (CCP/BRAC, Bangladesh) & Dr Mat Vanderklift

(IORA Indian Ocean Blue Carbon Hub)

The goal of this session was to identify pragmatic actions within three key themes that IORA can facilitate to scale-up ecoDRR across the region. The breakout sessions brainstormed within each theme and reported back in plenary. It is hoped that these could be used to guide future IORA activities. Following the workshop, the responses would be compiled into follow-up survey to all workshop participants to enable prioritisation. The following themes were selected:

- Theme 1: National indicators for coherent ecoDRR (“Top down”)
 - o Key aspects:
 - Structural coherence across levels
 - Integration of science into policy and plans
 - Reporting to global initiatives (i.e. Sendai Framework DRR, SDGs)
 - Considerate of regional socio-economics
 - Capacity and confidence building
 - Top down
- Theme 2: Policy into actions (“Bottom-up”)
 - o Key aspects:
 - Designing, planning and implementation of NbS/ ecoDRR
 - Engagement of stakeholders
 - Understanding the user needs
 - Building confidence
 - Context specific and feasible NbS/ecoDRR
 - Triple bottom line value (e.g. economic, social, environmental)
 - Potential actions/solutions
 - Funding and financing NbS/ecoDRR
 - Monitoring of successes and documenting failures
- Theme 3: Filling the gaps (“Top to Bottom”)
 - o Key aspects:

- Knowledge gaps
- Information gaps
- Components of risk (hazard, exposure, vulnerability)
- Identification of context specific and feasible pilot studies
- Identifying spatial planning tensions
- Resolution gaps
- Evidence for confidence building
- Knowledge sharing

A copy of the Dr Branson's presentation can be accessed at:

<https://drive.google.com/file/d/1d9TQkAzjUd5quP2Fs6tC8TxrFBJKofVz/view?usp=sharing>

1.5.1.3 Outcomes of the breakout sessions

Theme1: National Indicators for coherent ecoDRR

Facilitator: Dr Mat Vanderklift

The participants identified the following indicators and highlighted some important issues:

- National level indicators e.g. Sendai framework. CBD, SDGs, etc
- Do indicators make a difference?
- A need for indicators
- Do we need to standardise the indicators?
- There are more important differences between frameworks.
- They can complement each other - are there gaps we consider?
- Use the international indicators as a starting point – it is useful to be aligned with these for national strategies.
- However, we should check for gaps, so that if there are unique indicators we can include them.
- What are the indicators that could resonate in the Indian Ocean?
- Type of coastline and context is different. Hazards can have different impacts/effects/intensities due to regional geography / geomorphology. Types of coastline could be an indicator.
- Vulnerability- socio-economic affects; damage to ecosystems from events- i.e. effects of hazard on ecosystem.
- Sendai framework has 38 indicators associated with global markets: reduce global disaster mortality; reduce number of people affected; reduce direct disaster economic loss; reduce disaster damage to infrastructure; increase number of countries with national and local DRR; enhance international cooperation.
- Funding question: who would fund? Government, private, PPP, regional development, banks
- Evidence needed to convince funders (perhaps especially regional development banks) to direct grant/funds/finance to NbS.
- There could be an indicator on education/awareness, that is on maritime domain awareness. There need to be some form of education in Member States. Need for

education/awareness outside periods of extreme events. Maritime Domain awareness need to be developed.

- Actions start locally.
- Disconnect between rural/regional and urban areas, lack of awareness.
- From SDG14: conservation and sustainable use of oceans and resource.
- From SDG13: countries with NDC, that adopt and implement national DRR in line with the Sendai Framework.

Theme 2 – Policy into Action (“Bottom up”) – Whiteboard

Facilitator: Dr Golam Rabbani

The outcomes of this theme were as follows:

- **Potential actions/solutions**
 - o Mangroves (in Kenya)
 - o Consideration of landscape approach to bring solutions
 - o Integration of NbS in NAPA, NDC and other policy documents
 - o Seagrasses
 - o Coral reefs
 - o Locally managed marine area
 - o Coral reef and Seagrass Conservation Strategy (Kenya)
 - o Increase of marine protected areas

- **Funding and financing NbS/ecoDRR**
 - o Fund raising for supporting for NbS
 - o Green Climate Fund
 - o Commonwealth Blue Charter
 - o Internally private sector e.g. insurance
 - o Local investors/philanthropist

Theme 3 – Filling the gaps (“top to bottom”) – whiteboard

Facilitator: Dr Paul Branson

The outcomes of this theme were as follows:

- Dissemination of emergency early warning information and operational modelling
- Local scale resolution of components of risk
- Non-traditional platforms to disseminate learnings and successes to build confidence.
- Capturing Indigenous knowledge to expand the historical view of hazards.
- Education at the grass roots levels of the hazards but also the risks associated with degradation of coastal ecosystems.
- Marine spatial planning as best practice and scaling out across the region.
- IORA wide legal framework to support information sharing between members.
- Establishing the funding sources
- Region specific platforms for data and knowledge sharing that centralises available tools as well as the context that they were developed.

- Blue carbon discussion evolving – need common action and best practice applied consistently.
- Modelling to improve process understanding.

Comment

Some useful and interesting suggestions including things like policy briefs and representation at the various COPS.

Question/comment to all

The topic of blue carbon is evolving to encompass many matters but we need common action. Which means understanding what exactly we can do not only in theory but in practice. How can we help governments to manage blue carbon and how can organisations support governments through partnerships and funds, and how can we create a network between countries to exchange best practices on blue carbon?

CLOSING SESSION

1.5.1.4 Closing Remarks by H.E. Mr. Masud Bin Momen, Foreign Secretary of Bangladesh

H.E. Ambassador Masud Bin Momen expressed his gratitude to Australia for co-hosting the event with Bangladesh and thanked the IORA Secretariat for their continued support for keeping the momentum up amidst the ongoing outbreak of pandemic. He also expressed his appreciation to the speakers, trainers and participants who enlightened the audience through their knowledge, wisdom and excellence. He highlighted the importance of coastal dynamics and the vulnerability of coasts in facing natural calamities and the huge loss of both lives and resources. To keep the coast, its' resources and people protected, he mentioned that importance should be given to nature-based coastal risk reduction measures. He further stated that the geographical location and geomorphological conditions of the Indian Ocean Region have made the region one of the most vulnerable ones with Bangladesh being one of the worst affected countries in the world, losing 2% of its GDP regularly due to natural calamities and environmental degradation. In addition, Bangladesh also faces climate change induced salinisation and other disasters. In view of coping with the multidimensional vulnerabilities posed by climate change and disasters, the Government has recently adopted Delta Plan 2100, which will provide Bangladesh with a sustainable development pathway for the next 100 years. The Bangladesh Parliament declared climate change to be a "planetary emergency" and called on the world to work "on a war footing" to combat it and reduce its impacts.

He highlighted the various initiatives of Bangladesh, including afforestation projects to establish green belts along the coast; and the "Afforestation in Coastal Regions including the Newly Accreted Chars of Bay of Bengal" and "Sustainable Forests and Livelihoods" projects in the coastal districts. In the fiscal year 2020-21, Bangladesh has undertaken the following major projects under its

Annual Development Plan (ADP): Strategic Environmental Assessment (SEA) of South West Region of Bangladesh for Conserving Outstanding Universal Value of the Sundarbans; Formulating an Environmental Management Plan (EMP) up to 2041 aiming at conserving the Sundarbans by dividing it into 7 sectors; and Afforestation in five Coastal Districts and newly developed Chars in the coastal areas. He stressed on the need of a long-term strategic plan on risk assessment and reduction considering nature-based solutions and involving meaningful participation of member countries, as well as the need to promote 'Blue Finance' in the region so that the LDCs and Developing Countries acquire required science knowledge to develop appropriate science-policy interface. He suggested Australia to lead in developing strategies regarding ways to model waves, coastal engineering techniques, remote sensing that may assist in understanding mangrove restoration, while Bangladesh can contribute by sharing its forty years long experience in using mangroves as its nature-based coastal risk reduction measures. He also recognised the very productive outcomes of the workshop in the form of probable areas of cooperation among the IORA Member States and recommendations for future endeavours in the region. He recommended to have modelling to understand the wave surges and its inundation and also the vulnerability of coastal population including the socioeconomic impact of adverse events due to climate change, as well as the need to create coastal green belt, as part of nature-based solution, to protect our coastal areas from natural calamities. He hoped that the workshop's recommendations and outcomes will be instrumental in creating a sustainable and resilient post-pandemic cooperation especially to develop regional model to generate required science for science-policy interface associated with the nature based solutions for costal protection and risk reduction; ecosystem-based adaptation; develop understanding about the funding requirement & mechanisms for their implementation; and also aid Member States with required knowledge to build commitments into their "Nationally Determined Contributions (NDC)". He concluded his remark by reiterating the commitment of Bangladesh to embrace any collaboration for welfare of not only its own, but also the coastal community of the whole Region. The full remarks of H.E. Mr. Masud Bin Momen is annexed as [Annexure F](#).

1.6 ANNEXURES**LIST OF PARTICIPANTS**

MEMBER STATES				
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ANNEXURE B: AGENDA

IORA Blue Carbon Hub think tank meeting Nature-based solutions for coastal risk reduction

Draft Program

Times given in Bangladesh Standard Time: GMT+6

Day 1: Tuesday, 25 May 2021	
10:30 - 10:45	Virtual Meeting Platform Open Access [Testing Phase]
10:45 - 11:30	<p><i>Opening session</i> Host: Rear Admiral (Retd.) Md. Khurshed Alam, BN, Secretary (MAU), Ministry of Foreign Affairs, Dhaka</p> <p>Opening remarks by H.E. Dr. A. K. Abdul Momen, M.P., Honorable Foreign Minister of Bangladesh</p> <p>Opening remarks by the Honorable Sussan Ley, Minister for the Environment, Australia</p> <p>Opening remarks by Dr Gatot Gunawan, IORA Secretary General</p> <p>Background and introduction: Dr Mat Vanderklift: IORA Indian Ocean Blue Carbon Hub</p>
11:30 – 13:00	<p><i>Session 1: Introduction and overview [90 minutes]</i> Moderator: Rear Admiral (Retd.) Md. Khurshed Alam, BN, Secretary (MAU), Ministry of Foreign Affairs, Dhaka</p> <p>Dr Animesh Kumar: United Nations Office for Disaster Risk Reduction</p> <p>Dr Nathalie Doswald: United Nations Environment Programme</p> <p>Prof Saudamini Das: Institute of Economic Growth, Delhi</p> <p>Prof Dr. AKM Saiful Islam, Institute Water and Flood Mangament, Bangladesh University of Engineering & Technology, Dhaka</p> <p>Panel Q&A: 30 mins</p>

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13:00 – 13:30	Break
13:30 – 14:30	<p><i>Session 2: Finance and insurance [60 minutes]</i> Moderator: Dr Andy Steven, CSIRO</p> <p>Jacqueline Wharton: Willis Towers Watson</p> <p>Julieta Guanlao: Conservation International</p> <p>Stefanie Simpson: The Nature Conservancy</p> <p>Panel Q&A: 15 mins</p>
14:30 – 15:00	Break
15:00 – 16:00	<p><i>Session 3: Examples and knowledge needs [60 minutes]</i> Moderator: Dr Mat Vanderklift: IORA Indian Ocean Blue Carbon Hub</p> <p>Dr Borja Reguero: University of California, Santa Cruz</p> <p>Dr Bregje Van Wesenbeeck. Deltares</p> <p>Apri Susanto. Building with Nature Indonesia</p> <p>Panel Q&A: 15 mins</p>
Day 2: Wednesday, 26 May 2021	
10:45 - 11:00	Virtual Meeting Platform Open Access [Testing Phase]
11:00 – 12:15	<p><u>Day 2: Training</u></p> <p><i>Session 1: Understanding risk</i> <i>Note: the session will involve breakout groups and interactive discussion</i></p> <p>Trainers: Nathalie Doswald (United Nations Environment Programme), Simone Sandholz (United Nations University – Institute for Environment and Human Security)</p> <p>Modules Elements of risk Environment and disaster linkages What does this mean in terms of data one might need to understand risk?</p>
12:15 – 12:45	Break

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12:45 – 13:30	<p><i>Session 2: Modelling risk and risk reduction</i></p> <p>Moderator: Abu Saleh Khan, Institute of Water Modelling, Dhaka</p> <p>Trainers and case studies:</p> <p>Dr. Upal Mahmud (Coast Port & Estuary Management Division, Institute of Water Modelling, Dhaka): Nature-based Solution for Erosion Protection at Cox’s Bazar Sea Beach</p> <p>Farhana Akhter Kamal (Coast Port & Estuary Management Division, Institute of Water Modelling, Dhaka): Impact of climate change on salinity intrusion and its consequences on natural ecosystem</p> <p>Md. Raquibul Hasib (Coast Port & Estuary Management Division, Institute of Water Modelling, Dhaka): Mangrove Afforestation for Coastal Protection against Cyclonic Storm Surge; Bangladesh</p>
13:30 – 14:00	Break
14:00 – 15:00	<p><i>Session 3: Solutions</i></p> <p>Trainers: Karen Sudmeier (United Nations Environment Programme), Udo Nehren (TH Köln – University of Applied Sciences)</p> <p>Modules</p> <p>Coastal ecosystems and approaches</p>
Day 3: Thursday, 27 May 2021	
11:00 – 13:00	<p><i>Session 4: Solutions (continued)</i></p> <p><i>Note: the session will involve breakout groups and interactive discussion</i></p> <p>Trainers: Patrick Bolte, Sally Moore. Banyaneer Consulting</p> <p>Modules</p> <p>The Blue Guide to Coastal Resilience Solution Finder</p> <p>Resources for this session are available at: www.banyaneer.com/iora</p>
13:00 – 13:30	Break

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<p>13:30 – 14:30</p>	<p><i>Session 5: Open Discussion</i></p> <p>Moderator: Dr Andy Steven</p> <p>Panelists: Mr Zahirul Haque Khan, Institute of Water Modelling, Bangladesh Dr Jacqueline Uku, Kenya Marine And Fisheries Research Institute Dr Jacqueline Raw, Nelson Mandela University, South Africa</p>
<p>14:30 – 15:30</p>	<p><i>Session 6: The way forward</i></p> <p>Host: Dr Paul Branson, CSIRO</p> <p>The session will involve opening comments in plenary, breakout groups with discussion, and a final reporting back</p> <p>Additional facilitators: Md. Golam Rabbani (CCP/BRAC, Bangladesh) & Dr Mat Vanderklift (IORA Indian Ocean Blue Carbon Hub)</p>
<p>15:30 – 16:00</p>	<p>Closing Session</p> <p>Closing remarks: H.E. Jeremy Bruer, Australian High Commissioner to Bangladesh H.E. Mr. Masud Bin Momen, Foreign Secretary of Bangladesh</p>
<p style="text-align: center;">Conclusion of the Virtual Workshop on IORA Blue Carbon Hub Inaugural think tank meeting Nature-based solutions for coastal risk reduction</p>	

ANNEXURE C: OPENING REMARKS BY H.E. DR. A. K. ABDUL MOMEN, M.P., HONORABLE FOREIGN MINISTER OF BANGLADESH

Draft speech for Honorable Foreign Minister to be delivered on the ‘Think Tank meeting on nature-based solutions for coastal risk reduction’ to be held from 25th-27th May, 2021 jointly organized by the IORA Blue Carbon Hub, Australia and Bangladesh

Hon’ble Sussan Ley, Minister for the Environment, Australia,

Hon’ble Acting Secretary General of IORA,

Dr. Mat Vanderklift, IORA Blue Carbon Hub

Distinguished Representatives, Excellencies,

Ladies and Gentlemen,

Assalamu Alaikum, Peace be upon you.

It is indeed a great pleasure for me to be able to address the distinguished audience virtually on a very timely topic “ Nature-based solutions for coastal risk reduction” organized by Australia, Bangladesh, and IORA Blue Carbon Hub. The IORA Blue Carbon Hub was announced by the Honourable Foreign Minister of Australia at the 3rd Indian Ocean Ministerial Blue Economy Conference in Dhaka, Bangladesh, 2019.

Today is 25th May. On this day in 2009, the Cyclone “Aila” severely affected the coastal areas of Bangladesh and India, and caused extensive damages. It was the worst natural disaster to affect Bangladesh since Cyclone “Sidr” in November 2007. While I am delivering my speech, another severe storm “Yaas” is forming in the Bay of Bengal. Our Indian Ocean Region, tagged as World’s Hazard Belt’, is always at the forefront of vulnerability to natural disasters, including cyclones, floods, earthquakes and tsunamis. The intensity of natural hazards has increased by about 470% since 1970. I cannot agree more with the statement of Mr. Tadateru Konoé, President of the International Federation of Red Cross and Red Crescent Societies (IFRC): quote “The devastating humanitarian and economic impact of natural disasters in the Indian Ocean countries will only worsen with time, unless we double down on investments in resilience and preparedness.” unquote

Ladies and Gentlemen,

Nature offers many solutions for reducing the impacts from disasters and climate impacts. These so-called ‘Nature- based solutions’ are an important piece in the **puzzle** in building the resilience of coastal areas, mangroves, sea grasses, tidal marshes and communities to an ever-

increasing number of disaster events around the world specially in the Indian Ocean. Nature-based solutions are relevant to everyone, and we all benefit from seeing them applied. With this in mind, the workshop has been designed to be accessible to everyone, no matter what is your background.

It is important to learn how to apply nature-based solutions in enhancing resilience to disasters and climate change, whether you are a youth leader, practitioner, policy maker, engineer or business owner. How human activities are interlinked with ecological systems, main tools and approaches for applying nature-based solutions to reducing disaster and climate risks. How **policy makers and practitioners** are applying nature-based solutions for reducing risks of natural hazards by investing in restoration and protection.

These extreme events and disasters such as floods, cyclones, Tsunamis and tidal surges, known to be exacerbated by environmental changes including climate change, land-use changes and natural resource degradation, lead to substantial loss of life, livelihoods, and community assets, which not only threatens the pace of socio-economic development, but also undo hard-earned gains. Increasing climate variability and multi-dimensional vulnerabilities have severely affected the social, ecological, and economic capacities of the people in the coastal regions who are, economically speaking, the people with the least capacity to adapt. Climatic and other environmental hazards and anthropogenic risks, coupled with weak and wavering capacities, severely impact the ecosystems and Nature's Contributions to People (NCP) and, thereby, to human well-being. Long-term resilience building through disaster risk reduction and integrated adaptive climate planning, therefore, has become a key priority for scientists and policymakers alike. Nature-based Solutions is a cost-effective approach that utilizes ecosystem and biodiversity services for disaster risk reduction and climate change adaptation, while also providing a range of co-benefits like sustainable livelihoods and food, water and energy security.

Excellencies,

This workshop I believe should discuss the concept of Nature-based Solutions both as a science and as art – and must elaborate on how it can be applied to develop healthy and resilient ecosystems locally, nationally, regionally and globally. We all should take serious note of Nature-based Solutions, applications and challenges, research trends and future insights that have wider regional and global relevance. The aspects covered likely to include: landscape restoration, ecosystem-based adaptation, ecosystem-based disaster risk reduction, ecological restoration, and ecosystem-based protected areas management, nature-friendly infrastructure development in

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various ecosystem types, agro-climatic zones and watersheds. Experts participating in this workshop should highlight to offer insights into understanding the sustainable development goals (SDGs) at the grass roots level and can help indigenous and local communities to harness the ecosystem services. The workshop should offer a unique, essential resource for researchers, students, corporations, administrators and policymakers working in the fields of the environment, geography, development, policy planning, the natural sciences, life sciences, agriculture, health, climate change and disaster studies.

We recommend that this workshop should help provide a better understanding on how resilience is outlined from Disaster Risk Reduction perspective and how Nature based solutions can be potentially incorporated by complex systems in coastal areas. Long experiences with frequent cyclone and floods tell us that it is necessary to move forward to identify the risk chains and their dependence on services provided by nature.

Ladies and gentlemen,

Bangladesh had established coastal afforestation scheme since 1961 along the coastal areas of the country with a view to protecting the coastal people from cyclones and tidal surges, stabilize lands in the coast, conserve and support the fishery bio-diversity, increase forest and tree cover, sequester carbon to reduce the climate change impacts at the global scale. Forest Reference Emission Level (FREL) report to the UNFCCC showed that about 61% of removals (-247,749t) of CO₂ is due to plantation/afforestation/reforestation activity in the coastal areas. Bangladesh has implemented many projects since 1961 to establish green belt along the coast. **Now it is time to widen and intensify it.**

Recently, about 19,395 ha of plantation have been done under an on-going “Afforestation in Coastal Region including the Newly Accreted Chars of Bay of Bengal (2018-2022)” project in four coastal districts. About 9,720 ha of plantation was done under “Sustainable Forests and Livelihoods (2018 - 2023)” project in the coastal districts. Currently, a feasibility study project is under implementation to develop a “Climate Resilient Sustainable Coastal Forestry in Bangladesh” project with a view to reducing forest degradation and increase forest coverage through participatory planning/monitoring to contribute in building the long-term climate resilience of selected communities in coastal areas of Bangladesh with GCF funding. The project will establish about 25,000 ha plantation in newly accreted low lying lands in the coastal areas.

Bangladesh is not only conducting the coastal afforestation but also establishing plantations in homesteads, embankments, polders through engaging the local community to improve the micro climate, biodiversity and livelihoods which ultimately developing the resilience of the community to the climate change in the coastal region. Our government is playing an especially important structural role for the sustainable development in coastal areas as well as sustainable use of coastal and marine resources. There are number of national policies to support the blue economy concept in the context of mangrove forest conservation. Coastal Development Strategy sets nine strategic priorities for the coastal zone of Bangladesh. Environmental conservation is one of the strategic priorities that ensure to conserve the coastal critical ecosystems including Environmentally Critical Areas (ECAs), heritage sites including the Sundarbans mangrove forest and marine reserves.

Excellencies,

In pursuit of the reality of climate change, Hon'ble Prime Minister of Bangladesh Sheikh Hasina has established Climate Change Trust Fund for climate change adaptation, mitigation and disaster risk reduction where the government has allocated nearly \$443 million from her own resources. Every year, Bangladesh is spending 2 billion dollars for climate change sensitive projects and 3 billion dollars for adaptation measures **totaling \$ 5 billion dollars**. Moreover, we are facing serious climate impact because of 1.1 million forcefully displaced Rohingyas. Mentionable that Bangladesh is going to implement the 'Mujib Climate Prosperity Plan' to achieve low carbon economic growth for prosperity and partnership. We are the host of the South Asian office of Global Centre on Adaptation and are promoting locally led adaptation in this region. The parliament of Bangladesh has adopted a "Planetary Emergency Resolution" to save this planet. Furthermore, Nature based solution for coastal risk reduction would be a sustainable approach to combat the uncertain climate change. The Bangladesh's Climate Change Strategy and Action Plan seeks to build a medium- to long-term program for enhancing resilience to climate shocks and facilitating low-carbon, sustainable growth, including blue growth as linked to coastal ecosystems such as mangrove conservation and coastal resilience. It also suggests expansion of the "greenbelt" coastal afforestation program to include mangrove afforestation along the shoreline.

I heartily feel that 'Nature-based solutions for coastal risk reduction' is very much relevant for climate vulnerable countries. Therefore, at the outset, I would like to congratulate Australia for co-hosting with Bangladesh and arranging such a timely and important event during the birth centenary of the Father of the Nation Bangabandhu Sheikh Mujibur Rahman and the Golden Jubilee of the independence of Bangladesh. I also sincerely appreciate the IORA Secretariat and Dr. Mat Vanderklift for continuing their admirable initiatives amid the gloomy days of pandemic. It would have

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been our pleasure to have this Workshop in Dhaka and meet all of you in person. But, due to the pandemic it is being hosted virtually. We look forward to meeting you all in Dhaka in some other IORA events in near future.

With all these being said, I formally declare 'the IORA Blue Carbon Hub think tank meeting: Nature-based solutions for coastal risk reduction' open. I wish this 3-day event will be a meaningful one and it will come up with pragmatic way forward which would serve the realities of the region.

Conveying my best wishes to you all for a successful meeting and praying for your good health, peace and prosperity.

Thank you so much for your patient hearing.

Joy Bangla, Joy Bangabandhu

ANNEXURE D: WELCOMING STATEMENT BY HE MINISTER LEY, MINISTER FOR THE ENVIRONMENT, AUSTRALIA

IORA Blue Carbon Think Tank

Minister Ley opening remarks

Good morning, I am Sussan Ley, Australia's Minister for the Environment.

It is my great pleasure to open this webinar on Nature Based Solutions for Coastal Risk Reduction alongside Bangladesh's Foreign Minister, the Honourable Minister Dr Momen.

This event continues the highly effective collaboration between our two countries on promoting the benefits of blue carbon and on improving coastal risk management for the sustainable development of our oceans.

Since its launch, the Blue Carbon Hub has played a key role in raising awareness about the multiple benefits of protecting and restoring coastal ecosystems.

Australia is deeply committed to the Indian Ocean region and to the sustainable management of our precious ocean resources. With Prime Minister Scott Morrison, I recently announced a new \$100 million Ocean Leadership package to protect our oceans while investing in their productivity, their biodiversity, and importantly, their "blue carbon" ecosystems.

The ocean is central to Australia's national identity. Australia's marine territory is the third largest in the world.

Our commitment to protecting this critical habitat extends to the Indian Ocean region. I recently announced plans to create two new marine parks around Australia's Indian Ocean Territories, at Christmas Island and the Cocos (Keeling) Islands.

These islands host an incredible array of marine life and are globally recognised as one of the world's most intact tropical marine environments. The new parks will cover up to 740,000 square kilometres, lifting the percentage of protected Australian waters up to 45 per cent.

Our oceans provide many benefits that can't be bought or sold, such as climate regulation, nutrient cycling, oxygen production and coastal protection. Australian seagrasses alone were estimated to provide \$45 billion a year in carbon-dioxide-absorption services.

So, protecting these habitats makes economic and environmental sense. Australia looks forward to continuing to work with our regional partners to protect and conserve our ocean and blue carbon ecosystems, and I wish you every success in addressing our common challenges and opportunities through today's webinar.

ANNEXURE E: OPENING REMARKS BY DR GATOT H. GUNAWAN, ACTING-SECRETARY GENERAL OF IORA

Remarks by

Dr Gatot H. Gunawan, Acting-Secretary General of IORA

For

Virtual Workshop entitled “IORA Blue Carbon Hub think tank meeting- Nature Based Solution for Coastal Risk Reduction”, 25-27 May 2021.

Excellencies, Distinguished Delegates, Ladies and Gentlemen,

Good morning!

First of all, allow me to convey my deep appreciation and extend a warm welcome to all the distinguished delegates to the Virtual Workshop entitled “IORA Blue Carbon Hub think tank meeting- Nature Based Solution for Coastal Risk Reduction”, co-hosted by IORA Blue Carbon Hub (Australia) and the Institute for Water Modelling (Bangladesh), in collaboration with the IORA Secretariat and the Ministry of Foreign Affairs, Dhaka.

Ladies and Gentlemen,

Blue carbon ecosystems – seagrasses, tidal marshes and mangroves – provide critical services such as coastal protection, disaster risk reduction, water filtration and fisheries habitat. In fact, these blue carbon forests have been found to sequester and store more carbon per unit area than terrestrial forests. They are now being recognised for their role in mitigating climate change since they provide ecosystem services that are essential for climate adaptation and resilience along coasts, including protection from storm surge and sea level rise, erosion prevention along shorelines and coastal water quality regulation, and thus contributing to disaster risk reduction. Apart from being an important factor in the global carbon cycle, blue carbon forests have high biodiversity values, providing breeding grounds and nurseries for commercially important fisheries and endangered marine species and food security for many coastal communities around the world.

However, despite of their great importance, blue carbon ecosystems are the most threatened ecosystems on Earth, with an estimated 340,000 to 980,000 hectares being destroyed each year. Degradation of these ecosystems, mainly due to human activities, implies that their carbon sink

capacity is lost or adversely affected, and the carbon stored is released, resulting in globally significant emissions of carbon dioxide (CO₂) that contribute to climate change.

To address this issue, dedicated efforts should be geared towards conservation and restoration to ensure that coastal ecosystems continue to play their role as long-term carbon sinks. It is noteworthy that several countries are committed and are developing policies and programmes in support of sustainable development through initiatives that reduce the carbon footprint associated with the growth of their economies. These include actions to conserve and sustainably manage natural systems relevant to the United Nations Framework Convention on Climate Change (UNFCCC), including through the reducing emissions from deforestation and forest degradation in developing countries (REDD+) mechanism and Nationally Determined Contributions (NDCs).

Ladies and Gentlemen,

IORA saw the establishment of its Blue Carbon Hub in 2019, which aims to build knowledge and capacity relevant to protecting and restoring blue carbon ecosystems throughout the Indian Ocean, in a way that enhances livelihoods, reduces risks from coastal hazards, and helps mitigate climate change. In IORA, since its establishment, there has been growing interest of Member States in the protection and restoration of blue forests in the region. Following the first Blue Carbon Symposium in Australia in 2018, there has been several commitments from Member States to take this initiative forward. Madagascar hosted the Workshop on “Improving Knowledge For Research On Blue Carbon In The Western Indian Ocean” in 2019, which focused on the blue carbon ecosystems in Madagascar and to explore ways of collecting blue carbon related data, that would help the country to assess their own blue carbon and help better understand the extent of which seagrass ecosystems in Madagascar contribute to climate change mitigation.

In addition, the Blue carbon Hub will undertake a set of short ‘think tank’ meetings that will target the most promising areas for accelerated action. The first meeting one was held in Mauritius on 25-26 February 2020, with a focus on Blue carbon finance. During that meeting, experts presented on innovations and successes in blue carbon finance and the barriers to effective and sustainable blue carbon finance. the possibility of a White Paper on blue carbon finance was discussed and is currently being drafted.

The Hub also hosted the Early Career Visiting Scientists Programme that saw the participation of early career scientists from IORA Member States. However, owing to the COVID-19 crisis, progress

in this regard has slowed down due to travel restrictions. This pandemic has also led to prioritisation of online activities in IORA and in this context, several webinars are being hosted. The Blue Carbon Hub hosted its first one on Blue carbon initiatives in IORA in August 2020 while the second one entitled “Towards a sustainable blue forest economy” was held in March 2021.

Ladies and Gentlemen,

The importance of blue carbon is also recognised by the IORA Working Group on the Blue Economy, whereby specific activities/projects have been identified to be implemented by Member States. We sincerely hope that IORA and the Blue Carbon Hub could work together to better advance cooperation in this regard.

IORA Member States need to focus on the restoration and protection of these Blue carbon ecosystems because of the high amounts of carbon they store and their high rates of carbon sequestration. It is also important that Member States join efforts for blue carbon assessment and measurements because while mangroves are fairly well mapped, large areas containing seagrasses remain largely unsurveyed. And I remember that Member States emphasised on the need to have a standardised method for the IORA region in previous meetings. We also need to explore ways to promote ecosystem-based approaches that build resilience, as well as contribute to disaster reduction.

Ladies and Gentlemen,

This workshop will focus and discuss on the current potential, challenges and successes of using blue carbon ecosystems for coastal protection. It would also enable Member States to share best practices with regard to monitoring coastal ecosystems for disaster risk reduction. Member States will also be able to exchange information about and policy frameworks to support protection and restoration of blue carbon ecosystems, as well as identify critical knowledge gaps that currently impede effective implementation of solutions, for subsequent collaborative efforts across IORA.

Ladies and Gentlemen,

I sincerely hope that this three-day workshop will result in concrete recommendations as the way forward to further enhance Member States’ capacities and experience on Blue carbon and explore its potential in disaster risk reduction. I also wish to emphasise the need for action-oriented outcomes for the future development of the Indian Ocean region.

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Excellencies, Ladies and Gentlemen,

I again wish to express my sincere appreciation to your participation to this workshop and I also wish to thank Bangladesh and the IORA Blue Carbon Hub for their assistance in hosting this workshop.

I wish you all a fruitful deliberation.

I Thank You.

ANNEXURE F: CLOSING REMARKS BY H.E. MR. MASUD BIN MOMEN, FOREIGN SECRETARY OF BANGLADESH

Ambassador Masud Bin Momen, Foreign Secretary (Senior Secretary) at the Closing Session of the IORA Blue Carbon Hub Think Tank Meeting: Nature-based Solutions for Coastal Risk Reduction

Thursday, 27 May 2021; Virtual Platform; 1530-1600 hrs

H.E. Jeremy Bruer, Australian High Commissioner to Bangladesh
Hon'ble Acting Secretary General of IORA, **Dr. Gatot HariGunawan**,
Dr. Mat Vanderklift, IORA Blue Carbon Hub
Distinguished Representatives, Trainers,
Excellencies, Ladies and Gentlemen,

Assalamu Alaikum and a very good afternoon to you all.

I am pleased to be here today to attend at the closing session of this virtual IORA Blue Carbon Hub think tank meeting on nature-based solutions for coastal risk reduction. In a normal situation we could have met here in Dhaka and greet one another. The 'New Normal' world has made us to meet online. But the bright side is that the pandemic could not come in the way of our organizational spirit and morale. Successful holding of IORA's this 3-day event on such a relevant and timely topic is a testament to that. Therefore, at the outset, I heartily express gratitude to Australia for becoming co-host with Bangladesh and for arranging such an event. I also thank the IORA Secretariat for their continued support for keeping the momentum up amidst the ongoing outbreak of pandemic. My heartfelt appreciation goes to all the speakers, trainers and participants who have enlightened all of us through their knowledge, wisdom and excellence.

We all know that coastal dynamics including their interactions with the ocean events influence every coastal country as they provide with resources, employment and recreation. However, coasts are the most vulnerable part of any country for being prone to hit by natural calamities like storm surges, tidal waves, cyclones, tsunamis etc. and experience huge loss of both lives and resources. To keep the coast, its' resources and people protected, more importance should be given to nature-based coastal risk reduction measures.

Excellencies,

The geographical location and geomorphological conditions of the Indian Ocean Region have made the region one of the most vulnerable ones. Yesterday cyclone 'YAAS hit hard Odisha and West Bengal of India and caused substantial damage and losses. Some of our coastal districts and quite a number of villages are affected. We are now assessing the losses on the ground. Being one of the worst affected countries in the world, Bangladesh loses 2% of its GDP regularly due to natural calamities and environmental degradation. Climate change induced salinity and other disasters are harming our rice and other crop production significantly. In addition to all these, we have been hosting 1.1 million Rohingyas forcibly displaced from the neighbouring Myanmar. This phenomenon

has also been impacting our environment severely. Considering multidimensional vulnerabilities posed by climate change and disasters, our Government has recently adopted Delta Plan 2100, which will provide Bangladesh with the sustainable development pathway for the next 100 years. Bangladesh Parliament declared climate change to be a “planetary emergency” and called on the world to work “on a war footing” to combat it and reduce its impacts

Bangladesh has implemented many afforestation projects to establish green belt along the coast. Now we are focusing on widening and intensifying it. Recently, Bangladesh has undertaken “Afforestation in Coastal Region including the Newly Accreted Chars of Bay of Bengal and “Sustainable Forests and Livelihoods” projects in the coastal districts. You would be happy to know that on the occasion of celebration of the birth centenary of the Father of the Nation Bangabandhu Sheikh Mujibur Rahman, the Government has planted 11.5 million trees, and in total around 30 million trees are being planted all over Bangladesh this year. On top of that in the fiscal year 2020-21, Bangladesh has undertaken the following major projects under its Annual Development Plan (ADP):

- Strategic Environmental Assessment (SEA) of South West Region of Bangladesh for Conserving Outstanding Universal Value of the Sunderban;
- Formulating an Environmental Management Plan (EMP) up to 2041 aiming at conserving the Sunderban by dividing it into 7 sectors;
- Afforestation in five Coastal Districts and newly developed Chars in the coastal areas.

Dear Friends,

To make our efforts stronger, there is a need of long-term strategic plan on risk assessment and reduction considering nature-based solutions and involving meaningful participation of member countries. To reduce the risk of cyclonic storm surge and for the safety of lives and property forecasting and early warning of cyclone and storm surge inundation at community level is instrumental for us. We need to promote ‘Blue Finance’ in the region so that the LDCs and Developing Countries receive support from the Developed Nations to maintain their afforestation for keeping balance in the ecosystem by mitigating the impact of carbon emission. In this backdrop, we need to acquire required science knowledge to develop appropriate science-policy interface.

Having the innovative technological knowledge and experiences, Australia probably can lead in developing strategies regarding ways to model waves, coastal engineering techniques, remote sensing that may assist in understanding mangrove restoration. Also, Bangladesh can contribute by sharing its forty years long experience in using mangroves as its nature-based coastal risk reduction measure. It is now our duty to translate our commitment into concrete actions and take the level of cooperation to a higher trajectory.

Ladies and Gentlemen,

I am happy to learn that the meeting has generated, through brainstorming and discussions, some very productive outcomes in the form of probable areas of cooperation among the IORA member states and recommendations for future endeavors in the region. We should do modeling to understand the wave surges & its inundation and also the vulnerability of coastal population including the socioeconomic impact of adverse events due to climate change. We need to create coastal

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green belt, as part of nature-based solution, to protect our coastal areas from natural calamities. We also need to conduct research to explore the possibilities of Blue Carbon finance in the region.

I am confident that the knowledge we gathered from this 3-day event, the discussions held amongst the experts, will be instrumental in creating a sustainable and resilient post-pandemic cooperation especially to develop regional model to generate required science for science-policy interface associated to the nature based solutions for coastal protection and risk reduction; ecosystem-based adaptation; develop understanding about the funding requirement & mechanisms for their implementation; and also aid the Member States with required knowledge even to commit UN with their "Nationally Determined Contributions (NDC)".

Bangladesh is ready to embrace any collaboration for welfare of not only its own, but also the coastal community of the whole Region. We heartily believe the famous saying:

"If you want to go fast, go alone. If you want to go far, go together."

Thank you so much for your time, presence and patient hearing.