BLUE ECONOMY IN THE BAY OF BENGAL: BANGLADESH, INDIA & SRI LANKA

Know-how, tools and actions towards a sustainable blue economy in the Bay of Bengal

Prepared by:
Malaurie Le Bail & Joël Ruet

2022

The Bridge Tank
Palais Brongniart
28 Place de la Bourse
75002 Paris
https://thebridgetank.org/

NOTE OF MOTIVATION & THANKS

Why this report? The blue economy is much debated by policymakers, but it hardly gathers a scientific consensus on its definition or perimeter of issues, neither in physical nor social sciences; still, it exists, and seldom are its de facto actors properly investigated or listened to in a systemic manner.

As two organizations dealing, one with research on actors, the other with actors supported with research, we wanted to give a voice to the actors of the blue economy, be they data gatherers, makers and analysts, scientists in systems and ecosystems, economic planners, developers, social or economic actors, or regulators.

In a context where the blue economy is also the other facet of security concerns around the notion of the "Indo-Pacific" position, we wanted to provide an open, trusted space of informed speech across the geographies of South Asia and France. With the geographical scope of the "Bay of Bengal" as our series established itself, namely the national ecosystems of Bangladesh, India and Sri Lanka and with some backdrop of French bilateral tools and programs in the greater "Indo-Pacific" area, we conducted, along with think tanks from these three countries, an independent think tank exercise over a series of three webinars spreading across November 2021 to March 2022. These unveiled a trove of skills and wills at the origin of this report.

This report delves into three selected issues, the contributions by panelists in the course of these workshops chasing "the blue economy in the Bay of Bengal", a quest made less elusive through this collective journey. This work is at the crossroads between an analytical report and a verbatim: it is organized around editorial choices and challenges that however emerged organically across the process, and it closely reflects the statements as they were expressed and data as singled out by the contributors of the workshops.

Last but not least we heartfully thank all the participants from all shores who were the salt of our talks.

Dr. Joël Ruet & Dr. Hélène Djoufelkit

President, The Bridge Tank & Director, Research Department, AFD

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INTRODUCTION

INTERNATIONAL CONTEXT ON UNDERSTANDING THE BLUE ECONOMY

Although there is neither an academic nor institutional consensus on the definition of the blue economy, its challenges are pressing everywhere, and actors start shaping it in many parts of the world. In this report, the blue economy is understood as the sustainable use of ocean resources for economic growth, improved livelihoods and jobs, and ocean ecosystem health.[1]

South Asia is possibly one for which the development of the blue economy is the least widely known on the global stage despite being one of the most active. This report aims at shedding light on the way the blue economy structures in a bottom-up manner in this part of the world, and on its prospects and arenas for further integration, regionally and internationally. It is the outcome of a collective exercise based on a mapping of actors and rounds of interactive workshops.

How does this economic sector differ from others? Should it be handled, studied or implemented according to the economic objectives, or as a desire for sustainable actions for better management of marine and maritime resources, or for the sectors of activity concentrated around the oceans, seas and rivers? Current debates on the blue economy are paying particular attention to international organizations and research centers specialized in the maritime field. There are gaps in comparable methodological tools to show a global understanding of what the blue economy is. This report attempts at a better understanding of this field through a dialogue across three workshops, highlighting the importance of actors, debates and knowledge building in this region of the world, in order to identify existing trends between data and actors, and to respond to the challenges of the blue economy. To contribute to the understanding and clarification of the blue economy, we anchored this work by studying the linkages between operations, projects and research in the Bay of Bengal, and in particular in three countries: Bangladesh, India and Sri Lanka.

Before focusing on the essence of our study on the blue economy in the Bay of Bengal, we conducted an analysis of the major issues in this field to identify applicable trends or specificities of the studied region. Along with the research and operational departments of the AFD, The Bridge Tank engaged in a discussion with marine, coastal and fisheries resource management bodies, technical experts, influential national and regional Think Tanks and research centers.

Exchanges focused on the way Bangladesh, India and Sri Lanka:

[1] *What is the Blue Economy?* (2017). World Bank. https://www.worldbank.org/en/news/infographic/2017/06/06/blue-economy

- **Define their blue economy strategies and propose solutions,**
- **Assess the physical impacts of climate change on the sustainability of coastal and ocean ecosystems and the fishery resource,**
- **Adapt to these impacts on the evolutions of social communities and value chains.**

As the green economy concept gained prominence before Rio+20, UNEP proposed to apply this concept to the ocean economy. This 2012 Rio+20 conference was the first to raise the notion of a 'Blue Economy', a concept that has emerged as a new paradigm for the sustainable development of oceans and seas (Sustainable Development Goal 14) and particularly for the economic growth of coastal countries.

A blue economy can be defined as a **sustainable ocean economy**, where economic development is in balance with the long-term capacity of ocean ecosystems to support this activity whilst remaining resilient and healthy[2]. However, the definition of this recent term is still under discussion, hence the inaccurate understanding of the blue economy today. For example, the definition from UNFCCC describes the blue economy as "**all economic activity relating to oceans, seas and coasts, from fishing to renewable marine energy to coastal tourism**"[3]. These activities place the ocean at the heart of our global economy, providing a livelihood for over 820 million people worldwide. The value of ocean-related assets is estimated at more than 2.5 trillion dollars, making the blue economy the 7th economic power in the world by GDP, behind France and the United Kingdom, but ahead of Italy and Brazil. This sector suffers from a lack of sustainable management and production of its activities. To contribute to this, the issue of financing the blue economy is necessary. Hence, UNEPFI has developed **The Sustainable Blue Economy Finance Principles**[4], which "are the foundational keystone to invest in the ocean economy"[5]. The 14 Principles constitute the first worldwide guidelines for "banks, Insurers and Investors, which are waking up to the idea that their financial activities can have a sizeable impact on the health of the ocean".[6] In this report, the blue economy encompasses **all sectoral and cross-sectoral economic activities based on/or related to the oceans, seas and coasts, in a sustainable manner**:

[2] Economist Intelligence Unit - World Ocean Summit 2015. (2015). The blue economy Growth, opportunity and a sustainable ocean economy. https://perspectives.eiu.com/sites/default/files/images/Blue%20Economy_briefing%20paper_WOS2015.pdf

[3] Everything You Wanted to Know About the Blue Economy (but were afraid to ask). (2021, 4 June). UNFCCC. https://unfccc.int/blog/everything-you-wanted-to-know-about-the-blue-economy-but-were-afraid-to-ask#:~:text=When%20we%20talk%20about%20the,marine%20energy%20to%20coastal%20tourism

[4] to which the AFD has joined after the One Ocean Summit in Brest, February 2022: https://www.afd.fr/fr/actualites/groupe-afd-economie-bleue-durable

[5] *The Principles – United Nations Environment – Finance Initiative*. UNEPFI. https://www.unepfi.org/blue-finance/the-principles/

[6] *Sustainable Blue Finance – United Nations Environment – Finance Initiative*. UNEPFI. https://www.unepfi.org/blue-finance/

- **Marine-based activities**: this includes activities undertaken in the ocean, sea and coastal areas, such as marine living resources (capture fisheries and aquaculture), marine minerals, marine renewable energy, desalination, maritime transport and coastal tourism.
- **Marine-related activities**: activities which use products and/or produce products and services from the ocean or marine-based activities like seafood processing, biotechnology, shipbuilding and repair, port activities, technology and equipment, digital services, etc.

The blue economy concept is a lens through which to view and develop policy agendas that simultaneously enhance ocean health and economic growth in a manner that is consistent with the principles of social equity and inclusion. Sustainably developing ocean spaces for economic growth while maintaining human wellbeing and ocean health could define a new era of economic opportunity for ocean-facing countries.

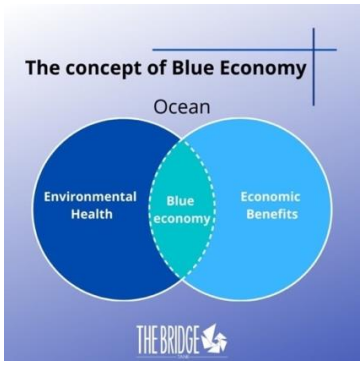

Figure 1. Blue Economy's concept

The blue economy concept considers the ecological systems that provide many services linked to the ocean economy as underlying and sometimes invisible natural capital assets. These assets include, for example, fish stocks, coral reef systems, beach and water quality, and mangroves, which help support the more visible produced capital (machinery and structures) and intangible capital (skills, expertise, and so on, with which labor is applied).[7]

[7] World Bank. (2016). Equity and Development. https://documents1.worldbank.org/curated/en/435331468127174418/pdf/322040World0Development0Report02006.pdf

Here are a few examples of a transition toward a blue economy within various sectors of the ocean economy:

- Sustainable fishing practices can in some instances be rewarded with an eco-label that brings a price premium;
- Shellfish aquaculture can both enhance coastal water quality and produce valuable seafood that supports employment and contributes to the GDP;
- Off-shore wind and other marine renewable energy technologies can generate new jobs and significant additional energy, according to some estimates;
- Green infrastructure along the coast can both create jobs and protect coastal development.

Figure 2. Established Blue Economy Sectors and Sub-sectors

According to the OECD[8], many ocean-based industries have the potential to outperform the growth of the global economy as a whole, thereby boosting employment. Over the next few years by 2030, the ocean economy could more than double its economic contribution to GDP equivalent. But at what cost, and to whom? "Sustainable should not imply the idea of a permanent and immutable state, but rather that of dynamic and balanced evolution. This is a matter of maintaining a homeostatic and resilient system from the bottom up, evolving towards great complexity."[9] Economic growth and environmental degradation have occurred concurrently in the Bay of Bengal over recent years, illustrating the need for introducing policies that promote the "decoupling" of such trends, so that economic growth continues and even accelerates, while environmental degradation reverses.

Many coastal nations have already introduced a mix of sector and industry-specific policies for economic activities in the ocean. Increasingly countries have undertaken efforts to develop more integrated policies reflecting the underlying ecosystems, including coordinating the actions of various government agencies.[10]

Over the course of our work, we mainly focused on activities, practices and debates around a sector on which dozens of millions of people rely directly or indirectly in the region: the fishery sector. Issues around this sector soon revealed a common denominator in the blue economy in the Bay of Bengal. On this basis, a red thread emerged:

1- A global vision of the **economic stakes** of the value chain of marine activities in the Bay of Bengal, focusing on resilient coastal ecosystems.

2- An understanding of the pressing **social needs and challenges** of public policies for the blue economy in the Bay of Bengal on food security, job creation and adaptation to climate change in fishing activities.

3- A collective inventory of **data gathering** and treatment systems, **logistic and financial resources**, gaps for sustainable economic activities, its implementation and acceleration.

[8] OECD. (2016). Development Co-operation Report 2016: The Sustainable Development Goals as Business Opportunities. https://www.oecd.org/dac/DCR%202016%20Highlights%20booklet%20FINAL.pdf
[9] Llopart, J. L. P. (2021, 7 juin). World Oceans Day : We cannot meet sustainable development goals with a sick ocean. The Conversation. https://theconversation.com/world-oceans-day-we-cannot-meet-sustainable-development-goals-with-a-sick-ocean-162002
[10] OECD. (2016). Development Co-operation Report 2016: The Sustainable Development Goals as Business Opportunities. https://www.oecd.org/dac/DCR%202016%20Highlights%20booklet%20FINAL.pdf

THE VOICE AND TOOLS OF LOCAL ACTORS FOR CONCRETE AND ADAPTED SOLUTIONS

The Bridge Tank, with the mandate by the research and operational departments of the AFD to broaden its knowledge of the blue economy in the Bay of Bengal, a topic at the crossroads of the French Indo-Pacific strategy and the AFD Ocean strategy, conducted a series of three workshops with the aim of:

- Institutionally: establishing and favoring contacts between AFD and French organizations in the field on the one hand, with marine, coastal and fisheries resource management bodies, technical experts, influential national, regional Think Tanks, research institutes, and concerned regional authorities of South Asia on the other hand.
- Scientifically: Identifying and exchanging shared assessments of issues and respective know-how and expertise in this area, as well as formulating joint conclusions on further needs and priorities, engaging in a discussion with relevant players, and organizing three workshops to understand the way in which these countries adapt to the physical impacts of climate change on the fishery resource and to identify priorities for action.

AFD contributes to the definition of a sustainable development dimension of the French "Indo-Pacific" position. In this context, the management and protection of halieutic resources, adaptation to economic and social consequences of their degradation, and more generally, the issues and stakes of the blue economy, are at the core of AFD's reflection and action, including its country/regional agencies and research direction both.

The Bridge Tank has developed a conversation across, and with the global South, motivated by the seeking of innovative ideas, solutions and collective intelligence towards fulfilling several global public goods or regional common goods. Bringing together the diversity of actors across a platform of trusted exchanges is at the core of The Bridge Tank's methodology in large emerging economies.

The series of three workshops revolved around acquainting actors with each other, presenting issues and solutions, in workshop 1 and in the first part of workshop 2; while the rest of the exercise (second part of workshops 2 and 3) attempted at identifying common issues and tools towards managing them.

Namely, they produced a mapping of key actors in the blue economy sector and assess their scientific, economic, and political or project scale involvement, in order to explore **operational leads for AFD as part of its Indo-Pacific strategy, particularly in the Bay of Bengal**. They allowed **assembling knowledge of the region, to pre-constitute a network of experts with whom to engage further in the conversation**.

In a nutshell, the logic of this work was to bring up the existing know-how at the local level to better adapt to the complementary actions that could be provided by a developing agency. In particular, the idea was that the series of webinars serve, although temporarily, as **a common good platform to accompany national actors to dialogue with each other and to move forward on the resolution of issues on a largely common resource.** Of equal importance was to draw **inspiration from successful experiences in the blue economy sector.** This work was made possible thanks to the keen and repeated **intervention of local experts from the Bay of Bengal.** After a survey of the actors involved, we identified about sixty structures (ministries, departments within ministries, research centers, Think Tanks, universities, chambers of commerce, NGOs, and consultancy companies). We engaged in a constructive dialogue over the course of our **three workshops with 21 structures in the Bay of Bengal**. The process gathered participants from scientific, technical, economic, society, government (ministries and agencies) organizations, from Bangladesh, India, and Sri Lanka as well as from France.

Our first workshop was held on November 26, 2021, to understand the main challenges. Our second workshop held on January 21, 2022, aimed at deepening this understanding, identifying solutions and starting a strategic conversation between AFD and local stakeholders. As demands grew around the first two workshops to introduce some elements of the French know-how, our final workshop, held on March 16, 2022, aimed at identifying technical coordination tools and blueprint projects, policy ambitions in the sector, including the willingness/possibility of regional cooperation with the contribution of the French know-how in the maritime field.

Methodologically, we approached organizations and speakers in the same way: an open-source survey of their activity and expert skills, bilateral meetings between the organization/expert and The Bridge Tank to share and co-assess the spirit of our work and how the organization/expert could contribute. From this, and as an outcome of the responses and interactions, we fine-tuned the approach nationally. In **Bangladesh**, the majority of the experts we met are scientists specialized in the blue economy or fisheries, and now hold positions in public agencies or chambers of commerce, contributing to the elaboration of public policies or the implementation of actions in this field. The case of **Bangladesh** is the most notable for studying how research is translated into policy-making as we could exchange with the high administration. On the **Indian side**, we have been in contact with experts open to our exercise who proposed solutions and ideas even before the organization of the workshops in which they were to intervene, some experts belonged to the state sponsored centers, though they spoke in their own capacity in this non-official process. Although this exercise was organized independent of the French and Indian governments, the interest of Indian experts,

as well as ours, was accelerated with the signing of the India-French roadmap on the Blue economy, on February 20, 2022. It was seen as an opportunity to provide new solutions for funding, engagement and support for capacity building at the institutional level. Regarding **Sri Lanka**, the experts we managed to mobilize are mainly project implementers, associations and researchers. In a nutshell, in India and Bangladesh, for different reasons -level of implication in Bangladesh and bilateral context in India-, the Think Tank process we conducted has been the closest to a "track 2 diplomacy" exercise, of a scientific kind in the case of India, and slightly more economic in the case of Bangladesh. In Sri Lanka, it has been closer to a stakeholders' generic engagement. During the workshops and exchanges with local actors, we particularly noticed **extensive know-how and the existence of tools in the region**. It gives hope for further cooperation within the region, and with French organizations. **Three clear outcomes that emerged** during the workshops constitute the following main chapters of this report:

1. One finds a **large amount of scientific and Think Tank activity in the region and technical know-how,** paving way for cooperation across the region, among local players as well as with international and French organizations. Sharing and co-producing additional knowledge together could contribute to the prosperity of the blue economy in the Bay of Bengal. This first finding can be qualified as a statement of what exists, by appreciating the degree of command and the economic, social and environmental capacities in terms of the blue economy before proposing solutions. (Chapter 1)

2. There is a **major challenge to have blue economy coordination at the regional level through the pooling of private and public sectors, instead of progress in silo**. Bangladesh, India and Sri Lanka are facing difficulties to coordinate the entire value chain of the blue economy within their own country and within the region. It is hard for these three countries to know the projects or initiatives launched and identify key lessons learned to replicate such solutions. (Chapter 2)

3. Last but not least, this exercise aimed at linking operational and research domains. Throughout the three workshops, it was interesting to see **how research is translated into policy making** in the Bay of Bengal, and how scientists could provide political, technical and social awareness and recommendations for action. (Chapter 3)

CHAPTER 1 – BLUE ECONOMY'S GROWTH: FROM SCIENTIFIC AND TECHNICAL KNOW-HOW TO TOOLS AND SOLUTIONS FROM LOCAL EXPERTS

BAY OF BENGAL'S CHARACTERISTICS

The Bay of Bengal is one of the largest bays in the world, among the 64 existing and is part of the Indian Ocean and of the Indo-Pacific region. The Bay of Bengal is bordered on the west by Sri Lanka and India, on the east by Myanmar and Thailand and on the north by Bangladesh. Its surface area is about 2,600,000 square kilometers and is home to approximately 1.4 billion inhabitants.

Figure 3. Map of the scope of work in the Bay of Bengal: Bangladesh, India & Sri Lanka

The Bay of Bengal is one of the essential parts of the Indian Ocean Region (IOR) based on its high potential for geopolitical and geoeconomics' views. The IOR is a multi-polar region that contributes more than half of the world's GDP and population, with the prime focus centered on the ocean. Its ecosystems and natural resources form a unique asset for the region's countries and territories. Hence, understanding and measuring the economic activity tied to this asset is essential for the sustainable growth of its economies.

Among the main areas of concern in the Indo–Pacific blue economy that particularly affect the Bay of Bengal are:

- Degradation of critical habitats (mangrove, coral reefs);
- Pollution & water qualities (marine litter, heavy metals, sedimentation);
- Overexploitation of living marine resources (fewer resources, migration, small fish);
- Risk management of marine resources (in particular fisheries and aquaculture).

A common trait among the littoral states of the Bay of Bengal is that their economies are increasingly based on the maritime domain[11]. As such, they have the potential to contribute to the sustainable use and management of fishery resources, employment creation and food security in South Asia. Because they are also highly vulnerable to climate change, preserving their blue economy is not only an economic opportunity but a necessity to protect their livelihood and workforce.

The common trends and shared interests of Bangladesh, India and Sri Lanka illustrate the challenges of the blue economy and the need for an external assistance. Before organizing the three workshops, we conducted a brief survey of academic, scientific and political aspects of the major issues in the region related to the blue economy. We identified common threads that characterize the three countries:

- **Lack of effective legal and governance framework**: All countries in the Bay of Bengal covered by our study (Bangladesh, India, Sri Lanka) have indirectly adopted the concept of the blue economy into their national sustainable development agenda. However, they have not institutionalized it into official policies. Bangladesh and India have drafted documents, which are still under discussion (Draft of development of sea resources for Bangladesh 2019 & India's Blue economy draft policy 2020).
- **A need for regional cooperation and to deepen regional ocean affairs**. So far there has been no cooperation between the littoral states of the Bay of Bengal. The region doesn't appear as a cooperative transoceanic community. Yet, littoral states should work together for the conservation of the ocean common goods: preservation of coastal ecosystems, prevention of marine pollution, exploitation of ocean materials and development of ocean energy.

[11] Rahman, M. R. (2017). Blue Economy and Maritime Cooperation in the Bay of Bengal: Role of Bangladesh. Procedia Engineering, 194, 356-361. https://doi.org/10.1016/j.proeng.2017.08.157

- **Role of India and Bangladesh's cooperation for regional leadership**: Both countries have a strong bilateral relationship in many fields, including the blue economy. India and Bangladesh could stimulate regional cooperation amongst the Bay of Bengal countries.

This diagnosis was useful in organizing the workshops, providing a solid basis for discussion among panelists and organizers. The emphasis of these collaborative workshops was to identify gaps, priorities, opportunities and needs for action. Actions identified and projects proposed are replicable at the regional level.

FISHERIES IN THE BLUE ECONOMY: AT THE HEART OF THE ECONOMIC AND SOCIAL DEVELOPMENT OF THE BAY OF BENGAL

"**Blue economy is a connecting element in the Bay of Bengal**".[12] The ocean represents between 3 to 5% of the regional GDP and it is estimated that 70% of people are involved in subsistence fisheries. The ocean sector is particularly vulnerable to climate change. Recognizing this, several challenges and issues have been identified, such as economic stakes, disaster risk management, growing demand for fisheries and tourism, and social aspect (job access and food security). The management and the preservation of ocean resources are key priorities. In Bangladesh, India and Sri Lanka, the blue economy gathers multiple sectors: fishery, aquaculture, ports, coastal tourism, resources (mining, oil and gas) and blue biotechnology.[13]

Among these sectors, fisheries (artisanal and industrial) are on the top of the strategic sectors of Bangladesh, India and Sri Lanka. In the Bay of Bengal, despite the fact that **artisanal fisheries concern more than 80% of the marine fish production, there are challenges in sustainably managing fishing resources**. India is the second-largest aquaculture fish producing country in the world. Bangladesh is depending on the Hilsa fishery production, which contributes to 12% of total fish production, 7 million employment (directly and indirectly) and over 1% of the GDP of the country. Hilsa is the most important fish species in the Bengal delta. 86% of the world's Hilsa come from Bangladesh; it is the national fish of Bangladesh and a state symbol in some Indian states. For the last thirty years, this species of fish has been declining. Some conservation and regulatory efforts have been taken in Bangladesh, such as banning Hilsa fishing during

[12] Dr. Saurabh Thakur, Associate Fellow, National Maritime Foundation, India, workshop 2, https://www.youtube.com/watch?v=EMhTLJFTzII&list=PLFY7PFEB2VPwwKH53CIo-kFKyEEb_5hlU&index=4&ab_channel=TheBridgeTank

[13] Mr. Ameya Prabhu, Vice-President, Indian Chamber of Commerce, workshop 2 & Mr. Abu Saleh Khan, Executive Director, Institute of Water Modeling, Bangladesh, workshop 2, https://www.youtube.com/watch?v=ZP-rYsdLHFQ&list=PLFY7PFEB2VPwwKH53CIo-kFKyEEb_5hlU&index=5&ab_channel=TheBridgeTank

spawning and breeding season (22 days in October and November), minimum allowable mesh size (6.5 cm) or maximum sustainable yield (690.000 metric tons/year).[14]

A number of initiatives have been taken to contribute to the improvement of a sustainable blue economy in the Bay of Bengal. In a non-exhaustive and synthetic manner, we will mention in particular these types of development, which illustrate the plurality and quality of the commitments made by these three countries:

- **Projects development** for solutions from the pilot phase to large-scale deployment (fisheries management, reduction of poverty and livelihoods of coastal community, framework for stakeholders and policymakers).

Department of fisheries in Bangladesh[15] developed a series of projects such as:

- **the sustainable coastal & marine fisheries project** that aims at exploring greater economic opportunity from coastal and marine fisheries resources, while promoting sustainable management of fisheries stocks and the environment to reduce poverty and improve the livelihoods of the coastal community.

- **the Hilsa development and management project**, which focuses on the implementation of fisheries low and installment of Hilsa sanctuaries, protection of Hilsa brood and juvenile by law implementation, and distribution of legal fishing nets to the fishermen.

- **a pilot project on tuna and similar fishing in the deep sea** that gathers experiences of tuna fishing in the deep sea and international waters, develops trained and skilled manpower in the tuna fisheries sector, and encourages private investment and entrepreneurship.

It developed a **Bangladesh Action Plan** with short-term, mid-term and long-term activities[16] and has introduced 15 acts and rules since 1974 for the Marine Fisheries management.

WorldFish[17], Enhanced coastal fisheries in Bangladesh Project (ECOFISH) with the collaboration of the Department of Fisheries Bangladesh and USAID. It aims at supporting coastal fishing communities and other stakeholders along the fisheries value chain to improve the resilience of the Meghna River ecosystem and communities reliant on coastal fisheries.

[14] Dr. Md. Abdul Wahab, EcoFish Team Leader, WorldFish, Bangladesh Wing, workshop 1, https://www.youtube.com/watch?v=VLKYNkV53g0&list=PLFY7PFEB2VPwwKH53CIo-kFKyEEb_5hlU&index=8&ab_channel=TheBridgeTank
[15] Dr. Md. Sharif Uddin, Director (Marine), Marine Fisheries Office, Department of Fisheries, Government of the People's Republic of Bangladesh, workshop 1, https://www.youtube.com/watch?v=VLKYNkV53g0&list=PLFY7PFEB2VPwwKH53CIo-kFKyEEb_5hlU&index=8&ab_channel=TheBridgeTank
[16] Mr. Mashiur Rahman, Joint Secretary, Ministry of Fisheries and Livestock, Bangladesh, workshop 1, https://www.youtube.com/watch?v=24dlc-GaHBE&list=PLFY7PFEB2VPwwKH53CIo-kFKyEEb_5hlU&index=9&t=2264s&ab_channel=TheBridgeTank
[17] Dr. Md. Abdul Wahab, EcoFish Team Leader, WorldFish, Bangladesh Wing, workshop 1, https://www.youtube.com/watch?v=VLKYNkV53g0&list=PLFY7PFEB2VPwwKH53CIo-kFKyEEb_5hlU&index=9&ab_channel=TheBridgeTank

MPEDA[18] identified pilot projects' ideas that might be supported by a developing agency or any external aid, such as the **aquaculture improvement program**, **smallholder farmer's shrimp**, **improving productivity via effective disease management and accurate weather forecasts at the micro-level**.

- **Research** regarding species, habitat mapping, and climate change forecasts.

National Maritime Foundation leads the research on the **blue economy and climate change and their national and regional impact**, notably on the mangrove.

Bangladesh Institute of Maritime Research & Development (BIMRAD) conducts research on **traditional and non-traditional threats in the Indian Ocean Region, a Bangladesh Perspective, a Historical overview of the Rohingya Question and Contemporary Issues** and **Critical Factors identification to merely study the stagnancy of Marine Fisheries Production in Bangladesh.**

Blue Resources Trust (BRT) is working on **habitat mapping** and participating in a **coral atlas**.

- **Institutional and technological mechanisms** for ocean observation, warning service.

Indian National Center for Ocean Information Services (INCOIS) uses satellite oceanography and ocean science and modeling to observe oceans to provide as much as possible information and advisory services to governments. INCOIS gathers data on the **Ocean Digital Center**. Any observation done by any institutions in India is grafted on INCOIS services and developed as part of IODE (International Oceanographic Data and Information Exchange), a **Digital Ocean App** where anyone can add, visualize and command ocean data.

Blue Resources Trust (BRT) supports Sri Lanka with **Vessel Monitoring Systems** (VMS) as a part of the Indian Ocean Tuna Commissions, providing the **development of databases and applications**.

- **Outreach solutions** such as seminar, training, and awareness campaign.

Bangladesh Institute of Maritime Research & Development (BIMRAD) develops **training modules** on local level strategy of reducing climate-induced loss and damage to seagoing fishers.

Maritime Research Center (MRC) organized **UDA Summer School** (project-based learning), **training modules** (field experimental learning) and plans to **create a Center of Excellence** (research center, incubation center, skilling and leadership center, academic center, strategy center).

[18] Mr. Aditya Dash, Vice Chairman, Marine Products Export Development Authority (MPEDA), India, workshops 2 & 3, https://www.youtube.com/watch?v=WRF0lGg556c&list=PLFY7PFEB2VPwwKH53CIo-kFKyEEb_5hlU&index=4&ab_channel=TheBridgeTank ; https://www.youtube.com/watch?v=3SPsQ7LXlNQ&list=PLFY7PFEB2VPwwKH53CIo-kFKyEEb_5hlU&index=19&ab_channel=TheBridgeTank

Blue Resources Trust (BRT) carries out **education and awareness projects** and **encourages the participation of local communities**.

Marine Environment Conservation Society of Sri Lanka (MECS), as a new growing structure, will plan to concentrate in the second phase of development by conducting **awareness programs in coastal communities**.

A balance must be achieved and maintained to sustainably develop activities, such as presented above. One of the biggest challenges is to consolidate each step of the value chain of the blue economy, which is the following in the region:

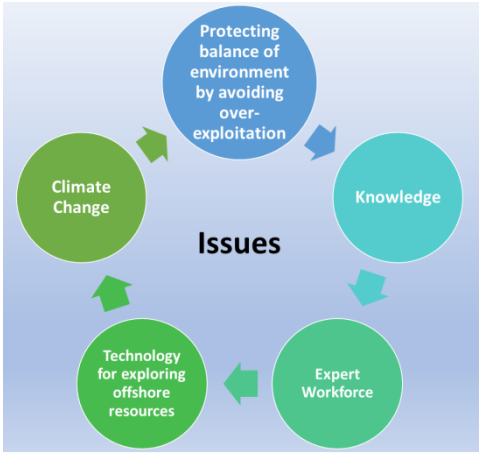

Figure 4. Issues related to value chain of blue economy in the Bay of Bengal[19]

Experts are aware of what needs to be done, and during the workshops, they developed several way forwards, such as the following (raised by all the speakers):

- **Framework and formulation of marine fisheries policy (for the social wellbeing of the fishing communities and regulations).** At this stage, such comprehensive measures do not exist. There are a series of regulations, laws and acts, but they have siloed perspectives, sector by sector or/and objective by objective. There may therefore be inconsistencies from one measure to another.
- **Need for species and livelihood assessment.** Assessments exist, but there is a need for a common methodologies and tools for each species and livelihood assessment.

[19] Mr. Abu Saleh Khan, Executive Director, Institute of Water Modeling, Bangladesh, workshop 2, https://www.youtube.com/watch?v=z4We4a8J8X0&list=PLFY7PFEB2VPwwKH53CIo-kFKyEEb_5hlU&index=17&ab_channel=TheBridgeTank

THE CATALYTIC ROLE OF DATA FOR SUSTAINABLE AND EFFECTIVE DEVELOPMENT OF THE BLUE ECONOMY IN THE BAY OF BENGAL

Researchers, policymakers, project leaders and coastal communities agree that rigorous data collection and precise inventory of the fish stocks are needed to halt resource abuse. It would ensure equal and sustainable use of ocean and coastal resources and are also essential to drive public policies in the sector. An entire panel during the second workshop was dedicated to data-related issues. The question of data was present throughout all three workshops.

There is a clear consensus among the panelists: the data are at the service of the action, the economic development and the yield of the fishery, the protection of ecosystems and the improvement of the quality of life of fishermen. Data is collected by different stakeholders, with different methodologies, different tools, and for various purposes. In the case of the Bay of Bengal, data is an essential component of the value chain of the blue economy, and especially for fishing, for three sub-purposes[20]:

- **Exploring and mapping natural blue resources,**
- **Quantifying the economic potential,**
- **Hydrological and morphological data.**

In addition to the know-how and strengths in terms of data collection, several concerns have been raised:

- **Methodological constraints on the collection of data,** such as the lack of transparency, open-access data and the need to improve the quality and reliability of available statistics. The National Maritime Foundation is facing such difficulties, notably by working on mangrove forests in India.[21]
- **The need for having data in a long-run perspective**,[22] which is necessary for better resources inventory. There is no strong temporal monitoring of Sri Lankan resources, linked to financing and funding.
- **The storage of data**, which requires appropriate vessels and specific technology.[23]

[20] Mr. Abu Saleh Khan, Executive Director, Institute of Water Modeling, Bangladesh, Workshop 2, https://www.youtube.com/watch?v=z4We4a8J8X0&list=PLFY7PFEB2VPwwKH53CIo-kFKyEEb_5hlU&index=17&ab_channel=TheBridgeTank
[21] Dr. Chime Youndon, Associate Researcher, National Maritime Foundation, India, Workshop 2, https://www.youtube.com/watch?v=EMhTLJFTzII&list=PLFY7PFEB2VPwwKH53CIo-kFKyEEb_5hlU&index=4&ab_channel=TheBridgeTank
[22] Mr. Nishan Perera, Co-founder, Blue Resources Trust, Sri Lanka, Workshop 2, https://www.youtube.com/watch?v=Nzdd3xTZPgQ&list=PLFY7PFEB2VPwwKH53CIo-kFKyEEb_5hlU&index=16&ab_channel=TheBridgeTank
[23] Mr. Abu Saleh Khan, Executive Director, Institute of Water Modeling, Bangladesh, Workshop 2, https://www.youtube.com/watch?v=z4We4a8J8X0&list=PLFY7PFEB2VPwwKH53CIo-kFKyEEb_5hlU&index=17&ab_channel=TheBridgeTank

To deepen these findings and concerns, we have identified a typology that seems to facilitate the understanding and analysis of the blue economy data types and to study a set of practices in a classified manner, possibly by sector, field of practice and/or recipients. This **typology of data**, which is a step back from what was said during the three workshops, seems to be quite replicable to other contexts. We organized it in the following manner:

DATA FOR/FROM OCEAN OBSERVATION, based on INCOIS, IWM and BRT's examples.

The blue economy, maritime security or risk disaster management require **ocean information** since it is impossible to manage something that is not known.[24] **Observation produces information** resource inventory in terms of species, hydrology, climate change, meteorological warning, stock assessment, ecosystem health, oceanography and socioeconomic challenges. This information can then be translated according to the needs in terms of political, economic, scientific or environmental actions and/or decisions. Ocean observation requires certain tools that need to be deployed.

Even if services, tools and programs exist within Bangladesh, India and Sri Lanka, several challenges remain for ocean observation. At the scale of the Bay of Bengal, the observation of the ocean is not equal, even though there are frameworks within organizations present, such as the Bay of Bengal Inter-Governmental Organization (BOBP-IGO); or within larger scale organizations or programs, such as the International Oceanographic Data and Information Exchange (IODE) or Indian Tuna Commission (IOTC). Bangladesh, India and Sri Lanka do not have the same tools and means to access repositories for the oceanographic data in the country. As discussed during the three workshops, India is the country that seems to be the most integrated in regional, international or United Nations programs for ocean observation, thanks to Indian National Center for Ocean Information Services (INCOIS). Bangladesh is more involved in the observation of water resources via the Institute of Water Modeling (IWM). Sri Lanka contributes through non-for-profit organizations, such as Blue Resources Trust (BRT) to the development of databases and applications via Vessel Monitoring System (VMS) and habitat mapping.

Whether at the level of one of these three countries or at the regional level, the panelists emphasized the need for technological assistance or collaboration, possibly from an external body, possibly French, as was suggested in the third workshop.

[24] Dr. Srinivas Kumar, Director, Indian Center for Ocean Information Services (INCOIS), India, workshop 1, https://www.youtube.com/watch?v=24dlc-GaHBE&list=PLFY7PFEB2VPwwKH53CIo-kFKyEEb_5hlU&index=9&t=2264s&ab_channel=TheBridgeTank

The needs were expressly identified as: [25]

- **Technological needs** for marine spatial planning, satellite-based stock and effort estimation;
- **Equipment**, such as vessels and ports' modernization;
- **Funds.**

DATA FOR/FROM CONDUCTING RESEARCH, based on NMF, MRC, BIMRAD and BRT's experience

Based on two substantive topics on the blue economy, as proposed in the first workshop:

- Marine and coastal ecosystems through economic valuation to discuss conservation of marine ecosystem facing increasing pressure, risk disaster management in climate-vulnerable condition and marine activities focusing on fisheries in a context of growing fishery stocks demand (panel 1);
- Social challenges related to food security, job access and climate change adaptation (panel 2).

The question of data collection as an object of study was then addressed in the next workshop. (workshop 2, panel 1). Data collecting is at the essence of research. Rigorous data collection and the transparency of result is key.

The research data in the case of the blue economy in the Bay of Bengal is the result of a long history of 30 years of capitalization of skills and mastery of the issues. We have identified that research conducted in the context of maritime issues used to be reserved for the military. Gradually, there has been a shift in concerns towards development issues, and very recently towards transverse, multi-dimensional and multi-actor studies. The National Maritime Foundation and the Bangladesh Institute of Maritime Research and Development were the first Think Tanks created, respectively in India and Bangladesh, devoted to multi-sectoral maritime domain studies in the region. The Maritime Research Center is among the youngest structure created in the region contributing to cross sectoral studies to improve coordination among the blue economy actors in the region. However, some barriers were highlighted by the speakers, such as:

- **Lack of data collection methodology** that differs from one institute to another, resulting in different data and therefore analysis. It could also lead to a lack of transparency, or even to manipulation of data for decision-makers, implementers and even beneficiaries. Misinterpretation

[25] Dr. P. Krishnan, Director, Bay of Bengal Inter-Governmental Organization, regional, workshop 3, https://www.youtube.com/watch?v=3SPsQ7LXlNQ&list=PLFY7PFEB2VPwwKH53CIo-kFKyEEb_5hlU&index=19&ab_channel=TheBridgeTank

of the data could cause maladaptation to climate change[26]. The panelists stressed on the need to correlate and/or make known the application of such methodology for official information.

- **From understanding of results to decision making** (from bottom up to decision makers): how can research impact decision making? The challenge for most of the panelists from the research sphere is for their ideas, solutions and recommendations to reach the decision makers.

DATA FOR/FROM FIELD EXPERIENCE, based on Friendship NGO, BRT, MRC, MECS and WorldFish's experience.

The degree of information and knowledge of the issues of the project leaders at the very local level is significant. Friendship NGO, BRT, MRC, MECS or WorldFish have the approach to work as close as possible to the field. These different project leaders insist on the need to work with policy makers, to make their actions known to policy makers or to call on policy makers to get involved as close as possible to the field. **Data from the field is essential for three reasons**: 1) it allows us to establish the state of play in terms of needs, by working with the beneficiaries; 2) it highlights the difficulties in implementing a given initiative; 3) the experience acquired in the field can serve as a lesson learned for other similar projects. However, the lack of support for the scaling up of pilot projects was highlighted because for many organizations understanding why a project did not work represent a time and a financial cost. "This understanding is far deeper than developing pilot mode. It is an understanding of the way fishermen, the economy and the society work. By working in this way, there are a lot of soft skills developed"[27]. For field implementers, **support from policy-makers is essential** in order to know what can be developed in this field based on this context, constraint, framework, policy and budgetary means.

Two main gaps have been identified:

- **The logic to develop a project is to start with a pilot mode.** Several elements have been put forward that do not necessarily guarantee the success of a pilot phase in the case of the countries studied in the Bay of Bengal: 1) Short-term perspective while the challenges of the blue economy, especially fisheries, require long-term actions. 2) Projects are rarely built with a possibility of deployment on a larger scale. 3) Lack of long-term funding. 4) Institutional barriers related to administrative procedures and lack of long-term monitoring and verification impact the project deployment.

[26] Dr. Chime Youdon, Associate Researcher, National Maritime Foundation, India, Workshop 2, https://www.youtube.com/watch?v=EMhTLJFTzII&list=PLFY7PFEB2VPwwKH53CIo-kFKyEEb_5hlU&index=4&ab_channel=TheBridgeTank

[27] Mrs. Runa Khan, Founder and Executive Director, Friendship NGO, Bangladesh, workshop 3, https://www.youtube.com/watch?v=3SPsQ7LXlNQ&list=PLFY7PFEB2VPwwKH53CIo-kFKyEEb_5hlU&index=19&ab_channel=TheBridgeTank

- **Avoiding silo project**: Most of the projects implemented have a one-objective and not a multi-objective logic. This is mainly due to the lack of technological and financial resources and the lack of capacity building. Hence, it does not allow a good coordination between the different issues. To avoid silo logic, there is a need for management and sustainable mechanisms as policy tools for practitioners.

DATA FOR/FROM POLICYMAKERS (Ministries, official departments)

The challenge for policy makers is not to be disconnected from the realities on the ground. The panelists insisted on the lack of coordination, capacity building and contradictions within the institutions.[28] It would be important that a policy tool be developed **to promote access to data, their dissemination and promotion, in order to improve the general knowledge of actions implemented by all actors in the value chain of the economy**.

DATA FOR/FROM BENEFICIARIES

At the beginning of this work, the issue of data for the beneficiaries was only secondary and was gradually brought to the fore. The improvement of the living conditions of the populations living near the coastal zones and more specifically the improvement of the living and working conditions of the fishermen is essential. On one hand, this improvement requires modernization of equipment and infrastructures, securing of jobs, introduction of norms to guarantee food security, etc. This would lead to a visible and tangible improvement of a sector's value chain. On the other hand, the significant improvement related to access to information, awareness and training dedicated to the capitalization of knowledge or the protection of ecosystems still requires extensive work.

It is important not to ignore the **crucial role of the knowledge** of coastal areas, of the evolution of living conditions, of fishing seasons, of the reduction or proliferation of certain resources **by the populations living in coastal areas or fishermen, as they are observing ocean and its evolution**. It would be essential to include them more in the value chain of the blue economy data.

[28] Mr. Nishan Perera, Co-founder, Blue Resources Trust, Sri Lanka, Workshop 2, https://www.youtube.com/watch?v=EMhTLJFTzII&list=PLFY7PFEB2VPwwKH53CIo-kFKyEEb_5hlU&index=4&ab_channel=TheBridgeTank

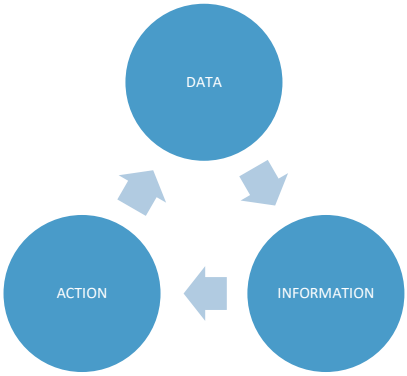

Figure 5. Value chain of data relevance for action

Efforts need to be made to strengthen the monitoring of ocean, resources, species and climate change and to enforce mechanisms at the policy level, as data should feed national frameworks to integrate scientific data, population observation along with environmental, social and economic data for better monitoring of the oceans.[29]

TAKEAWAYS OF THE CHAPTER: This first chapter has enabled us to highlight the different know-how existing in the region and the important mobilization of the actors that we invited during our workshops to demonstrate their skills and their ability to share their expertise. Thanks to these various contributions, we were able to build scientific and methodical schemes of thought and tools on the blue economy, such as a typology of data or development categorizations based on concrete illustrations.

[29] Dr. Shailesh Nayak, Director, National Institute of Advanced Studies, India, Workshop 2, https://www.youtube.com/watch?v=A3pPfYtIjH0&list=PLFY7PFEB2VPwwKH53CIo-kFKyEEb_5hlU&index=14&t=1s&ab_channel=TheBridgeTank & Mr. Pattabhi Rama Rao, Group Director, Ocean Observations, Modelling and Data Assimilation Group, Indian National Center for Ocean Information Services (INCOIS), India, Workshop 2, https://www.youtube.com/watch?v=3lIC1Js7CJk&list=PLFY7PFEB2VPwwKH53CIo-kFKyEEb_5hlU&index=13&t=383s&ab_channel=TheBridgeTank

CHAPTER 2 – THE GRAND CHALLENGE: COORDINATING BLUE ECONOMY CONTRIBUTIONS AT A NATIONAL LEVEL, AND NOT IN A SILO, THROUGH THE POOLING OF THE PRIVATE AND PUBLIC SECTORS

In the Bay of Bengal, a shared blue economy blueprint would be crucial to ensure operational governance of ocean resources as a common good. There is a need to build a sustainable fishery value chain by modernizing maritime infrastructures. To accomplish it, all the panelists pointed out the need to better manage their fisheries resources and the current lack of coordination and financial, political and technological infrastructures.

Excellent expertise in the field exists. However, from one country to another or within a country, it is difficult to know the projects or initiatives launched and identify key lessons learned from neighboring country or state to replicable such solutions. Our workshops contribute in some manner to provide a better understanding of the great expertise and experiences developed in Bangladesh, India and Sri Lanka and to bring together around a virtual table, the experts of the blue economy. For instance, the Bay of Bengal Inter-Governmental Organization provides guidelines and framework with clear mandates to promote the successful development of the blue economy in the region through cooperation between countries, among others. However, the cooperation is very limited and represents only a few initiatives that have a limited large-scale scope.[30] This is why all the panelists insisted on investing on priority at a national level to clarify and better manage national resources in terms of tools and means.

The real challenge of coordination between actors is to collaborate on the same line as a network of actors holding complementary expertise. The issue of coordination, apart from the logic of work and efficiency, was discussed around the need **to bring the private and public sector together** to ensure operational governance of the blue economy as a common good.

Three main objectives are required to avoid silo actions that we wished to tackle through various sub-parts to deepen the issue: 1) improving coordination, 2) strengthening private and public cooperation and 3) promoting institutional capacity building in front of data collection and coordination.

[30] Dr. P. Krishnan, Director, Bay of Bengal Inter-Governmental Organization, regional, workshop 3, https://www.youtube.com/watch?v=3SPsQ7LXlNQ&list=PLFY7PFEB2VPwwKH53CIo-kFKyEEb_5hlU&index=19&ab_channel=TheBridgeTank

IMPROVING COORDINATION

The **lack of coordination**, from national to regional and local levels within the activities of the blue economy sector, is the element that came out frequently during the workshops. Coordination is crucial to effectively and efficiently deploy and implement the blue economy activities and use resources sustainably.

This is why improving coordination in the region could lead to multiple co-benefits for stakeholders and sectors' development, such as increasing efficient blue economy governance, time and funds saving, stimulating cooperation between public and private stakeholders, research implementation and others.

What solutions exist? What successful projects have been developed? What institutional mechanisms have been introduced in the neighboring country? What were the results? These questions are shared by the majority of the panelists. By working collectively during the three workshops, a series of takeaways was developed:

- **The understanding of top-down and bottom-up** content on how the blue economy is going to be implemented in the region. It is necessary to understand how the blue economy is formalized at the national level and how it gets translated at the very bottom level, as well as the regional level.[31] There is no monitoring, verification and transparency tool to support the deployment of an effective and efficient blue economy. Such a mechanism could be developed based on international standards with the institutional support of external assistance. Panelists insist that there is no strong coordination, which is why there is no coercive approach, in particular in Sri Lanka[32], to international policy/mechanism at national policy/mechanism level nor at implementation and research and data gathering level. The question of having a coercive mechanism to monitor the implementation and efficiency of policies was raised but not answered during our three workshops.
- **The multiplicity of stakeholders** is somehow an issue for coordination improvement across the value chain of the blue economy. This multiplicity explains the fragmentation of the decision and actions.[33] The biggest challenge is gathering all these experts on the same lines of the blue economy topics. At our level, the multiplicity of actors had already been identified before the organization of the three workshops. We carried out a mapping of the actors with the perspective

[31] Dr. Saurabh Thakur, Associate Fellow, National Maritime Foundation, India, workshop 2, https://www.youtube.com/watch?v=EMhTLJFTzII&list=PLFY7PFEB2VPwwKH53CIo-kFKyEEb_5hlU&index=4&ab_channel=TheBridgeTank

[32] Mr. Nishan Perera, Co-founder, Blue Resources Trust, Sri Lanka, Workshop 2, https://www.youtube.com/watch?v=EMhTLJFTzII&list=PLFY7PFEB2VPwwKH53CIo-kFKyEEb_5hlU&index=4&ab_channel=TheBridgeTank

[33] Mr. Aditya Dash, Vice Chairman, Marine Products Export Development Authority (MPEDA), India, workshop 2, https://www.youtube.com/watch?v=WRF0lGg556c&list=PLFY7PFEB2VPwwKH53CIo-kFKyEEb_5hlU&index=4&ab_channel=TheBridgeTank & Mrs. Dharshani Lahandapura, Chairperson, Marine Environment Protection Authority, Sri Lanka, workshop 2, https://www.youtube.com/watch?v=uBVaYdpjVuQ&list=PLFY7PFEB2VPwwKH53CIo-kFKyEEb_5hlU&index=3&ab_channel=TheBridgeTank

of drawing up an overview of the stakes and socio-economic challenges of the blue economy. The mapping focused on fisheries issues and the types of actors ranging from Think Tanks, research centers to chambers of commerce and fisheries departments within the ministries of fisheries, from the three countries. However, an internal mapping allowing a deep knowledge of the actors and their activity within each country should be conducted.

Our series of three workshops aimed at identifying lessons learned one from another institution and possibly stimulating the willingness of these institutions to replicate such initiatives or to develop cooperation. The example and the experience of the Maritime Research Center (MRC) illustrate what could be deployed on a larger scale. The MRC[34] has developed the Underwater Domain Awareness (UDA) framework, which could contribute to addressing the issue of coordination. The UDA framework encourages the pooling of resources and synergizes efforts across the stakeholders of the maritime sector (blue economy, security, environment, disaster management, science and technology). It is replicable and aims to optimize resources, and technological and political intervention for better actions.

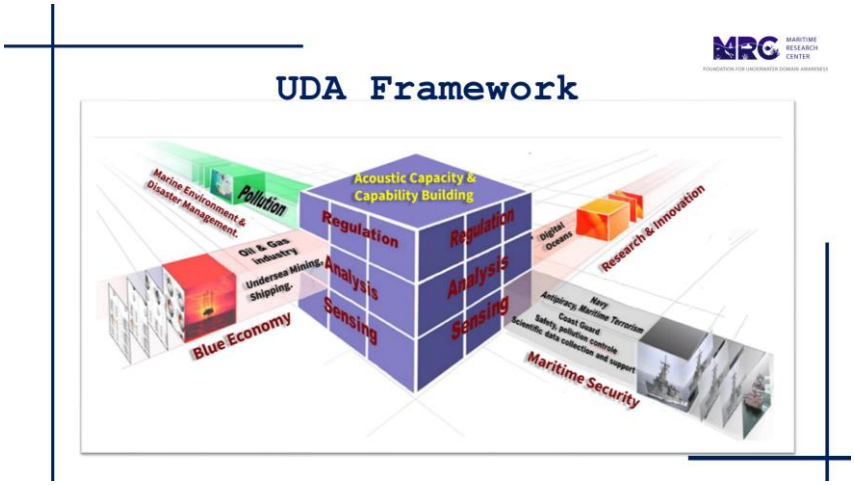

Figure 6. Scheme of UDA Framework

Solutions exist but they are little known. Knowing them would contribute to better coordination between actors, actions and resources. In the region and between other countries, there is a huge potential of

[34] Dr. Arnab Das, Executive director and founder, Maritime Research Center, India, workshops 1, 2, 3, https://www.youtube.com/watch?v=24dlc-GaHBE&list=PLFY7PFEB2VPwwKH53CIo-kFKyEEb_5hlU&index=9&t=2264s&ab_channel=TheBridgeTank ; https://www.youtube.com/watch?v=1lmjBsC4L1E&list=PLFY7PFEB2VPwwKH53CIo-kFKyEEb_5hlU&index=11&ab_channel=TheBridgeTank ; https://www.youtube.com/watch?v=3SPsQ7LXlNQ&list=PLFY7PFEB2VPwwKH53CIo-kFKyEEb_5hlU&index=19&ab_channel=TheBridgeTank

cooperation and knowledge exchange. But at the same time, recognizing and understanding the expertise and the knowledge existing within the countries of the region is critical.[35]

STRENGHTENING PRIVATE AND PUBLIC COOPERATION

In the first stage of the work, we focused exclusively on research centers and Think Tanks to identify the interconnections between research and operations. However, we gradually identified the importance of the private sector in participating in the development of a sustainable and innovative blue economy. As a bridge to the private sector, chambers of commerce are crucial.

- As project implementers, **the private sector should connect their project at the very bottom level, contribute to sustainability awareness**[36] and **develop projects for the long run** (from pilot phase to deployment phase).
- **Developing and financing the blue economy**.[37] Measures could be deployed to facilitate public bodies to be financed by the private sector and the private sector to be supported by the public bodies. As public entities face difficulties in budget balance, private entities should engage in solutions for the public sector advocacy. The financing mechanism needs to be developed in a self-sufficient manner. Solutions such as **blue bonds** and **blue loans** could be introduced in order to meet the long-term and low-cost financing needs in the blue economy scope. Panelists, particularly those of the chambers of commerce, insist on the fact that the private sector needs **incentive measures**, such as fiscal and non-fiscal supports, tax holidays, tax exemptions or technological supports to exploit desired growth. According to some speakers, there is no such financial or budgetary mechanism in the Bay of Bengal. Funding groups and mechanisms need to be convinced.[38]
- **The public and private sectors could work in tandem** for the common development of this sector. Frequent exchange of delegation, information, knowledge and training between the two sectors

[35] Mr. Daniel Fernando, Chairperson, Blue Resources Trust, Sri Lanka, workshop 3, https://www.youtube.com/watch?v=3SPsQ7LXlNQ&list=PLFY7PFEB2VPwwKH53CIo-kFKyEEb_5hlU&index=19&ab_channel=TheBridgeTank
[36] Ms. Soma Mitra-Muckerjee, Director – Head of Projects, Bengal Chamber of Commerce and Industry, India, workshop 2, https://www.youtube.com/watch?v=hzKpR9Sktdc&list=PLFY7PFEB2VPwwKH53CIo-kFKyEEb_5hlU&index=17&ab_channel=TheBridgeTank
[37] Mr. Khairul Majid Mahmud, Director, Dhaka Chamber of Commerce & Industry, Bangladesh, workshop 2, https://www.youtube.com/watch?v=Ya3RD9MXFGc&list=PLFY7PFEB2VPwwKH53CIo-kFKyEEb_5hlU&index=1&ab_channel=TheBridgeTank & Dr. Arnab Das, Executive director and founder, Maritime Research Center, India, workshop 2, https://www.youtube.com/watch?v=1ImjBsC4L1E&list=PLFY7PFEB2VPwwKH53CIo-kFKyEEb_5hlU&index=11&ab_channel=TheBridgeTank
[38] Dr. Arnab Das, Executive director and founder, Maritime Research Center, India, workshop 2, https://www.youtube.com/watch?v=1ImjBsC4L1E&list=PLFY7PFEB2VPwwKH53CIo-kFKyEEb_5hlU&index=11&ab_channel=TheBridgeTank

could help capacity building of the private sector, enriching maritime resource skills as well as encouraging foreign investment for technology and knowledge transfer. [39] It could also be developed as "a user guide for industrial partnership as in the regional, particularly in India, there is a failure to get the ecosystem right; either it is too politics heavy or business heavy".[40] For instance, the Bengal Chamber of Commerce (BCCI) contributes to bringing private sector finance into various projects, notably on water waste transportation with the collaboration of World Bank.[41]

PROMOTING INSTITUTIONAL CAPACITY BUILDING FOR COORDINATION AND DATA COLLECTION

Within Bangladesh, India and Sri Lanka, institutional frameworks exist to promote the proper implementation of activities related to the blue economy. Nonetheless, the challenges remain in capacity building, in terms of resource and data management, translation of policies into action, capacity to collect information and identify needs at the very local level and to achieve economic, human and environmental development objectives.

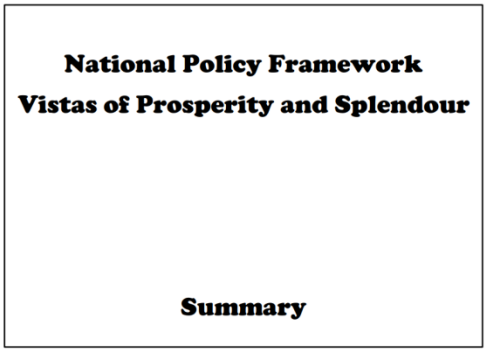

Figure 7. National policies framework related to blue economy in Bangladesh, India and Sri Lanka

[39] Mr. Khairul Majid Mahmud, Director, Dhaka Chamber of Commerce & Industry, Bangladesh, workshop 2, https://www.youtube.com/watch?v=Ya3RD9MXFGc&list=PLFY7PFEB2VPwwKH53CIo-kFKyEEb_5hlU&index=1&ab_channel=TheBridgeTank & Dr. Arnab Das, Executive director and founder, Maritime Research Center, India, workshop 2, https://www.youtube.com/watch?v=1lmjBsC4L1E&list=PLFY7PFEB2VPwwKH53CIo-kFKyEEb_5hlU&index=11&ab_channel=TheBridgeTank & Mr. Manish Singhal, Deputy Secretary General, Federation of Indian Chambers of Commerce and Industry, India, workshop 3, https://www.youtube.com/watch?v=3SPsQ7LXlNQ&list=PLFY7PFEB2VPwwKH53CIo-kFKyEEb_5hlU&index=19&ab_channel=TheBridgeTank

[40] Dr. Arnab Das, Executive director and founder, Maritime Research Center, India, workshop 2, https://www.youtube.com/watch?v=1lmjBsC4L1E&list=PLFY7PFEB2VPwwKH53CIo-kFKyEEb_5hlU&index=11&ab_channel=TheBridgeTank

[41] Mrs. Soma Mitra-Muckerjee, Director-Head of Projects, Bengal Chamber of Commerce, workshop 2, https://www.youtube.com/watch?v=hzKpR9Sktdc&list=PLFY7PFEB2VPwwKH53CIo-kFKyEEb_5hlU&index=17&ab_channel=TheBridgeTank

Having given the floor to the speakers, we have seen a real mastery of the blue economy's issues by the research centers, Think Tanks and chambers of commerce. They all pointed to the need of a strong integrative support from policymakers. Among Bangladesh, India and Sri Lanka, two main topics require policymakers' support: coordination and data collection.

Coordination

Regarding **coordination**, the institutional capacity building should aim at strengthening **3 main challenges**:

- **Sustainability**[42]**,** in terms of ecosystems' preservation. There is still a lot to do to improve the blue economy's development in a sustainable manner and find a balance between exploitation, preservation and regeneration of the marine environment.
- **Informality.** In fisheries, informality is huge but limits the multi-stakeholder approach[43]. It goes from IUU fishing to unmanaged artisanal fisheries, which raises economic, regulatory, statutory-and social issues.[44]
- **Communication and awareness.** Supporting stakeholders' coordination requires tools that can better monitor and report what is existing, or being developed, from whom and for who. Such mechanism, so far, does not exist.

The integration and coordination across policy are a key component for enhancing maritime domain governance.[45] Policymakers should know what is developed at the very bottom level. Currently in Bangladesh, India and Sri Lanka, there is a huge challenge of strengthening institutional capacity of the sector to promote national strategies and local interest reconciliation. On this subject, the panelists were less committed to the topic but are aware of the challenges which need to be resolved concerning the issue. In some other initiatives on the blue economy to improve coordination and governance from policymakers to local actors, integrative and participatory process and mechanisms have been deployed, such as in Indonesia, where AFD is active[46]. Such experience could be replicated in the Bay of Bengal.

[42] Mrs. Soma Mitra-Muckerjee, Director-Head of Projects, Bengal Chamber of Commerce, workshop 2, https://www.youtube.com/watch?v=hzKpR9Sktdc&list=PLFY7PFEB2VPwwKH53CIo-kFKyEEb_5hlU&index=17&ab_channel=TheBridgeTank
[43] Mr. Reda Souirgi, Country Director, AFD Sri Lanka, workshop 2, https://www.youtube.com/watch?v=81IAYxwB18s&list=PLFY7PFEB2VPwwKH53CIo-kFKyEEb_5hlU&index=10&ab_channel=TheBridgeTank
[44] Dr. Md. Sharif Uddin, Director (Marine), Marine Fisheries Office, Department of Fisheries of the Government of the People's Republic of Bangladesh, workshop 1, https://www.youtube.com/watch?v=VLKYNkV53g0&list=PLFY7PFEB2VPwwKH53CIo-kFKyEEb_5hlU&index=9&ab_channel=TheBridgeTank
[45] Dr. Chime Youdon and Dr. Saurabh Thakur, Associate Fellows, National Maritime Foundation, India, workshop 2, https://www.youtube.com/watch?v=EMhTLJFTzII&list=PLFY7PFEB2VPwwKH53CIo-kFKyEEb_5hlU&index=4&ab_channel=TheBridgeTank
[46] Mr. Martin Lemenager, Senior Program Manager for Infrastructure, AFD Office in Indonesia, workshop 3, https://www.youtube.com/watch?v=3SPsQ7LXlNQ&list=PLFY7PFEB2VPwwKH53CIo-kFKyEEb_5hlU&index=18&t=2735s&ab_channel=TheBridgeTank

Data collection

Regarding the institutional capacity building regarding **data collection**, contributions from researchers are required to develop adequate methodology, which is lacking at present and results in a lack of transparency, usefulness and manipulation of data.[47] The case of fishery sector is a good illustration of the constraints of institutional capacity building with data collection. This sector suffers from many deficiency issues, but government figures estimate that the public services are very poor and are at around 40-50%. This is mainly attributed to the poor harbor facilities and services, fish offloading, landing, handling and storage practices. The market conditions are quantity-oriented rather than quality-oriented, which directly contributes to the overfishing and maintaining the circle of poverty for fishing communities. A lack of transparency and monitoring, contribute to long-term overfishing practices. In the fishery sector, the issue of data is regularly addressed by policymakers in a quantitative manner. In addition to quantitative data, qualitative data would be necessary to improve fishing practices, species preservation and population nutrition.[48]

This data must be translated in order to better manage the fisheries sector in a sustainable and efficient manner, according to the following elements, as presented during our workshops: [49]

- Clear definition of goals;
- Agreement of user groups on goals and strategies;
- Practical tools that can be implemented and enforced;
- Information feedback loops to allow assessment of success or failure;

Institutional capacity building is too often led by the development assistance ecosystem, such as NGOs (WorldFish, Friendship NGO), multilateral organizations (WorldBank) or development agencies (USAID). It would also be essential to include research and Think Tank actors, who themselves contribute to the awareness and recommendations for policy makers.

TAKEAWAYS OF THE CHAPTER: The objective of this second chapter was to synthesize the main challenges of the blue economy sector, particularly fisheries in the Bay of Bengal. Two main trends were highlighted as the core challenges to be addressed: coordination and cooperation between the private and public sectors.

[47] Dr. Chime Youdon and Dr. Saurabh Thakur, Associate Fellows, National Maritime Foundation, India, workshop 2, https://www.youtube.com/watch?v=EMhTLJFTzII&list=PLFY7PFEB2VPwwKH53CIo-kFKyEEb_5hlU&index=4&ab_channel=TheBridgeTank

[48] Mrs. Panchali Ellepola, Project Officer, AFD Sri Lanka, workshop 2, https://www.youtube.com/watch?v=81IAYxwB18s&list=PLFY7PFEB2VPwwKH53CIo-kFKyEEb_5hlU&index=10&ab_channel=TheBridgeTank

[49] Dr.M.F.M. Fairoz, Dean, Faculty of Fisheries and Marine Science, Ocean University of Sri Lanka, workshop 1, https://www.youtube.com/watch?v=VLKYNkV53g0&list=PLFY7PFEB2VPwwKH53CIo-kFKyEEb_5hlU&index=9&ab_channel=TheBridgeTank

CHAPTER 3 – HOW IS RESEARCH TRANSLATED IN POLICY MAKING?

Through the words of panelists, research allows for the gain of multiple benefits: knowing a context, learning about positive or negative developments in a situation, and being complementary to ongoing or future actions. This notion of complementarity is interesting because it underlines the notion of transfer of skills. Throughout the workshops, the experts all agreed on the fact that the blue economy in the region and within the countries was silo-based. However, research in its essence foresees to be translated into action. This is why conducting research is important to feed policy making or project implementers' process.

Thanks to the workshops, we have identified **3 elements** that justify the way research is applied and replicated: this is done through a 1) process 2) tools and 3) weak signals that allow the evaluation of potential and the degree of scientific appropriation of a subject. We will open this potential to research through the example of Bangladesh.

The following sections will identify trends in the translation of research into policymaking, but also more broadly into a structuring tool for project leaders.

PROCESS, TOOLS & WEAK SIGNALS ON RISING LOCAL COMPETENCIES

PROCESS

Process is most important to build dialogue between research and operation and between experts and policymakers. There is a need for more research and to know more actors and experts to reinforce knowledge before translating it into action.

In terms of approach, all the panelists addressed the issue of the blue economy, in terms of preservation of the coastal ecosystems and the socio-economic stakes of fishing in a broader perspective, i.e. by linking the marine and maritime activities and the climatic, security and social risks they encompass (e.g. IUU fishing, oil and gas, maritime piracy, geopolitics context etc.). It illustrates that the blue economy needs to be studied in a **cross-cutting manner**. These different topics and the identification of a cross-cutting approach to be deployed are proof of the capacity to conduct quality research in the Bay of Bengal. There is a lot of research existing at the national level. It would be interesting, through further research, to empower and push policy dialogue at national, regional, and even at local levels. Besides, research should not be

disconnected from projects: projects benefit from feasibility and baseline studies, and research can take the form of project evaluation.[50]

Another point to confirm this idea is that this work has put into perspective the **complementarity of research**. Through structured and critical scientific approaches to the blue economy, the panelists have shown their ambition to impact the policymaking sphere with their research.

The project sponsors, such as developing agencies, have an interest in meeting needs. In the framework of the Bay of Bengal and of national realities and needs, organizations are invited to come to the field, since they should get to know the realities, particularly of the fishermen community at a very small scale. The role of a developing agency could be:

- **Identifying what already exists**;
- **Supporting local organizations on the ground to scale up;**
- **Taking precautionary measures** to protect nature and biodiversity, as "action needs to be proactive and not reactionary".[51]

TOOLS

Research develops scientific and analytical tools necessary for building methodologies and patterns of reflection and/or action. Several tools have been put forward to act in favor of the blue economy within the three countries and also on a regional scale. These tools, developed by the research institutions, Think Tanks, chambers of commerce and officials contribute to prove the existing interconnections between research and operation. We particularly identified two kinds of tools:

- **Joint research/project** with multi-stakeholder and multi-domain approaches, in a cross-cutting manner.
- **Outreach actions**, such as seminars, publications, workshops, training, and awareness campaign, to better inform and raise awareness of the subject.

Based on the panelists' presentations, we also identified that research in the region was conducted in a concentric circle. The "blue economy" circle is the foundation of the research. However, this observation can surely be applied to other regions of the world. The "joint research/project" circle is the circle of how

[50] Dr. (Mrs) Hélène Djoufelkit, Research Director, AFD, workshop 2, https://www.youtube.com/watch?v=mnWKGz4L10g&t=1882s&ab_channel=TheBridgeTank
[51] Mr. Daniel Fernando, Chairperson, Blue Resource Trust, Sri Lanka, Workshop 3, https://www.youtube.com/watch?v=3SPsQ7LXlNQ&list=PLFY7PFEB2VPwwKH53Clo-kFKyEEb_5hlU&index=19&ab_channel=TheBridgeTank

research is conducted for better understanding by the research community. And the "outreach actions" circle is the way in which the research is translated on a larger scale, particularly targeted to an audience of policymakers. These three circles demonstrate the very function of **research as a tool of knowledge** for policymakers.

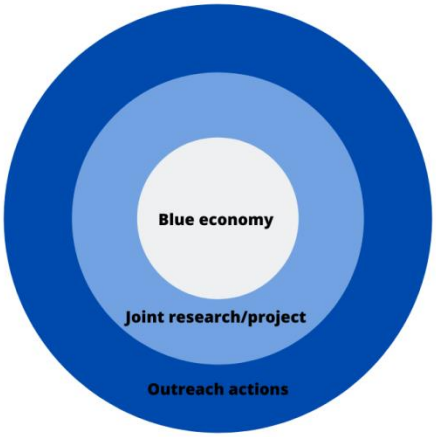

Figure 8. The logics of blue economy research in the Bay of Bengal as a tool of knowledge for policymakers

Think Tanks, research institutions and NGOs, such as the Bangladesh Institute of Maritime Research and Development (BIMRAD), Blue Resources Trust, National Maritime Foundation, Maritime Research Center, Friendship NGO, and Marine Environment Conservation Society contribute to **increase maritime awareness among policymakers and civil society by carrying programs and outreach actions putting forward recommendations for the decisionmakers.** For instance, the MRC proposes an "**outreach, engage and sustain program":**[52]

- Organizing webinars, seminars and workshops to sensitize stakeholders and policymakers.
- Introducing multi-disciplinary UDA fellowships to encourage innovation and research.
- Building on projects and policy papers across the multiple sub-domains and applications.

In addition to Think Tanks, chambers of commerce have understood the usefulness of having more research. For example, the Bengal Chamber of Commerce and Industry (BCCI) has a research team. They conduct a cross-disciplinary approach. On the blue economy, they mainly focus on improving the livelihood

[52] Dr. Arnab Das, Executive director and founder, Maritime Research Center, India, workshops 1, 2, 3, https://www.youtube.com/watch?v=24dlc-GaHBE&list=PLFY7PFEB2VPwwKH53CIo-kFKyEEb_5hlU&index=9&t=2264s&ab_channel=TheBridgeTank ; https://www.youtube.com/watch?v=1lmjBsC4L1E&list=PLFY7PFEB2VPwwKH53CIo-kFKyEEb_5hlU&index=11&ab_channel=TheBridgeTank ; https://www.youtube.com/watch?v=3SPsQ7LXlNQ&list=PLFY7PFEB2VPwwKH53CIo-kFKyEEb_5hlU&index=19&ab_channel=TheBridgeTank

of coastal communities. Thanks to the work of the research team, many projects and works have been conducted for many of the 80,000 fish farming families in Bengal.[53]

WEAK SIGNALS ON RISING LOCAL COMPETENCIES

As a weak signal to express the increasing amount of research that could be connected to operational needs, we identified a growing number of PhD programs about the blue economy, notably in India and Sri Lanka. In the case of Sri Lanka, the Ocean University was created in 2014 to "develop the manpower requirement to achieve the economic benefits of Marine, Maritime, Fisheries and allied sectors".[54] During our workshops, some experts highlighted the importance of awareness and training for the younger generation on the preservation of the ocean resources.[55] More broadly, these weak signals explain several things:

- The desire to train on the blue economy;
- The will to increase the number of researchers and thus to improve the knowledge of the blue economy;
- The capacity of universities to innovate in a sector;
- The economic attractiveness of the sector among the younger generation and therefore the capacity of this sector to create jobs.

By contributing to public awareness and putting forward recommendations to decision-makers, research can complement concrete actions to answer current demands in the industry and economic sector. There is still a need to think about what the missing links on demand are. There is also a need to plug research at a decisional level (budget and reform). Any contribution should be designed whilst keeping in mind a model which can gather blue economy aspects by creating a network of thinkers, implementers, decision-makers and beneficiaries to work together on solutions.

THE EXAMPLE OF BANGLADESH

The case of Bangladesh is interesting because we were able to gather, during our workshops, a large panel of experts (research centers and think tanks, chambers of commerce, NGOs and political authorities). This is why we could cover all the issues on the whole value chain of the blue economy actors in Bangladesh. Plus,

[53] Ms. Soma Mitra-Muckerjee, Director – Head of Projects, Bengal Chamber of Commerce and Industry, India, workshop 2, https://www.youtube.com/watch?v=hzKpR9Sktdc&list=PLFY7PFEB2VPwwKH53CIo-kFKyEEb_5hlU&index=17&ab_channel=TheBridgeTank

[54] http://ocu.ac.lk/about-us/

[55] Ms. Soma Mitra-Muckerjee, Director – Head of Projects, Bengal Chamber of Commerce and Industry, India, workshop 2, https://www.youtube.com/watch?v=hzKpR9Sktdc&list=PLFY7PFEB2VPwwKH53CIo-kFKyEEb_5hlU&index=17&ab_channel=TheBridgeTank

to illustrate how research is influencing or is integrated into policymaking, Bangladeshi experts put more emphasis on this aspect during the three workshops.

Three trends have been identified in the case of Bangladesh:

- **Research with a cross-sectoral approach**. The Bangladeshi experts explained that they try to collaborate as much as possible with different types of stakeholders in the blue economy sector.
- **Research impacts public policies**. While this element is not unique to Bangladesh and has also been noted among Indian and Sri Lankan researchers, the translation of research through the evidence provided allows to be fitted into the policy-making process. This translation is simply a transfer of skills and knowledge from informal to formal. For instance, the BIMRAD carries out multiple researches on the maritime domain and actions on maritime awareness and proposes recommendations within policymakers, or Friendship NGO and is pushing policymakers to be more anchored in the field.
- **Researchers hold official positions**. The majority of the experts we met were scientists specializing in the blue economy or fisheries, who now hold positions in public agencies or chambers of commerce, contributing to the elaboration of public policies or the implementation of actions in this field.[56]

TAKEAWAYS OF THE CHAPTER: This last chapter takes up the very essence of this work, which aimed to build a bridge between the world of research and the operational world. The ability to transfer research into policy decisions underlines the importance of research as a tool of knowledge, but also as a monitoring tool on the capacity of a government to mobilize in a sector.

[56] Mr. Mashiur Rahman, Joint Secretary, Ministry of Fisheries and Livestock, Bangladesh, workshop 1, https://www.youtube.com/watch?v=24dlc-GaHBE&list=PLFY7PFEB2VPwwKH53CIo-kFKyEEb_5hlU&index=9&t=2264s&ab_channel=TheBridgeTank & Dr. Md. Sharif Uddin, Director, Marine Fisheries Office, Department of Fisheries of the Government of the People's Republic of Bangladesh, workshop 1, https://www.youtube.com/watch?v=VLKYNkV53g0&list=PLFY7PFEB2VPwwKH53CIo-kFKyEEb_5hlU&index=9&ab_channel=TheBridgeTank & Mr. Khairul Majid Mahmud, Director, Dhaka Chamber of Commerce & Industry, Bangladesh, workshop 2, https://www.youtube.com/watch?v=Ya3RD9MXFGc&list=PLFY7PFEB2VPwwKH53CIo-kFKyEEb_5hlU&index=1&t=4s&ab_channel=TheBridgeTank

CONCLUSION

Across the workshops, experts from Bangladesh, India, Sri Lanka and France agreed on the fact that ocean ecosystem resources could be treated as a common good. They also pointed to the shared national issues across actors and countries. Fish stock, for instance, is definitely a common resource where lack of coordination across actors within a country or across countries might lead to overexploitation and thus depletion.

Experts from the three countries unearthed these shared concerns and discussed how the countries incorporate the blue economy in their national strategies. They discussed how they assess the physical impacts of climate change on the fishery resource and the evolutions of coastal ecosystems, social communities, and value chains, and how they adapt to these changes.

Coordination has been called for. Especially, the coordination of research, data providing and technical centers, or lack thereof, is an issue that many participants in these workshops have raised, both at the national and regional levels.

This mapping of actors and the current state of know-how in the blue economy in the Bay of Bengal draws a picture of the issues and existing resources – technical, institutional and natural. It may serve as an enabler to frame assistance and support in the projects or policy-making. Investments are indeed needed; concerns need to be highlighted, as the "importance of the blue economy as economic growth prospects beyond 2030 will be limited without a large investment in coastal and ocean environments".[57]

At any rate, the stakes around these issues of common resources and possibly skills and data coordination also open more broadly the question on the issue of governance of the blue economy sector within a community of actors involved, at this stage, in a silo, having, however, the desire to better align themselves to mobilize their effort.

Our own analysis is that all local players have identified shared common natural resources and shared issues that may possibly benefit from being managed as some sort of regional common good.

A common resource with possible multi-level coordination

To serve towards this direction, let us here point out that, in our perspective, **the question may be regarded under one key framework: of a common natural resource that ought to be coordinated in a "club manner" by national actors, or possibly by the regional level. Coordination at regional level may**

[57] Dr. Shailesh Nayak, Director, National Institute of Advanced Studies, Workshop 2

respond to the commons approach: one resource, actors and common rules of use/governance. States may not necessarily intervene in the regional coordination of research actors.

At each national level, the technical skills and policy role of technical centers and Think Tanks are indeed important and coordinative support by national authorities will undoubtedly make its way, provided countries wish to keep some sense of bottom-up-informed governance. In which case, national coordination across different types of actors and uses might be hoped for (national) rivalry on the resource to pacify through common governance. This would allow for more sustainability of the local resources (fish stock, health of ecosystems, coastal ecosystems and socio-economic value chains), which **might become managed like a club good, in the sense that data, technical know-how, and skills over the resource could be shared nationally and partially shared regionally**.

Indeed, should coordination mostly remain at the national level, it is expected that, at least in some shared waters, there would still be competition around the resource. **The resource would ideally benefit from being managed and regulated as a regional common good.**

In this framework, research centers, Think Tanks, agencies, and organizations that constitute the data ecosystem, and would retain a national dimension, might however **aspire to communalizing information sharing or even some processes, in a way that might be partly contributing the global common good of Ocean science.**

APPENDIX

ABBREVIATIONS

AFD: Agence Française de Développement

BIMRAD: Bangladesh Institute of Maritime Research & Development

BOBP-IGO: Bay of Bengal Inter-Governmental Organization

BRT: Blue Resources Trust

CLS: Collecte Localisation Satellites

FICCI: Federation of Indian Chambers of Commerce & Industry

GDP: Growth Domestic Product

ICC: Indian Chamber of Commerce

INCOIS: Indian National Center for Ocean Information Services

IODE: International Oceanographic Data and Information Exchange

IOR: Indian Ocean Region

IOTC: Indian Tuna Commission

MECS: Marine Environment Conservation Society of Sri Lanka

MEPA: Marine Environment Protection Authority

MPEDA: Marine Products Export Development Authority

MRC: Maritime Research Center

NGO: Non-governmental organization

NIAS: National Institute of Advanced Studies

OECD: Organization for Economic Cooperation and Development

UNEP: United Nations Development Programme

UNEPFI: United Nations Environment Programme Finance Initiative

UNFCCC: United Nations Framework Convention on Climate Change

USAID: United States Agency for International Development

VMS: Vessel Monitoring System

PROCESS AND PROGRESS OVER THE WORKSHOPS

Workshop 1: Which blue economy priorities for the Bay of Bengal?

This first workshop, organized on November 26 2021, was organized in a conference mode with presentations by the speakers to constitute the first basis for dialogue and knowledge of the issues and actors. It aimed at assessing the blue economy priorities for various actors and nations in the Bay of Bengal, bringing shared understandings and diagnostics, and identifying opportunities and needs in socio-economic projects. It aimed at identifying the regional context and issues related to the blue economy, in particular the improvement of living standards of coastal communities and resource users through sustainable management of fisheries and integrated coastal management to adapt to climate change, through two panels:

- Panel 1 – **resilient coastal ecosystems as a crucial prerequisite for sustainable economic value chains:** providing a vision of the economic stakes of the value chain of marine activities in the Bay of Bengal;
- Panel 2 – **sustainable fisheries and enhanced livelihood – interlinking of fisheries, food security, job access and climate change adaptation in the region**: an introduction to the most pressing social needs and challenges of public policies for the Blue Economy in the Bay of Bengal**.**

Workshop 2: Blue economy in the Bay of Bengal: cracking implementation bottleneck

The second workshop, organized on January 21 2022, was organized in two parts: a continuation of the presentations of the speakers who could not participate in the first workshop and a round table to start the conversations in the presence of AFD country directors. It aimed at a discussion between experts, policymakers and economic actors in order to identify gaps and challenges that hamper an efficient implementation of the blue economy value chains in the Bay of Bengal region (data collection and analysis, logistics, financial resources). Two panels were organized:

- Panel 1 – **Data collection for improved monitoring of the blue economy's assets**: recognizing that rigorous data collection and precise inventory of the fishery stocks are key to drive public policies for the blue economy.
- Panel 2 – **National framework for improved coordination between public, private entities, researchers and implementers**. Transversal and transparent coordination is needed to encourage public policy actions, and boost public and private investment for the blue economy

mainstreaming, such as infrastructures related to fisheries activities, access to market, legal framework, and social services for people.

Workshop 3: Towards a regional blue economy: which contribution of the French know-how?

The third and final workshop, organized on March 16, 2022, aimed at the identification of political ambitions in the sector and willingness and/or possibility of regional cooperation with the contribution of the French know-how in the maritime field. It intended to open up the conversation to design solutions which the French side could contribute in response to the challenges identified during the first two workshops in collaboration with key players in the Bay of Bengal region. This workshop was organized in three panels:

- Panel 1 - **Institutional cooperation and ambitions at regional level with the support of French know-how;**
- Panel 2 - **Developing nationally and regionally viable projects to enhance the value chains of blue economy;**
- Panel 3 - **Enhancing shared resources through a regional network**.

Throughout this study, the following material got assembled:

- An **inception report**: upstream literature review based on institutional and scientific documents in order to address comprehension of the blue economy and regional issues, before identifying local contacts that could be mobilized in the different workshops.
- **Workshop reports:** synthesis of the debates into two different documents (an extensive summary and an executive summary).
- An **issue brief:** consensus-based information presented and discussed during the three workshops as a basis for the identification of concrete solutions.
- This **final report:** extensively report the know-how, the ideas developed and the solutions identified over the course of the work.

AGENDA WORKSHOP 1

Date: November 26, 2021 – 8:30-11:30 am GMT / 9:30-12:30 Paris Time / 2:00-5:00 PM IST & Sri Lanka Time / 2:30-5:30 PM Bangladesh Time

Objectives: This first workshop will aim at earmarking, new blue economy priorities for various actors and nations in the Bay of Bengal, bringing shared understandings and diagnostics, identifying opportunities and needs in the socio-economic projects.

It aims to identify the regional context and issues related to the blue economy, in particular the improvement of living standards of coastal communities and resource users through sustainable management of fisheries and integrated coastal management to adapt to climate change, through two panels:

1. Panel 1: a global vision of the **economic stakes** of the whole value chain of marine activities in the Bay of Bengal
    - **Resilient coastal ecosystems as a crucial prerequisite for sustainable economic value chains**
2. Panel 2: an introduction to the most pressing **social needs and challenges** of public policies for the Blue Economy in the Bay of Bengal related to food security, job security and adaptation to climate change in fisheries activities.
    - **Sustainable fisheries and enhanced livelihood – interlinking of fisheries, food security, job access and climate change adaptation in the region**

Panel 1: Resilient coastal ecosystems as a crucial prerequisite for sustainable economic value chains?

Date: November 26, 2021 – 8:30-10:00 am GMT / 9:30-11:00 Paris Time / 2:00-3:30 PM IST & Sri Lanka Time / 2:30-4:00 PM Bangladesh Time

Context & objectives of the panel:

Bangladesh, India and Sri Lanka, rely heavily on coastal and marine resources. Their degradation will most likely have a profound impact on people's quality of life and on economic growth.

The first panel aims to shed light on operational projects focusing on marine and coastal ecosystems' conservation through **economic valuation**. This will help identify threats arising from non-sustainable blue economy vs opportunities in a sustainable one. Three main challenges may notably be discussed:

- **conservation of marine ecosystem facing increasing pressure** (critical marine habitats & biodiversity; overexploitation of resources; illegal/unreported/unregulated -IUU- fishing),
- **risk disaster management in climate-vulnerable conditions** (environmental degradation, pollution/water quality, early warning, disaster response and recovery, cost-efficient approach of coastal resources and infrastructures)
- and **marine activities** (tourism & fisheries) **in a context of growing fishery stocks demand**.

List of speakers:

- Dr Arnab Das, Maritime Research Centre, India
- Dr Srinivasa Kumar, Director, Indian Center for Ocean Information Services (INCOIS), India,

- Ms Hasamini Sweenie Thilakarathne, Project coordinator and international affairs, Marine Environment Conservation Society of Sri Lanka (MECS), Sri Lanka
- Dr Chime Youdon & Dr Saurabh Thakur, Associates Fellow, National Maritime Foundation, India
- Mr Mashiur Rahaman, Joint Secretary, Ministry of Fisheries and Livestock, Bangladesh,

Panel 2: Inter-linkages in Sustainable fisheries and enhanced livelihood: actions on fisheries for food security, job access and climate change adaptation in the region

Date: November 26th, 2021 – 10:00-11:30 am GMT / 11:00-12:30 Paris Time / 3:30-5:00 PM IST & Sri Lanka Time / 4:00-5:30 PM Bangladesh Time

Context & objectives of the panel:

In the Bay of Bengal, fishing is one of the main economic resources, with a threefold **social challenges:**

- **food security** (fish is the main protein source in the Bay of Bengal, with more than 50% of people's daily diet),
- **job access** (it is estimated that 70% of people are involved in subsistence fisheries; the COVID-19 pandemic and lockdown have shaken the fishery activities)
- and **climate change adaptation** (the increase in extreme weather events, such as flash floods, heavy rains, tsunami etc. impact fishery activities). Throughout these three challenges, discussions focus on small-scale fisheries' projects in each country and projects related to inland and marine fisheries and aquaculture.

List of speakers:

- Mrs. Afifat Khanam Ritika, Research Officer Institute of Maritime Research and Development
- Runa Khan, Founder & Executive Director of the Friendship NGO,
- Md. Abdul Wahab, WorldFish, EcoFish Team Leader, Bangladesh wing
- Dr. Fairoz, Dean of the Fisheries and Marine Science Faculty, Ocean University of Sri Lanka,
- Mr. Kh. Mahbubul Haque, Additional Director General, Department of Fisheries & Dr. Md. Sharif Uddin, Director (Marine), Marine Fisheries Office, Government of the People's Republic of Bangladesh, Department of Fisheries,

AGENDA WORKSHOP 2

Objectives: Discussions between experts, policymakers and economic actors aim at identifying gaps and challenges that impede a concrete and efficient implementation of the blue economy value chains in the Bay of Bengal region. By linking research and operational approaches, this workshop conducts a collective inventory of data gathering and treatment systems, logistic and financial resources and gaps for sustainable blue economy activities (value chains and social and natural resilience) implementation and acceleration.

Date: January 21, 2022

Panel 1 (1.5 hours) - interactive workshop (discussion open to speakers from workshop 1), open to public audience; 8:30-10:00 am GMT / 9:30-11:00 Paris Time / 2:00-3:30 PM IST & Sri Lanka Time / 2:30-4:00 PM Bangladesh Time

Panel 2 (1.5 hours) – close door roundtable public & private actors; experts from workshop 1 and panel 1 as guests; 10:00-11:30 am GMT / 11:00-12:30 Paris Time / 3:30-5:00 PM IST & Sri Lanka Time / 4:00-5:30 PM Bangladesh Time

Panel 1: Data collection for improved monitoring of the blue economy's assets

Rigorous data collection and precise inventory of the fishery stocks are key to drive public policies for the blue economy. Allowing better monitoring, reporting and making inventory, such as scientific and technological advancements have the potential to better harness resources' abuse, while ensuring an equal and sustainable use of ocean and coastal resources.

Speakers:

- Dr. Shailesh Nayak, National Institute of Advanced Studies (NIAS), India
- Mrs. Akshita Sharma, Biodiversity Portfolio Manager, AFD Delhi
- Mr. Nishan Perera, Blue Resources Trust, Sri Lanka
- Mr. Abu Saleh Khan, Executive Director, Institute of Water Modelling – Bangladesh

Discussion participants:

- Dr. (Mrs.) Hélène Djoufelkit, Research Director of the AFD
- Dr. Arnab Das, Director, Maritime Research Center, India
- Mr. Md. Adbul Wahab, EcoFish Team Leader, World Fish Bangladesh Wing
- Dr. (Mrs.) Chime Youdon, Associate Fellows, National Maritime Foundation, India
- Dr. Saurabh Thakur, Associate Fellows, National Maritime Foundation, India

Panel 2: National framework for improved coordination between public, private entities, researchers and implementers

In the Bay of Bengal countries, lack of coordination between public, private entities, researchers and implementers result in difficulty to drive strong, resilient and sustainable blue economy activities. Transversal and transparent coordination is needed to encourage public policy actions, and boost public and private investment for the blue economy mainstreaming, such as infrastructure related to fisheries activities, access to market, legal framework, and social services for people.

- **Short presentation of take-aways from experts' workshops and objectives by Joël Ruet, President of The Bridge Tank & Jacky Amprou, Regional Director for South-Asia, AFD**
- **Round table – 5 minutes pitch of projects, initiatives or solutions from each speaker**
- **Open discussion across panelists**

Speakers and guests:

- Mr. Shri Aditya Dash, Vice Chairman, Marine Products Export Development Authority (MPEDA) - India
- Mrs. Dharshani Lahandapura, Chairperson, The Marine Environment Protection Authority (MEPA) – Sri Lanka
- Mr. Khairul Majid Mahmud, Director, Dhaka Chamber of Commerce & Industry – Bangladesh
- Mrs. Panchali Ellepola, Project Officer, AFD Sri Lanka
- Mr. Ameya Prabhu, Vice-President, Indian Chamber of Commerce – India

- Mrs. Soma Mitra-Muckerjee, Director – Head of Projects, The Bengal Chamber of Commerce and Industry – India
- Mr. Pattabhi Rama Rao, Group Director, Ocean Observations, Modelling and Data Assimilation Group, Indian National Center for Ocean Information Services (INCOIS)
- Mr. Reda Souirgi, Country Director Sri Lanka, AFD

With the participation of the panelists from the panel 1.

AGENDA WORKSHOP 3

Objectives: Identification of political ambitions in the sector and willingness/possibility of regional cooperation with the contribution of the French know-how in the maritime field. This third workshop aims to open up the conversation to design solutions which the French side could contribute in response to the challenges identified during the first two workshops in collaboration with key players in the Bay of Bengal region.

Introductory session - Dr. Joël Ruet, President, The Bridge Tank, Dr. (Mrs) Hélène Djoufelkit, Research Director of the AFD and Mr. Jacky Amprou, Regional Director for South Asia, AFD

Date: March 16, 2022

Session 1 – Institutional cooperation and ambitions at regional level with the support of French know-how (1 hour 15 minutes)

8:30-9:45 am GMT / 9:30-10:45 Paris Time / 2:00-3:15 PM IST & Sri Lanka Time / 2:30-3:45 PM Bangladesh Time

Moderator: Dr. Joël Ruet, President, The Bridge Tank

- Dr. (Mrs) Hélène Djoufelkit, Research Director of the AFD
- Mrs. Runa Khan, Founder & Executive Director of the Friendship NGO
- Mr. Daniel Fernando, Chairperson, Blue Resources Trust, Sri Lanka
- Dr. Arnab Das, Executive Director & Founder, Maritime Research Centre, India
- Mr. Matthieu Piron, Policy officer for international affairs, Directorate for Sea Fisheries and Aquaculture, Ministry for the Sea
- Mr. Benoît Gauthier, Head of the Regional Economic Service, Embassy of France in India
- Vice Admiral Pradeep Chauhan, Director-General, National Maritime Foundation, India
- Dr. P. Krishnan, Director, Bay of Bengal Inter-Governmental Organization (BOBP-IGO), regional
- *Open to all speakers*

Session 2 – Developing nationally and regionally viable projects to enhance the value chains of blue economy (1 hour 15 minutes)

9:45-11:00 am GMT / 10:45-12:00 Paris Time / 3:15-4:30 PM IST & Sri Lanka Time / 3:45-5:00 PM Bangladesh Time

Moderator: Dr. Joël Ruet, President, The Bridge Tank

- Mr. Manish Singhal, Deputy Secretary General, Federation of Indian Chambers of Commerce & Industry (FICCI), India
- Mr. Martin Lemenager, Senior Program Manager for Infrastructure, AFD Office in Indonesia
- Mr. Loïc Monod, Bioeconomy research officer, France AgriMer
- Mr. Nicolas Vuillaume, Indian Ocean Representative, Collecte Localisation Satellites (CLS)
- Dr. Mostafa A. R. Hossain, Professor, Aquatic Biodiversity & Climate Change, Department of Fish. Biology & Genetics, Bangladesh Agricultural University, consultant with AFD Bangladesh
- Dr. Arnab Das, Executive Director & Founder, Maritime Research Centre, India
- Mr. Aruna Maheepala, Senior Research Officer of National Aquatic Resources Research and Development Agency of Sri Lanka
- Mr. Shri Aditya Dash, Vice Chairman, Marine Products Export Development Authority (MPEDA), India
- Mr. Bruno Bosle, Country director of the AFD Office in India
- Mr. Reda Souirgi, AFD Sri Lanka, represented by Mrs. Panchali Ellepola, Project Officer
- Mr. Benoît Chassatte, Country director of the AFD Office in Bangladesh
- *Discussion opens to all speakers*

Session 3 – Enhancing shared resources through a regional network (30 minutes) & general conclusion

11:00-11:30 am GMT / 12:00-12:30 Paris Time / 4:30-5:00 PM IST & Sri Lanka Time / 5:00-5:30 PM Bangladesh Time

Moderator: Dr. Joël Ruet, President, The Bridge Tank

- Mrs. Afifat Khanam Ritika, Research Officer Bangladesh Institute of Maritime Research and Development
- Mr. Pattabhi Rama Rao, Group Director, Ocean Observations, Modelling and Data Assimilation Group, Indian National Center for Ocean Information Services (INCOIS)
- Dr. (Mrs) Hélène Djoufelkit, Research Director of the AFD
- Dr. Joël Ruet, President, The Bridge Tank
- Mr. Jacky Amprou, Regional Director for South-Asia, AFD

PARTICIPANT'S LIST – WORKSHOPS ON BLUE ECONOMY IN THE BAY OF BENGAL

Title	Name	First Name	Position	Company	Country	Email	Other
Mr.	Amprou	Jacky	Regional Director for South Asia	AFD office	Regional	CONFIDENTIAL	
Mrs.	Biswal	Tinku	Secretary	Indian Administrative Service	India		
Mr.	Bosle	Bruno	Country Director	AFD office	India		
Mr.	Chassatte	Benoît	Country Director	AFD office	Bangladesh		
Vice Admiral	Chauhan	Pradeep	Director-General	National Maritime Foundation	India		
Dr.	Das	Arnab	Founder & Executive Director	Maritime Research Center	India		
Mr.	Dash	Sri Aditya	Vice Chairman	Marine Products Export Development Authority	India		
Dr. (Mrs)	Djoufelkit	Hélène	Research Director	AFD	France		
Mrs.	Ellepola	Panchali	Project Officer	AFD office	Sri Lanka		
Dr.	Fairoz	MFM	Dean	Ocean University of Sri Lanka, Faculty of Fisheries and Marine Science	Sri Lanka		
Mr.	Fernando	Daniel	Chairperson	Blue Resources	Sri Lanka		
Mr.	Gauthier	Benoît	Head of the Regional Economic Service	Embassy of France	India		
Mr.	Haque	Kh. Mahbubul	Additional Director General	Department of Fisheries, Marine Fisheries Office, Government of the People's Republic of Bangladesh, Department of Fisheries	Bangladesh		
Dr.	Hossain	Mostafa A.R.	Professor & consultant	Aquatic Biodiversity & Climate Change, Department of Fish. Biology & Genetics, Bangladesh Agricultural University	Bangladesh		
Mr.	Khan	Abu Saleh	Executive Director	Institute of Water Modelling	Bangladesh		
Mrs.	Khan	Runa	Founder & Executive Director	Friendship NGO	Bangladesh		
Dr.	Krishnan	P.	Director	Bay of Bengal Inter-Governmental Organization	Regional		
Dr.	Kumar	Srinivas	Director	Indian National Center for Ocean Information Services	India		
Mrs.	Lahandapura	Dharshani	Chairperson	Marine Environment Protection Authority	Sri Lanka		
Mr.	Lemenager	Martin	Senior Program for Infrastructure	AFD office	Indonesia		
Mr.	Maheepala	Aruna	Senior Research Officer	National Aquatic Resources Research and Development	Sri Lanka		
Mr.	Mahmud	Khairul Majid	Director	Dhaka Chamber of Commerce & Industry	Bangladesh		
Mrs.	Mitra-Muckerjee	Soma	Director and Head of Projects	Bengal Chamber of Commerce and Industry	India		
Mr.	Monod	Loïc	Research Officer	France AgriMer	France		
Dr.	Nayak	Shailesh	Director	National Institute of Advanced Studies	India		
Mr.	Perera	Nishan	Co-founder	Blue Resources Trust	Sri Lanka		
Mrs.	Pochet	Cécile	Officer	AFD office	Regional		
Mr.	Prabhu	Ameya	Vice-President	Indian Chamber of Commerce	India		
Mr.	Prion	Matthieu	Policy officer for international affairs	Directorate for Sea Fisheries and Aquaculture, Ministry for the Sea	France		
Mr.	Rahaman	Mashiur	Joint Secretary	Ministry of Fisheries and Livestock	Bangladesh		

Mr.	Rao	Pattabhi Rama	Group Director	Ocean Observations, Modelling and Data Assimilation Group, Indian National Center for Ocean Information Services	India
Mrs.	Ritika	Afifat Khanam	Research Officer	Bangladesh Institute of Maritime Research and Development	Bangladesh
Mr.	Sahay	Vishvajit	Secretary	Ministry of Earth Sciences	India
Mrs.	Sharma	Akhista	Biodiversity Portfolio Manager	AFD office	India
Mr.	Singhal	Manish	Deputy Secretary General	Federation of Indian Chambers of Commerce & Industry	India
Dr.	Thakur	Saurabh	Associate Fellows	National Maritime Foundation	India
Mr.	Souirgi	Reda	Country Director	AFD office	Sri Lanka
Ms.	Thilakarathne	Hasamini Sweenie	Project coordinator	Marine Environment Conservation Society of Sri Lanka	Sri Lanka
Mr.	Thomson	Jiji	Former Chief Secretary Government of Kerala & Independent Director	Cochin Shipyard Limited	India
Mr.	Uddin	Md. Sharif	Director (Marine)	Marine Fisheries Office, Government of the People's Republic of Bangladesh, Department of Fisheries	Bangladesh
Mr.	Vuillaume	Nicolas	Indian Ocean Representative	Collecte Localisation Satellites (CLS)	France
Dr.	Wahab	Md. Abdul	EcoFish Team Leader	World Fish (Bangladesh wing)	Bangladesh
Dr. (Mrs)	Youdon	Chime	Associate Fellows	National Maritime Foundation	India

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BIBLIOGRAPHY

From Decline to Recovery A Rescue Package for the Global Ocean. (2014). Global Ocean Commission. https://www.iucn.org/sites/dev/files/import/downloads/goc_full_report_1.pdf

Economist Intelligence Unit - World Ocean Summit 2015. (2015). The blue economy Growth, opportunity and a sustainable ocean economy. https://perspectives.eiu.com/sites/default/files/images/Blue%20Economy_briefing%20paper_WOS2015.pdf

WWF. (2015). Reviving the ocean economy. https://wwfintcampaigns.s3.amazonaws.com/ocean/media/RevivingOceanEconomy-REPORT-lowres.pdf

OECD. (2016). Development Co-operation Report 2016: The Sustainable Development Goals as Business Opportunities. https://www.oecd.org/dac/DCR%202016%20Highlights%20booklet%20FINAL.pdf

World Bank. (2016). Equity and Development. https://documents1.worldbank.org/curated/en/435331468127174418/pdf/322040World0Development0Report02006.pdf

What is the Blue Economy? (2017). World Bank. https://www.worldbank.org/en/news/infographic/2017/06/06/blue-economy

Rahman, M. R. (2017). Blue Economy and Maritime Cooperation in the Bay of Bengal : Role of Bangladesh. Procedia Engineering, 194, 356-361. https://doi.org/10.1016/j.proeng.2017.08.157

Damsarie Ranasinghe. (2019). Strategic Importance of Blue Economy to Sri Lanka and Challenges. Institute of National Security Studies Sri Lanka. https://www.academia.edu/36804371/Strategic_Importance_of_Blue_Economy_to_Sri_Lanka

Blue economy: Global Best practices and Opportunities for Indian Industry. (2020). Federation of Indian Chambers of Commerce & Industry (FICCI). https://ficci.in/spdocument/23313/Glimpse-Document-blue-economy.pdf

Alam, M. W., Xiangmin, X., Ahamed, R., Mozumder, M. M. H., & Schneider, P. (2021). Ocean governance in Bangladesh : Necessities to implement structure, policy guidelines, and actions for ocean and coastal management. Regional Studies in Marine Science, 45, 101822. https://doi.org/10.1016/j.rsma.2021.101822

Bennett, N. J., Blythe, J., White, C. S., & Campero, C. (2021). Blue growth and blue justice : Ten risks and solutions for the ocean economy. Marine Policy, 125, 104387. https://doi.org/10.1016/j.marpol.2020.104387

Choudhary, P., G, V. S., Khade, M., Savant, S., Musale, A., G, R. K. K., Chelliah, M. S., & Dasgupta, S. (2021). Empowering blue economy : From underrated ecosystem to sustainable industry. Journal of Environmental Management, 291, 112697. https://doi.org/10.1016/j.jenvman.2021.112697

Hossain, M. S., Sharifuzzaman, S., Nobi, M. N., Chowdhury, M. S. N., Sarker, S., Alamgir, M., Uddin, S. A., Chowdhury, S. R., Rahman, M. M., Rahman, M. S., Sobhan, F., & Chowdhury, S. (2021). Seaweeds farming for sustainable development goals and blue economy in Bangladesh. Marine Policy, 128, 104469. https://doi.org/10.1016/j.marpol.2021.104469

P.K.B.IsuruPremarathna. (2021). Blue Economy Strategically issues andopportunity in Indian Ocean : A study based on Sri Lanka. American Research Journal of Humanities Social Science (ARJHSS)R). https://www.researchgate.net/publication/350006310_Blue_Economy_Strategic_issues_and_opportunity_in_the_Indian_Ocean_A_study_based_on_Sri_Lanka

Ocean Panel. (2021). Ocean Solutions That Benefit People, Nature and the Economy. https://www.oceanpanel.org/ocean-action/files/full-report-ocean-solutions-eng.pdf

Climate change Impacts on Biodiversity and Maritime Security in the Bay of Bengal », webinar, June 25th 2021, AFD, IRIS, DGRIS

Dennis Mombauer, D. (2021, 29 June). Sri Lanka banks on the ocean to chart a green path toward a blue economy. Mongabay Environmental News. https://news.mongabay.com/2021/06/sri-lanka-banks-on-the-ocean-to-chart-a-green-path-toward-a-blue-economy/

Finding Solutions to Fishermen Transgressions in the India-Bangladesh Maritime Space. (2021, september). Observer Research Foundation. https://www.orfonline.org/research/finding-solutions-to-fishermen-transgressions-in-the-india-bangladesh-maritime-space/

Definition « coordination ». (2022, 20 April). Cambridge Dictionary. https://dictionary.cambridge.org/fr/dictionnaire/anglais/coordination