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## Policy Interventions for the Development of the Blue Economy in Bangladesh

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## 1 INTRODUCTION

Between 2012 and 2014, disputes over maritime boundary with Myanmar and India were favourably settled for Bangladesh, resulting in the expansion of its territorial waters of more than 30% and the country received entitlement to 118,813 km<sup>2</sup> in the Bay of Bengal. This achievement offers a wide range of new economic opportunities for jobs & growth around marine and coastal sectors such as marine fisheries, marine aquaculture, tourism, exploitation of natural resources, trade and energy. In that regards, the Government of Bangladesh has initiated, since 2014, discussions with stakeholders in order to adopt the concept of blue economy across relevant policies and plans. By definition, the blue economy fosters the idea of exploiting untapped potential of the marine environment using smart solutions and innovations for increasing food security, improving nutrition and health, alleviating poverty, creating jobs, lifting trade and industrial profiles while protecting ecosystem health and biodiversity, and improving regional security and peace.

The document presents the policy interventions that will contribute to impulse the development of the Blue Economy in Bangladesh. It is conducted through an analysis of the institutional, commercial and environmental context of a set of selected sectors and the identification of the major areas of policy intervention in a near future. In that regards, it complements the document recently released entitled “Inputs for the Blue Economy strategy of Bangladesh” (Failler, Hossain, and Hussain 2018). The identification of the sectors presented here has been done from August 2016 to July 2018 under the context of the EU-BGD Joint Collaboration on Blue Economy and more particularly during the national coordination workshop held in Dhaka on the 30<sup>th</sup> of June 2018 (Failler and Hussain 2018). The analysis reflects therefore the point of view of all key stakeholders including practitioners, entrepreneurs, researchers, academics and representatives of the civil society.

The document is made of 8 sections that present the context and the key policy interventions for the:

- Fishery management
- Marine Aquaculture development
- Commercial Shipping
- Cruise tourism
- Marine Litter Pollution
- Ecosystem Services of Mangroves
- Blue Biotechnologies Research and Development
- Marine Spatial Planning

These interventions have to be made in parallel of the enhancement of the policy coordination and the elaboration of an Ocean or Blue Economy Policy required to fully implement the Blue Economy in Bangladesh.

## **2 MARINE FISHERIES MANAGEMENT**

### **2.1 Context**

In comparison to inland capture and culture fisheries, production of marine capture fisheries is meagre because almost all of Bangladesh's marine fishing is carried out in shallow and shelf waters, beyond which no fishing is being currently practiced due to lack of vessel capacity and appropriate fishing technologies. But under the concept of the blue economy, marine fisheries and aquaculture are extremely promising. Bangladesh marine fishing sector provides a relatively small fraction (16%) of its national fisheries production of 3.78 million MT in 2015-16, it involves over 200 industrial trawlers and more than 67,000 artisanal vessels. To exploit multi species marine fish resources, numerous fishing gears are used in Bangladesh. Artisanal small scale fishery contributes 86.8%; i.e. 0.51 million tonnes of the total marine catch, which includes gill nets, set bag net, seine net, push net, hook and line, trammel net etc. mostly used for fishing within 10 to 30 meter-depth. Large industrial fishery (Trawl fishery) contributes 14.2%; i.e. 0.084 million tonnes of total marine production. Large trawlers are used for mostly penaeid shrimps and fin fish fishing within the depth of 40 – 100 meters. Rehabilitation of hilsa fishery is another important task that requires intervention at the trans -boundary level. At present 50-60% of global hilsa catch takes place in the coastal and marine waters of Bangladesh, 20-25% in Myanmar, 15-20% in India and the remaining 5-10% in other countries. In fact, marine catches are dominated, nearly 50% by one species i.e. hilsa. Fishery production in the country is confined by the traditional techniques that are used. In particularly for marine capture fisheries, Bangladesh must come out of the traditional fishing practices and harness the potentials of moving towards beyond the existing fishing grounds to harvest large pelagic fishes from deeper zones within 200 nm of Exclusive Economy Zone and even up to the high seas. In view of doing this, the first important thing is to conduct a thorough survey to accomplish stock assessment of marine fishes in Bay of Bengal area to explore more new fishing ground(s). In view of expanding capture fisheries production, the country should adopt appropriate deep-sea fishing technologies i.e. long line and hook fishing and the utilization of supporting gears and vessels for harvesting deep-sea species on the profound fishing grounds of the Bay of Bengal and immediate international waters.

The industrial fleet has been growing in recent years in spite of increasing concern about the state of the resources. The target fisheries have shifted from shrimp and demersal fish to small pelagic fish and declining effort on shrimp. The 67,000 artisanal vessels operate from over 300 landing centres were enumerated recently by the Bangladesh Marine Fisheries Capacity Building project (BMFCB). This project has also established a land-based survey programme for catch monitoring for the artisanal sector, collecting data from 32 selected landing sites. The BMFCB project also managed the procurement of a 38 m research vessel in 2016. The FAO project “Technical support for stock assessment of marine fisheries resources in Bangladesh” has been providing assistance in establishing the survey programme for the RV Meen Shandhani through training, equipment and system development. The FAO project is also providing technical assistance for fisheries monitoring, stock assessment and fisheries management planning. Building on both the BMFCB project and the FAO TCP, a World Bank

funded project for Sustainable Coastal and Marine Fisheries in Bangladesh is expected to begin operations in 2018. It is intended to address governance and fisheries management, strengthening of coastal communities and livelihoods including co-management, and improved economic performance. Bangladesh is in the process of establishing fisheries management information systems to provide the scientific basis for stock assessment and management advice. The RV Meen Shandhani will provide survey information for shrimp, demersal fisheries and limited capacity for small pelagic surveys. Improved management information requires survey both species of economic importance as well as by-catch and unexploited species to improve knowledge of biodiversity in the marine realm. This knowledge will help exploring untapped marine fisheries resources for boosting up of blue economy through increased fish catch. Besides, introduction of coastal aquaculture and mariculture will help increase fish production and support livelihood of marine fishers' community. The major challenges towards sustainable marine fisheries resources include proper implementation of regulatory measures against fisheries non-compliances, licensing of huge number of mechanised fishing boats for controlling their effort at sustainable level, efficient monitoring, controlling and surveillance (MCS) of the industrial and artisanal fishing vessels, climate changes implications and poor fishers' livelihood and also engagement of fishers community to manage the natural resources along with Govt. Agencies.

The lack of implementation and enforcement of management measures leads to a situation where many opportunities in marine resources development remain untapped. Presently, in particularly for marine fish stock capture and harvesting a limited number of commercial trawlers (247 trawlers), huge number of motor drive (32,859 boats) and non-motor drive (34,810 boats) artisanal boats are engaged in marine and coastal fishing. In particularly the artisanal fishermen are using different types of net having unregulated mesh size for harvesting marine small and big fish in the shallow coastal areas. After harvest they mostly separate medium and large size fish for selling to the local markets and rest of the harvested stocks consisting of millions of various varieties of tiny marine fish fry and juveniles never release into the sea waters and dump at the boat bottom chambers and baskets as trash fish. In the following morning, most of those boats back to the shore and sell all these as trash fish to local buyers as raw materials for fish and poultry feeds. No regulation and enforcement measures have yet been undertaken on these issues by the respective ministry/departments. As a result, marine fish biodiversity is being declining day by day, which is dangerous for future sustainable management of marine stocks in Bangladesh.

The huge maritime area, shoreline & the coastal waters can be used in a very coordinated way as they can sustainably contribute to the blue economy on improving socio-economic development of the coastal population as well national economy. The sector-wise interventions will definitely generate jobs and bring about tangible changes in the lives & livelihood of the people. In this respect, Govt. departments, research institutions and non-government organizations (NGOs) should come forward to develop the strategies and plans and implement those for enhancing marine fisheries and mariculture production in the country. There is also a lack of stock assessment data and a lack of understanding of deep sea pelagic fisheries that

could significantly increase total fishery production, both in terms of volume and value. Thus, there is significant potential to develop this sector.

## 2.2 Policy Interventions for Marine Fishery Management

Priority	Name	Opportunity description	Constraints	Actions to be taken	Institution in charge	Time scale	Estimated Budget	Partnership to be implemented	Additional comments
1	Initiate and complete appropriate marine stock assessment	Thorough survey to accomplish stock assessment of marine fishes in Bay of Bengal area extremely essential. Appropriate and complete stock assessment, the country needs to hire more advanced and modern survey vessel, so that a detailed picture of marine fish stocks could be explored.	Due to lack of implementation and enforcement of management measures, many opportunities in marine resources development remain untapped. No straight forward planning has yet been made to declare and establish specific Marine Protected Areas (MPA).	Respective ministries, departments and research institutions along with interested private entrepreneurs might sit together for proper formulation of strategies, planning and coordination for effective development and implementation of marine fisheries management	1. Marine Stations of BFRI 2. Marine wing of Department of Fisheries 3. Ministry of Fisheries and Livestock	2019 – 2030 (approx.)	USD 50 million for next 10 years (apprx.)	For capacity building of trained and technical manpower, linkage can be made with European countries, Australia and Japan.	The respective ministries, department and res. Institutions in Bangladesh might initiate urgently marine fishery management aspects.
2	Trash fish minimizing and curtailing	The artisanal fishermen marine fish harvest of undesirable size fish stocks should be regulated by imposing nets having desirable mesh sizes at the shallow coastal waters.	Landing of huge quantity of trash fish become serious threat for marine fish biodiversity and future sustainable management of marine stocks in Bangladesh	Same as above	1. Marine wing of Department of Fisheries 2. Ministry of Fisheries and Livestock	2019 – 2030 (approx.)	USD 20 million for next 10 years (apprx.)	Concerned ministries and department impose regulation and enforcement measures to minimize and curtail trash fish problems	Essential for restoration of marine fish biodiversity to enhance the natural stocks
3	Rehabilitation of hilsa fishery	It is utmost important to rehabilitation of hilsa fishery in the Bay of Bengal and adjacent river systems where hilsa stocks migrate during breeding season.	Not yet attempted seriously	Need to initiate immediately	1. Riverine Station of BFRI 2. Marine wing of Department of Fisheries 3. Ministry of Fisheries and Livestock	2019 – 2030 (approx.)	USD 40 million for next 10 years	Both public and private sector might initiate jointly	Essential for enhancing hilsa production
4	Management of gravid mother tiger shrimp	Management of gravid mother shrimp by developing strategy, regulate and control harvesting enable to have	Not yet attempted seriously	Need to initiate immediately	1. Brackish water Station of BFRI 2. Marine wing of Department of Fisheries	2019 – 2030 (approx.)	USD 30 million for next 10 years	Same as above	Shrimp production will be increased to support export to

Priority	Name	Opportunity description	Constraints	Actions to be taken	Institution in charge	Time scale	Estimated Budget	Partnership to be implemented	Additional comments
		good breeding stock for shrimp hatcheries for quality seed production.			3. Institute of Marine Sciences and Fisheries, CU				international market
6	Exploration of new fishing grounds	In exploring new fishing grounds should enable to identify new marine stocks and assist to diversify new fishing areas to avert risks associated with overfishing of certain fish stocks.	Not yet attempted seriously	Need to initiate immediately	1. Marine Stations of BFRI 2. Marine wing of Department of Fisheries 3. Ministry of Fisheries and Livestock	2019 – 2030 (approx.)	USD 40 million for next 10 years	Mostly Govt. department and ministries to be active	Important for marine fishery resource management

### 3 MARINE AQUACULTURE DEVELOPMENT

#### 3.1 Context

Aquaculture industry backs the country's economy with increasing production capacity and high export opportunities. As already mentioned presently, two types of aquaculture are being practiced by the country such as, freshwater and coastal aquaculture. There is no marine aquaculture currently practiced in the country. Freshwater aquaculture is mainly comprised of ponds and other closed fresh water bodies oriented mostly farming of carps, pangas, live fish (Asian catfishes and perches) and tilapias and coastal aquaculture is mainly comprised of shrimp and prawn farming in the ghers (coastal ponds or enclosures). In Bangladesh, aquaculture production systems are mainly extensive and improved extensive, with some semi-intensive, and intensive systems, in very few cases. Marine aquaculture is demarcated as the establishment of man-made enclosures to raise marine aquatic life, such as shellfish, finfish & sea weeds for the human consumption purposes. There have been limited attempts to promote mariculture in Bangladesh over the last 40 years. Bangladesh is still lagging behind other countries of South East Asia; viz. China, Myanmar, Philippines and Vietnam. But, there are enormous opportunities for marine aquaculture of both brackish (tiger shrimp, *Penaeus monodon*; mud crab, *Scylla serrata* and marine (Sea bass, *Lates calcarifer*, Grey mullet, *Mugil cephalus*, Green back mullet, *Chelon subviridis*, Pomfret, *Pampus argenteus*, Hilsa, *Tenualosa ilisha*, saline tolerant tilapia etc.) fish species aquaculture as well as opportunities exists also for marine aquaculture of non-traditional marine species like seaweed, macro algae, shellfish (ie. mussel, oyster etc.), sea urchin, sea cucumber etc.

In Asia Pacific region, the countries viz. China, Indonesia, Malaysia, Taiwan Province of China, Thailand, Singapore and Vietnam is making headway in finfish mariculture using hatchery produced seeds and formulated feeds. Lessons can be learned from these countries and under the concept of blue economy development of the government. Bangladesh might initiate urgently marine aquaculture farming with the available and identified finfish, shellfish and non-traditional species (mentioned above). Respective ministries, departments and research institutions along with interested private entrepreneurs might sit together for proper formulation of strategies, planning and coordination for effective development and implementation of marine aquaculture farming in the coast, near shore and offshore areas of the country.

### 3.2 Policy Interventions for Marine Aquaculture Development

Priority	Name	Opportunity description	Constraints	Actions to be taken	Institution in charge	Time scale	Estimated Budget	Partnership to be implemented	Additional comments
1	Seabass breeding and farming	Artificial breeding and mass seed production in might enhance mariculture	No seabass hatchery and nursery facilities yet been developed	Lessons to be learned from neighbouring countries	1. Brackishwater and Marine Stations of BFRI 2. Marine wing of Department of Fisheries	2019 – 2030	USD 4.0 million for next 10 years	Through bilateral collaborations with public and private sector institutions	Marine farming in the coast, near shore and offshore areas
2	Hilsa shad offshore cage culture	The hilsa shad ( <i>Tenualosa ilisha</i> ), cage culture promising approach	Natural calamities	Same as above	1. Brackishwater and Marine Stations of BFRI 2. Marine wing of Department of Fisheries 3. Institute of Marine Sciences and Fisheries, CU	2019 – 2030	USD 5.0 million for next 10 years	BFRI, Department of Fisheries, Chittagong Univ. can work together	Offshore cages will be suitable
3	Mullet breeding and culture	Artificial breeding and mass seed production in might enhance mariculture	No mullet hatchery and nursery facilities yet been developed	Same as above	1. Brackishwater and Marine Stations of BFRI 2. Institute of Marine Sciences and Fisheries, CU 3. Technology Discipline, Life Science School, Khulna University	2019 – 2030	USD 4.0 million for next 10 years	BFRI, Department of Fisheries, Chittagong Univ. can work together	Marine farming in the coast, near shore areas
4	Marine shrimp broodstock domestication and SPF seed production and farming	Domestication of tiger shrimp broodstock in the selected shrimp hatcheries and selective breeding techniques can be adopted in Cox's Bazar and other shrimp farming areas including SPF seed production	No attempt has yet been undertaken	Same as above	1. Brackishwater and Marine Stations of BFRI 2. Marine wing of Department of Fisheries	2019 – 2030	USD 4.0 million for next 10 years	BFRI, Department of Fisheries, Chittagong Univ. can work together	Initiative is promising and important
5	Mud crab breeding and soft shell crab farming	Soft shell carb farming has recently attracted attention of entrepreneurs in Shamnagar, Shatkhira, Moheshkkali and Cox's Bazar regions.	Natural seeds being used, no hatcheries yet developed	Same as above	1. Brackishwater and Marine Stations of BFRI 2. Marine wing of Department of Fisheries 3. Institute of Marine Sciences and Fisheries, University of Chittagong	2019 – 2030	USD 4.0 million for next 10 years	BFRI, Department of Fisheries, Chittagong Univ. can work together	Same as above

Priority	Name	Opportunity description	Constraints	Actions to be taken	Institution in charge	Time scale	Estimated Budget	Partnership to be implemented	Additional comments
6	Seaweed mariculture	Good opportunity for seaweed development and culture in the coastal areas of Bangladesh. Seaweed has classic	No scientific attempt has yet been undertaken	Same as above	1. Brackishwater and Marine Stations of BFRI 2. Marine wing of Department of Fisheries 3. Institute of Marine Sciences and Fisheries, University of Chittagong	2019 – 2030	USD 4.0 million for next 10 years	For seaweed culture, research institutions of South Korea and Japan need to be contacted.	Seaweed could be used as human food unlike Japan and Korea



## 4 COMMERCIAL SHIPPING

### 4.1 Context

Shipping is by far a cheapest, most cost effective and efficient mode of transportation system. Over 90% by volume of world trade is transported through seaborne transportation. Shipping industry thus directly contributes to the growth of world GDP. Besides the industry creates employment generations both shore and on board and also directly contribute to the national economy towards the socio-economic developments. Shipping in Bangladesh has been practicing over few decades and Bangladesh being a developing country there has been a continuous development in the trade growth especially in the RMG sectors. A 77B \$ worth of trade has been registered in 2016-17 where 43B \$ of Import & 34B \$ of Export. Of this total volume of trade over 98% is seaborne which is handled by 3 major sea port in Bangladesh. However, Chittagong port takes the major market share compared to Mongla and newly incepted Pyra port. Needless to mention with the growing demand both Chittagong and Mongla port is limited with channel draft where most of the handy size bulk with over 9M draft is handled at around outer and Kutubdia anchorage. On the other hand, due to economies of scale and merging mega liners the trending sizes of ships are getting bigger and bigger where the port capacities are not capable to accommodate such bigger vessels.

The projected shipping growth in Bangladesh suggest that by 2043 Bangladesh will handle more than 124 Mil tonnes of cargo of which 14Mil Tues and by 2019 Chittagong port will reach 2.79Mil Tues club (a strategic study by ADB in 2015). In this circumstances the expansion of port facilities and to increase the number of national fleets is time demanding. Considering the facts Chittagong port alone has taken various mega initiatives along the coast to expand the port area in different strategic locations with sector wise SEZ like Oil & Gas, Bay terminal, Coal based mega port, Patenga container terminal, Laldia container terminal etc.

On the other hand, Chittagong port can play a pivotal role for the transit of the landlocked provinces of the neighbouring countries. Nevertheless. there are various other challenges need to be addressed through developments of Road, Rail and Riverine connectivity to get the maximum benefits of the ocean use through commercial shipping. Through the workshop a number of comprehensive other recommendations were drawn to facilitate the formulations of integrated Ocean Policy.

## 4.2 Policy Interventions for Commercial Shipping Development

Priority	Name	Opportunity description	Constraints	Actions to be taken	Institution in charge	Time scale	Estimated Budget	Partnership to be implemented	Additional comments
1	Integrated shipping policy	Bangladesh yet does not have an Ocean policy: which is need of the time	Not much emphasis were given in the time but however to get the maximum benefits of the ocean resources a comprehensive ocean policy is a top priority	Formulation of a pragmatic ocean policy	An exclusive government agency under direct supervision of PMO	Immediate	Government of Bangladesh/Donor	Ngo's/donor agencies	Executing agency could be different
2	Expansion of port facility	Expanding trade growth suggest that a numerous steps need to be taken to accommodate trending business	Not only the government steps but private entrepreneur need to be encouraged	Offer private participation	Relevant government agency	Short, medium and long term	Both Government of Bangladesh and private investors	PPP deals	Govt. Monitoring cell with target goals
3	Expansion of national/ flag vessel	Trade volume suggest that a good amount of cargo may have been lifted through national/flag vessel. Foreign reserve could be saved	Due to multiple tax regime local ship owners are discouraged to invest for new fleets	Introduction of tax holiday/ incentives	NBR and relevant government agencies	Immediate	For national shipping (Government of Bangladesh) and for private bank loans	To some extent national shipping may include private participation in operation and management	Single digit loans with reasonable timeframe may be given for investors
4	Infrastructure Developments	Expansion maritime clusters with logistics support may grab the opportunity for trade growth	Efficient handling of ports result in deficiencies in turnaround time	Adequate logistics need to be procured with development of skill manpower	Relevant ministry/govt. Agencies/Ports	Short/medium /long term planning	Both Government of Bangladesh and Private	Participation of private entrepreneurship	Investment//financing through banking channels
5	HRD	Utilization of skill/semi skill manpower through employment generations	No such research and development done in the past	Adequate manpower development through education and research	Relevant ministries/maritime training institutes	Utilization of exiting maritime training facilities in the field of Research and developments	Government of Bangladesh /Donor agencies	Research fund through donor agencies	Re-naming with designated training of the existing facilities

Priority	Name	Opportunity description	Constraints	Actions to be taken	Institution in charge	Time scale	Estimated Budget	Partnership to be implemented	Additional comments
6	Sub Regional Hub	Bangladesh ports can be utilized as sub regional hubs for the neighbouring land locked countries/provinces	Expansion of transit trade between Bangladesh and India	Adequate coastal trade fleets need to be deployed	Relevant ministries	Expansion of bi lateral agreements between the countries	Government of Bangladesh /Private entrepreneurship	National coastal fleets/cabotage trade	MOU between the countries for mutual trade benefits
7	Road/Rail/River Bottlenecks	Existing linkage insufficient to accommodate the trade prospects	Designated highways/railway linkage and riverine passage need to be expanded through infrastructure development plans	Port congestions	Relevant ministries	Short/Medium /long term planning	Government of Bangladesh /DONOR/Private participation	PPP may be encouraged	More ICT/Off Docks/SEZ need to be introduce to reduce the port congestions
8	Good governance & Co ordinations between the agencies/major stake holders	Good governance and monitoring will enhance the image of the country in the shipping industry	Lack of coordination between the stake holders	Time Delay	Relevant government agencies	Pragmatic shipping policy	Government of Bangladesh	A maritime ONE Stop Service may be introduced	Strengthening shipping ministry and DOS with adequate manpower of relevant knowledge

## **5 CRUISE TOURISM OPPORTUNITIES**

### **5.1 Context**

Global cruise tourism started as a destination for elite, exotic, even opulent adventurers. It maintains an image of grandness of pleasure and place. It has become a favorite destination for millions of travelers. It has become one of the fastest growing destinations of global travel and tourism. It is making it possible for travelers to have all of their wishes fulfilled. It offers more choices for travelers at once than most likely any other destination. It is a destination that is making special efforts to take the hassle out of international travel experiences. For over 20 million travelers in 2014, it was the perfect travel destination. Yes, it is not actually a destination at all. Not in the classical `place on a map` sense. Instead it is a place that moves from place to place, taking with it travellers making it a second home, for a short while. And it is set to be charting the way for tourism, for the next decade. Taking the advantage of strong tailwinds, today, global cruise travel represents one of the fastest growing sub- segments within the greater travel and tourism industry. Cruise Lines International Association (CLIA), which represents over sixty member lines, has 2014 projections reaching an estimated 21.7 million guests worldwide across its membership base. Continued growth of the segment has made it necessary to bring an additional 24 new ships onto the seas in the 2014-2015 period, which equates to an estimated US\$8 billion ocean and river cruise categories. The leading cruise destination in terms of deployments remains the Caribbean, accounting for 37.3 per cent of all global itineraries followed by the Mediterranean (18.9 per cent), Northern Europe (11.1per cent), Australia/New Zealand (5.9 per cent), Alaska (4.5 per cent), Asia (4.4 per cent) and South America 3.3 per cent). In 2014, markets experiencing increased ship deployments include the Caribbean (+12 per cent) Northern Europe (+5.2 per cent), Asia (+31.6 per cent) and Australasia at +22 per cent.”

Cruise tourism acts as another valuable proposition bringing the people of the world closer together through connection of wishes and waterways. Bangladesh is the only country in the region, which this far remained out of cruise map. So, impending cruise seems to be very important for the future of cruise tourism in Bangladesh. If Bangladesh can extend quality and efficient immigration, Customs and other services, to the tourist onboard, that will be good for the expansion of the industry. Efficient handling of the whole operating will encourage Cruise Lines to expand its operating to include Bangladesh in their itinerary. As per the regional Cruise ship scenario, there are approximately 45 cruise ships (different sizes and capacity) that are scheduled to come through the west coast of India (October to April). The main ports in India that they visit are Mumbai, Goa and Cochin. There are just a couple of cruise ships doing the east coast. Unfortunately, the bigger ships do Srilanka and proceed directly to Yangon. American based Silver Sea cruise will operate 3 sailings in 2019 to Bangladesh- One in January and another 02 in February: covering Sunderbans, Maheshkali and St. Martin Island.

Cruise Tourism can play an important role in boosting tourism sector that can directly impact of a country`s blue economic development. Bangladesh poised to enter global ocean cruise map, ushers in new era in tourism industry. Cruise tourism acts as another valuable travel

proposition bringing the people of the world closer together through connection of wishes and waterways. Bangladesh was the only country of the region- which this far remained out of cruise map. Luxury expedition cruise specialist Silversea made history with the first-ever cruise ship call to Bangladesh territory on 22 February 2017- when Silver Discoverer visited Maheshkhali island and largest mangrove forest Sundarbans. If we consider the economic benefit, we found that, approx. BDT 65 lacs (\$81,000) foreign exchange earned through this operation. They are: On arrival visa fees: BDT 5.25 lacs (\$6,500), Logistics: BDT 20 lacs

\$25,000), Sundarban forest permission & fees: BDT 15 lacs (\$18,750), Expenses at Maheshkhali island: BDT 10 lacs (\$12,500) (120 Tuk-Tuk hire, 24 Speed Boat, 200 Green coconuts, 200 chips etc.) There are some community benefits through this operation as well. They buy Local Handicraft: BDT 5 lac (\$6,250- in 4 hrs), Primary School donation: BDT 3 lac (\$3,750). The donation includes: Sports items like Cricket bat, pad, ball, wicket, Badminton, etc.

But for the smooth operations, we need one stop service provider. At our visa policy Sea port should be included with the Airport and Land port. The authority should ensure on arrival visa at Cruise ship, ensure on board immigration at Cruise ship, ensure on board Customs formalities at Cruise ship, enhance port facilities for jetties, fenders, berthing and special take care of International Cruise ship. A monitoring cell should be introduced. We suggest, Bangladesh Tourism Board should be the focal point. Security is the most concern for foreign tourists. So, Home Ministry should be more co-operative and active. Tourist Police & District Police should work jointly. Other security agencies co-ordinate each other. But most importantly, Foreign Ministry should take the lead for the promotion and marketing and positioning Bangladesh as an International cruise destination.

If Bangladesh can extend quality and efficient Immigration, customs and other services to the tourists on board, that will be good for the expansion of existing tourism industry of Bangladesh and enhance the Cruise tourism opportunities in the country.

## 5.2 Policy Interventions for Cruise Tourism

Priority	Name	Opportunity description	Constraints	Actions to be taken	Institution in charge	Time scale	Estimated Budget	Partnership to be implemented	Additional comments
Very high and promising	Immigration and Customs. Visa policy should be amended including Seaport along with Airport and Land port.	Economic benefit and community benefit and involvement is essential.	Lack of co-ordination among ministries / Departments. One stop service provider needed and that Should be Bangladesh Tourism Board.	Visa policy needed to be amended. Sea port should be included.	Home Ministry Shipping ministry Forest ministry Customs Dept.	3 months	-	Ministry of Tourism and Tour Operators	Government should come forward and enhance the all possible support to implement the policy and facilities.

## **6 MARINE LITTER IN THE BAY OF BENGAL**

### **6.1 Context**

Plastic in the Bay of Bengal is known to have serious negative impacts on marine resources and fisheries, as well as on the use of coastal areas for tourism. It is of the utmost importance to minimize these impacts. Lack of co-ordination among ministries/division and NGOs and private sectors, absence of a dedicated agency to exploit the opportunity of Blue Economy and having no system in place to make consumers and industries responsible for the final deposition of plastic are identified as major constraints of reducing plastics and fisheries waste from the bay. Government/authorities can put taxes on single-use plastic items. Financial incentives to buy more environmentally friendly fishing and/or some kind of deposit-refund system can be very effective to tackle waste from plastics. Reducing future dumping of plastic into the bay can be achieved by raising awareness amongst the fishermen and coastal communities.

Microplastics/Microbeads are not picked up by sewage treatment plants and thus there is no system in place to avoid those ending up in the oceans. Micro-beads in consumer goods are often unnecessary as well as the fact that natural substitutes do already exist so the phasing out should not be complicated. Consumerism, lack of consumer awareness, not paying for the environmental cost of products containing microplastics by the consumers are identified as major constraints of reducing microplastic pollution from the bay. Government/authorities can ban microplastics in consumer goods, raising awareness amongst the consumers and educate people can be the key to reduce microplastics pollution from the bay.

## 6.2 Policy Interventions for Marine Litter Pollution

Priority	Name	Opportunity description	Constraints	Actions to be taken	Institution in charge	Time scale	Estimated Budget	Partnership to be implemented	Additional comments
Very high	Reducing plastic and fisheries waste	Plastic in the Bay of Bengal is known to have serious negative impacts on marine resources and fisheries, as well as on the use of coastal areas for tourism. It is of the utmost importance to minimize these impacts.	Lack of co-ordination among ministries/division and NGOs and private sectors, absence of a dedicated agency to exploit the opportunity of Blue Economy and there is no system in place to make consumers and industries responsible for the final deposition of plastic.	Put taxes on single-use plastic items  Financial incentives to buy more environmentally friendly fishing and/or some kind of deposit-refund system to tackle waste from plastics.	Government  Government/authority	2019-2025	200 million USD	Ministry and Environment, NGO and large international organisations	Environmental and social costs need to be included in pricing  Most likely an effective way to get back part of the plastic waste otherwise ending up in the marine environment
Very high	Reducing microplastics from consumer goods	Microbeads/microplastics are not picked up by sewage treatment plants and thus there is no system in place to avoid those ending up in the oceans. Microbeads in consumer goods are often unnecessary as well as the fact that natural substitutes do already exist so the phasing out should not be complicated.	<ul style="list-style-type: none"> <li>▪ Consumerism.</li> <li>▪ Lack of consumer awareness.</li> <li>▪ Consumer's don't pay for the environmental cost of products containing microplastics</li> </ul>	Ban microplastics in consumer goods  Educate and aware people	Government/authority  Government, NGO's, industries	2019-2030	40 million USD	Authorities. Industries and consumers	Education and awareness is the base for action

## 7 ECOSYSTEM SERVICES OF MANGROVES FOR RESILIENT LIVELIHOODS

### 7.1 Context

Being the world's largest dynamic delta Bangladesh's topography is extremely flat and most of the country lies below 10 m sea level. The delta has experienced two dramatic land use change in the recent past including the construction of polders in the 60-70s and the advent of export-oriented shrimp farming in the 80s.

Polders were built to protect coastal area against tidal floods and salinity intrusion to boost rice yield and also to protect coastal land from periodic cyclones that affected the lives and livelihoods of the coastal community. Apart from boosting rice production, polders protected the coast from normal cyclones but destroyed the natural hydrodynamic regime resulting in rapid siltation in the river beds. This ultimately affected rice production defying the purpose for which polders were actually built and farmers shifted to more lucrative shrimp culture practice because of increasing international demand for seafood and because of government's favorable policy shift at the same time. Shrimp sub-sector, nowadays, plays a central role in the fisheries sector of Bangladesh by providing employment and export earnings. However, the question is whether this economic gain is at the expense of lost ecosystem connectivity or not.

Quite often shrimp culture is linked to destruction of mangroves. However, historical data suggest that except the Chakaria Sunderbans, no mangroves were cleared for shrimp culture. Shrimp culture took place in abandoned and waterlogged rice fields where mangroves had already been cleared to bring more area under rice culture. Nevertheless, mangroves are very important ecosystem that provide many ecosystem services to coastal communities. ES is nothing but the direct and indirect contributions of ecosystems to human well-being. Provisioning services are the one we can count, measure in easy economic terms. But many other services are apparently difficult to measure. It is easy to understand timber, forest products, fish catch but carbon storage, water quality, climate regulation, flood regulation all are different services that mangrove ecosystem services can provide.

Mangroves provide essential ecosystem services but fish also provide different ecosystem services in addition to protein and cash from sale. For example, oyster provides shore line protection, mud crab provides sediment deposition, oyster, mussel provides water quality purification services apart from their direct economic values as cash crop. However, most of these ecosystem services derived from fish are in fact dependent on the health of the ecosystem they are part of. Mangrove trees support periphyton, soils support benthos and waters support growth of phytoplankton and zooplankton. Leaves and woody matter are decomposed into palatable fragments for fish by microorganisms and crabs. Mangroves also provide nutrients in the form of dissolved organic carbon, and living biomass, such as planktonic larvae of fish and invertebrates to consume by juvenile and adult fish. Roots, trunks provide structures for oysters to grow on. Roots trap fine particles, create soft soils ideal for molluscs and crustaceans to

burrow in. Provide shelter for many species, enabling them to avoid predation and also invest more time in feeding.

Given the enormous potential that the new maritime boundary can offer Bangladesh should have a robust plan with different sectors and prioritize the activities. Since the concept of Blue Economy is subject to multiple interpretations of the sectors and coverage of activities depending on a country's socioeconomic development needs, at first Bangladesh should have an unambiguous operational definition of Blue Economy. To do so, ecosystem service assessment of the coast and the ocean of the country with a particular focus on the ESS of the Sunderbans mangrove forest should be undertaken on a priority basis. Bangladesh lags far behind the other maritime nations in assessing the ecosystem services. The concept is universally accepted but the methodology is not an easy task even for the developed countries. However, the country has an excellent repertoire of experts in different universities of the country and with some structural collaboration with international institutes and organizations Bangladesh can easily materialize this.

## 7.2 Ecosystem Services of Mangroves

Priority	Name	Opportunity description	Constraints	Actions to be taken	Institution in charge	Time scale	Estimated Budget	Partnership to be implemented	Additional comments
1	Ecosystem Services assessment of the Sunderbans	The opportunities of mangroves are multifaceted. Sustainable timber, fisheries and other aquaculture products provide multiple benefits in terms of income generation, protein supply and establishment of ecotourism. Studies show that fish production is high where there are mangroves with functioning ESS.	Ecosystem Service valuation is a tedious and costly endeavour and apparently fall within the domain of academia. Therefore, policy makers and donors are reluctant to fund in projects of such academic nature. Besides, the efforts need international scientific collaboration which is difficult for individual materialize.	Seed fund immediately to design a research program incorporating national and international experts from renowned maritime universities of the world and fund for a large-scale project to undertake the ESS assessment of mangroves	Khulna University through Ministry of Education	2-3 years	BDT 1.2 million USD approx.	Ministry of Environment and Universities	-
2	Linking community to Sunderbans conservation approaches	Life and livelihood of so many adjacent people depend on the resources offered by the Sunderbans. Without their active involvement it is impossible to implement any conservation attempt. If communities see the values they will motivate to conserve the resources for their own benefits.	The major problem is understanding how do community extract mangrove resources on a sustainable basis without exhaustion; how best can the resources be utilized for value addition so that community members can be involved without directly going into the forest; lack of appropriate policy for community engagement in research and development; conservation efforts are top down without considering the community need	Identify the resource base and resource extraction pattern of the community; Prepare detail community maps; Prepare detail value chain map; Identify entry points for intervention; Pilot project to showcase best practices	Department of Forest Department of Fisheries	2-3 years		Ministry of Environment, NGOs and Universities	-
3	Promotion of Slivoaquaculture to restore mangrove based ES	Current monoculture based shrimp farming lacks a development framework. Subsidence and effects of climate change threaten the already fragile ecosystem; Coastal polders are not	Land subsidence, sediment management, change in salinity regime, loss of biodiversity and disease progression are the major constraints that make the current monoculture practice of	Action research with coastal farmers to identify the best landscape planning options, change in policy including channelling export subsidy to promote	Department of Fisheries Water Development Board	3-5 years		Ministry of Environment, Ministry of Fishery, BFRI and Universities	-

Priority	Name	Opportunity description	Constraints	Actions to be taken	Institution in charge	Time scale	Estimated Budget	Partnership to be implemented	Additional comments
		resilient, nor tuned to present land use and future threats. By integrating mangroves in the existing land use pattern it is thought that not only shrimp production will increase but also the shrimp farms will be able to accommodate sediment management and restoration of ESS to make coastal livelihoods more resilient	shrimp unsustainable. Integrating mangroves in shrimp culture through a redesigned and changed landscape will address most of these problems.	mangrove based silvo-aquaculture in coastal areas, inject public money to excavate canals and rivers to address sediment management problem, promote tidal river management. Establish mangrove tree nurseries in public and private sectors and provide incentive to farmers to plant					
4	Integrating Ecosystem Services into Coastal Town Planning	Identification of potential resources; Contribution to national economic development; Optimum utilization of maritime resources	Lack of institutional hierarchy; Lack of coordination among the institutes, sectors, major stakeholders; Coastal embankments/polders	Training and capacity building of city planners on ES integration; Change in policy to integrate ES in city planning; Planning approval requires ecosystem assessment	Town development authorities; Public Works Department	3-5 years		Ministry of Planning, local authorities and universities	-
5	Blue carbon trading	Diversified flora having at least 10 times higher carbon sequestration rate.  Carbon trading provides incentives for conservation that will ultimately enrich ES	Lack of research and policy initiative to understand and promote carbon trading	Carbon stock assessment for the Sunderbans; Initiative to list into carbon finance mechanism; Feasibility study of social forestry for carbon trading	Department of Forest Department of Environment	3-5 yrs		Ministry of Environment, Climate Change Cell and universities	-

## 8 BLUE BIOTECHNOLOGY RESEARCH AND DEVELOPMENT

### 8.1 Context

Biotechnology comprises a broad spectrum of scientific applications that use biological systems, living organisms, or derivatives thereof to make or modify products or to improve plants, fish/animals or to develop microorganisms for specific uses. Since 18th century onwards, significant achievements have been made for development and application of biotechnological techniques for the production of antibiotics, vaccines and enzymes and development of new improved fish/animal breeds and plant varieties. Biotechnology has already made significant contributions to the welfare of agriculture, fisheries, livestock and other sectors, and the modern frontier technique such as gene-based biotechnology proved to be rewarding for mankind. In regard to broad areas of impact and application, four major biotechnological branches are i) Green biotechnology; ii) Red biotechnology; iii) Blue biotechnology and iv) White biotechnology. At present, as many coastal countries are conceptualizing the attention towards the development of ocean based blue economy, so among a number of identified economic sectors, marine or blue biotechnology has become predominant. By definition, blue (marine) biotechnology is the use of living marine resources at ecosystem, concept, and organism at molecular level to provide beneficial solutions for the society.

In considering the diversity of marine living resources, oceans are considered as a unique reservoir for a wide variety of potentially useful molecules. Due to difficulties associated with accessing to those resources, such marine molecules remained largely unexploited. (Arrieta, Arnaud-Haond, and Duarte 2010) But in recent decades, as a result of advances in oceanographic technologies, human access to remote parts of the ocean has greatly contributed towards an exponential increase in the use of marine molecules or sequences of nucleic acids extracted from marine living organisms in a variety of biotechnological fields and used those in a range of applications including human health, food, energy, aquaculture, cosmetics, industries, bioremediation and marine environmental services (Leal et al. 2012). Blue biotechnology is used to contribute on the sub-sectors like those, where the proportion of stakeholders in the field of health (24%); food (16%); aquaculture (11%); cosmetics (18%); marine environmental health (19%); energy (4%) and industries (8%). Intensive research on marine biotechnology so far contributed many potential products and services, which could be used in many areas of identified sub-sectors. Among these products, i) In health sub-sector: Pharmaceuticals and biomaterials are utilized for developing anti-cancer drugs, novel antibiotics, wound dressing, medical polymers etc.; ii) In food sub-sector: Functional foods and marine food products are useful for prebiotics, Omega-3 supplements, food jelly, foaming agents etc.; iii) in aquaculture sub-sector: Genetically improved strains, algae oils & pigments in feed are derived as quality fish seed, feed, disease treatment and aquaculture system development; iv) in energy sub-sector: Renewable Energy (from macro & micro algae); microbial oil recovery products are used for bioethanol, biofuel from seaweed. sugars & fats from microalgae, oil recovery etc.; v) in cosmetic sub-sector: Functional Ingredients, marine

oysters product and other raw materials are utilized for UV-filter, protects for sun burn & cosmetics from marine pearls etc.; vi) in marine environmental sub-sector: Bioremediation, De-pollution, Antifouling agents are being used for removal of toxic & dye materials; reduce drag & fuel from sea etc.; vii) in industries sub-sector: Bio-adhesives and bio-refinery products are useful for making feed for fish/animal, biodiesel etc.

Blue biotechnology a novel area of biotechnology, where research institutes of various potential sectors and universities are fundamental Center of Excellence to conduct high tech research using molecular tools and techniques for developing new marine aquaculture/animal species, new pharmaceutical drugs/medicines for controlling human cancer and inhibition of arthritis due to failure of immune system, biomaterials, production of bio-ethanol, bio-fuel and bio-diesel from macro algae (eg. Red seaweed) and micro algae (green algae and cyanobacteria) and extracting valuable cosmetics from marine pearls. Obviously these biotechnologically derived improved strains and products have multi-various application to all the aforementioned sub-sectors. Moreover, molecular and nuclear based isotope signature technologies could also be developed and applied for detection of trans-boundary sea fish/food products. Both classical and molecular biotechnological tools and technologies have already been used successfully in the field of agriculture, aquaculture, medicines and industries in Bangladesh and other coastal countries of Asia Pacific region. There are great opportunities that lessons could be learned from terrestrial biotechnology to apply and utilize marine or blue biotechnology in our huge marine bio-resources under the concept of recent ocean economy or blue economy. Blue biotechnology sector is not yet fulfilling its true potential in European Union and other regions of the world. Globally weak coordination between public research institutions and investors due to low number of clusters compared to other blue economy sectors are the main constraints. In particularly for Bangladesh it is a novel area of research, so strong coordination between/among public & private sectors institutions, research institutes & universities are extremely required. For such high tech research strong collaboration & technical assistance required from international donor agencies.

## 8.2 Policy Interventions for Blue Biotechnology Research and Development

Priority	Name	Opportunity description	Constraints	Actions to be taken	Institution in charge	Time scale	Estimated Budget	Partnership to be implemented	Additional comments
1	Marine capture fisheries	Characterization/gene mapping, gene sequencing of commercially important marine species using molecular/SNP Markers. Determination of population structure of selected marine stocks to be addressed; Post-harvest quality assessment and product development of marine fish; shrimp and crabs can be conducted.	1. Lack of understanding and initiatives yet among public research institutions and universities 2. Lack of adequate technical manpower/expertise and funds for blue biotechnology research and development in the public research institutions and universities.	In particularly for Bangladesh it is a novel area of research, so strong coordination between/among public & private sectors institutions, research institutes & universities	1. Maritime Affairs Unit, Ministry of Foreign Affairs 2. Marine Wing of Department of Fisheries 3. Marine Station of Bangladesh Fisheries Research Institute 4. Department of Fish Genetics and Biology, Faculty of Fisheries, Bangladesh Agricultural University, Mymensingh,	2019 – 2030	USD 12 million for next 10 years	Overseas Universities and Research Institutions: 1. Marine Environmental Sciences Laboratory, Brest, France 2. TECHNOPOL E BREST-IROISE PlleMer Bretagne Atlantique Plouzane, Brest, France	Blue biotechnology a novel area of biotechnology for welfare of many sub-sectors of blue economy
2	Marine aquaculture	Genetically improved strains, algae oils & pigments in feed can be derived as quality fish seed including feed, disease treatment and aquaculture system development.	Same as above	Same as above	1. Marine Station of Bangladesh Fisheries Research Institute 2. Department of Fish Genetics and Biology, Faculty of Fisheries, Bangladesh Agricultural University, Mymensingh,	Same as above	USD 12 million for next 10 years	Same as above	Extremely important for mariculture
3	Sea weed and other non-traditional products	Development of some useful chemicals like agar, carrageenan; alginates etc. and therapeutic agents from seaweed and similar micro algae. Development of chemicals and pharmaceuticals can be produced from sea cucumber and sea urchin.	Same as above	Same as above	1. Marine Station of Bangladesh Fisheries Research Institute 2. Department of Fish Genetics and Biology, Faculty of Fisheries, Bangladesh Agricultural University, Mymensingh,	Same as above	USD 10 million for next 10 years	Same as above	Extremely important for marine product development

Priority	Name	Opportunity description	Constraints	Actions to be taken	Institution in charge	Time scale	Estimated Budget	Partnership to be implemented	Additional comments
4	Human health care	In case of Human health care: Pharmaceuticals and biomaterials can be utilized for developing anti-cancer drugs, novel antibiotics, wound dressing, medical polymers etc.	Same as above	Same as above	1. National Biotechnology Institute (NBI), Shavar, Dhaka, Bangladesh 2. Bangladesh Oceanography Research Institute	Same as above	USD 10 million for next 10 years	Same as above	Extremely important for marine product development
5	Food and nutrition	In case of Food and nutrition: Functional foods and marine food products can be useful for peribiotics, Omega-3 supplements, food jelly, foaming agents etc.	Same as above	Same as above	1. National Biotechnology Institute (NBI), Shavar, Dhaka, Bangladesh 2. Bangladesh Oceanography Research Institute 3. Biotechnology Department, Dhaka University	Same as above	USD 12 million for next 10 years	Same as above	Extremely important for marine food and nutrition
6	Marine environment and energy	Bioremediation, Depollution, antifouling agents can be utilized for removal of toxic & dye materials; reduce drug & fuel from sea etc. On the other hand, renewable energy (from macro & micro algae); microbial oil recovery products can be used for bioethanol, biofuel from seaweed. sugars & fats from micro-algae, oil recovery etc.;	Same as above	Same as above	1. Maritime Affairs Unit, Ministry of Foreign Affairs 2. Blue Economy Cell, Energy and Mineral Resources Division, Ministry of Power, Energy and Mineral Resources 3. National Biotechnology Institute (NBI), Shavar, Dhaka, Bangladesh	Same as above	USD 10 million for next 10 years	Same as above	Important for biofuel and renewable energy
7	Marine industries	Bio-adhesives and bio-refinery products can be useful for making feed for fish/animal, biodiesel etc.	Same as above		1. National Biotechnology Institute (NBI), Shavar, Dhaka, Bangladesh 2. Bangladesh Oceanography Research Institute	Same as above	USD 12 million for next 10 years	Same as above	Important for marine products and fish feeds

Priority	Name	Opportunity description	Constraints	Actions to be taken	Institution in charge	Time scale	Estimated Budget	Partnership to be implemented	Additional comments
					3. Biotechnology Department, Dhaka University 4. Banghabandhu Sheikh Mujibur Rahman Maritime University, Mirpur, Dhaka, Bangladesh				
8	Marine cosmetics	Functional ingredients, marine oysters products and other raw materials can be utilized for UV-filter, protects for sun burn & cosmetics from marine pearls etc.;	Same as above		1. National Biotechnology Institute (NBI), Shavar, Dhaka, Bangladesh 2. Bangladesh Oceanography Research Institute 3. Biotechnology Department, Dhaka University	Same as above	USD 10 million for next 10 years	Same as above	Important for marine based cosmetic development

## **9 MARINE SPATIAL PLANNING**

### **9.1 Context**

Blue Economy is one of the important aspects of Sustainable Ocean Governance as it refers to sustainable use of ocean resources for economic growth and improved livelihood by maintaining healthy marine ecosystem. In order to achieve sustainable ocean governance, it is important to implement the contemporary and newly developed principles and concepts including Blue Economy and Ecosystem based management (EBM). As an implementation toll for sustainable ocean governance, Marine Spatial Planning (MSP) can play an important role to achieve the objectives of Blue Economy. Due to various reasons, the current institutional arrangements for sustainable ocean govern as well as exploring the concept of Blue Economy is at a very rudimentary stage in Bangladesh.

Marine Spatial Planning (MSP) aimed to establish a more rational use of marine space and the interactions between its uses. As a useful approach to marine and coastal management in an integrated and sustainable manner MSP has been used at national and regional levels. An Effective MSP is an imperative to achieve a sustainable ecological status of the world oceans. Although an adaptable spatial panning system exists to manage and protect the marine and coastal resources in some regional seas, due to lack to capacity and resources this panning system is absent in many parts of the world oceans including the Bay of Bengal particularly in Bangladesh. As MSP emphasises a balance between economic development and environmental protection by allowing both a wide range of development activities and a high level of environmental protection, its introduction in Bangladesh marine and coastal areas would contribute to create new economic opportunities from its marine and coastal resources.

Furthermore, Transboundary MSP (TBMSP) that focuses on Large Marine Ecosystem (LME), provides an opportunity for cross-border cooperation and contribute to the effective protection of the regional ocean ecosystem through regional and transnational ocean management system. Introduction and implementation of MSP at national and Transboundary level will be very useful to achieve the objectives of goal 14 (relates to sustainable ocean governance) of Sustainable Development Goals 2030 as well as to achieve the objectives of Blue Economy.

The main constraints identified are: 1. The sectoral national policies are not compatible for the newly developed concept of Blue Economy; 2. The current legal framework for ICZM and MSP is not adequate and uniform; 3. The current institutional arrangements in Bangladesh is based on sector by sector management approach, which is insufficient for sustainable ocean governance and effective management of Blue Economy activities; and 4. The current institutional arrangements are not integrated and coordinated, which will create a number of challenges in operation of economic activities in the Bay of Bengal.

## 9.2 Policy Interventions for Marine Spatial Planning

Priority	Name	Opportunity description	Constraints	Actions to be taken	Institution in charge	Time scale	Estimated Budget	Partnership to be implemented	Additional comments
1	Marine Spatial Planning at National as well as Transboundary Level	SDG context and 8 <sup>th</sup> 5-Year Plan under preparation.  World Bank and EU support	Incapacity, lack of coordination and sectoral and fragmented legislation and policy	1. A comprehensive National Ocean Policy for SOG, 2. Uniform and consistent legislation for SOG, and 3. Integrated and coordinated institutional framework for MSP and ICZM	Ministry of Planning and MOFA	2019 - 2025	2 m USD over the next 5 years.	Key MSP international institutions in collaboration with national institutions such as the Maritime University	These initiatives are crucial to make the Blue Economy cell, Bangladesh effective as well as to maximise the benefits of ocean based economy for Bangladesh
5	Marine Environmental Education	CBD, IPBES and CC  Development of University Environment Curriculum and Research Capacities	Incapacity, lack of coordination and sectoral and fragmented legislation and policy	Develop a strong Blue Economy MSP curriculum	Ministry of Education	2019 - 2030	5 m USD over the next 10 years	Same as above	Same as above

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