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WORLD MARITIME UNIVERSITY

Malmö, Sweden

**THE CONCEPTION, PLANNING AND
IMPLEMENTATION OF INTEGRATED
COASTAL AND OCEAN MANAGEMENT FOR
SUSTAINABLE BLUE ECONOMY IN
BANGLADESH**

By

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Bangladesh

And

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A dissertation submitted to the World Maritime University in partial
Fulfilment of the requirements for the award of the degree of

MASTER OF SCIENCE

In

MARITIME AFFAIRS

(OCEAN SUSTAINABILITY, GOVERNANCE & MANAGEMENT)

2018

DECLARATION

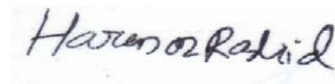
We certify that all the material in this dissertation that is not our own work has been identified, and that no material is included for which a degree has previously been conferred on us.

The contents of this dissertation reflect our own personal views, and are not necessarily endorsed by the University.



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ABSTRACT

Title of Dissertation: **The Conception, Planning and Implementation of Integrated Coastal and Ocean Management for Sustainable Blue Economy in Bangladesh**

Degree: **Master of Science**

The dissertation is a study of the integrated coastal and ocean management for sustainable blue economy in Bangladesh.

The main objective of the research is to understanding the conception of Blue economy in Bangladesh, analyzing existing institutions, laws and policy and investigating the human impact and anthropogenic pressures on the ocean due to growth of blue economy. The expected outcome of the research is articulation of the best integrated coastal and ocean management for sustainable blue economy suitable for Bangladesh.

The successful settlement of ocean dispute with Myanmar and India in 2012 and 2014 opened the opportunity for Bangladesh to utilize the ocean resource and continue with its socio-economic progress. The Government also has taken many policy measures to explore the blue economy and reduce the poverty level. However, the opportunities and challenges for sustainable economic growth by exploring ocean are simultaneously high in Bangladesh. Therefore, this research is timely with real life implications to evaluate the socio-economic contribution and prospects of the coastal and marine resources of Bangladesh, the impact of human pressure on the marine eco-system, and finally the management approach for balancing the economic growth and ocean health.

The final output of such huge work is the solution approached on the integration of the coastal and ocean management in Bangladesh. The study has provided insights on the various steps of management practice in term of coastal and ocean resource exploitation and environment protection by managers in Bangladesh. The study on integrated coastal and ocean management in Bangladesh is highly challenging with plenty constraints which will also contribute into the global ocean knowledge. A number of recommendations are made concerning the need for further investigation in the subject.

KEYWORDS: coastal, ocean, management, sustainability, blue economy, Bangladesh, Integration, Fisheries, Shipping, Sectors.

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LIST OF ABBREVIATIONS

BE	Blue Economy
BOB	Bay of Bengal
BOBLME	Bay of Bengal Large Marine Ecosystem
CIA	Cumulative Impact Assessment
CBM	Community Based Management
DOALOS	Division for Ocean Affairs and the Law of the Sea
DOS	Department of Shipping
DPSIR	Drivers-Pressures-State-Impact-Response
DoF	Department of Forest
DoS	Department of Shipping
EEZ	Exclusive economic Zone
FAO	Food and Agriculture organization
FD	Finance Division
GDP	Gross Domestic Production
GED	General Economic Division
GIS	Geographic information System
IAD	Institutional Analysis Development
ICOM	Integrated Coastal and Ocean Management
IEA	International Energy Agency
IMF	International Monetary Fund
IO	Indian Ocean
IMO	International Maritime Organization

ITLOS	International Tribunal for the Law of the Sea
JICA	Japan International Corporation Agency
LOS	Law of the Sea
LOSC	The Law of the Sea Convention
LPG	Liquefied Petroleum Gas
MARPOL	International Convention for the Prevention of Pollution
MAU	Maritime Affairs Unit
MCS	Monitoring Controlling and Surveillance
MMU	Mercantile Marine Department
SDG	Sustainable Development Goals
SREDA	Sustainable and Renewable Energy Development Authority
UN	United Nations
UNCLOS	United Nations Convention on Law of the Sea
UNEP	United Nations Environment Program
UNSDG	United Nations Sustainable Develop Goals
UNWTO	World Tourism Organization
UNCTAD	United Nations Conference on Trade and Development
WB	World Bank
WTTC	World Travel & Tourism Council

1.0 INTRODUCTION:

The ocean covers three quarter of the world's surface and more than three billion inhabitants are dependent for their livelihood on marine and coastal biodiversity (UN-OC, 2017). The ownership of the ocean was a legal debate in ancient sailing times, but since the 17th Century, theorist were in favor of "Ocean as a Common Heritage of Mankind" with limited and narrow coastal state jurisdiction. (Farthing, 1997). In 1982, the UN adopted the United Nations Convention on Law of the Sea (UNCLOS), which opened the offshore for oil and mineral exploration, and various other human activities in the ocean for economical purposes. (UN, 2017)

The ocean is the most prominent feature on the planet, and is essential for planetary survival. It serves as the Earth's respiratory system, producing oxygen for life and absorbing carbon dioxide and waste. The ocean provides storage and absorbs half of the CO₂ produced by fossil fuel burning, in last 200 years (John Raven et al , 2005), while marine phytoplankton generate 50 per cent of the oxygen needed for survival (Miriam et al, 2014). The ocean regulates the climate and temperature, making the planet hospitable to diverse forms of life (Williams and Follows, 2011).

The Oceans seems to be large enough, with infinite boundary, to absorb all the waste of the world in unlimited capacity and boundless bounty of providing seafood, and minerals to us. Unfortunately, the reality is not like that. Today our ocean, including its biodiversity, are under threat of disruption and depletion due to multiple human stressors and climate change (Christopher D. G. Harley et al, 2006) . Therefore, a unique management and governance system should be adopted globally, but adaptable to the regional and local marine environment to save our ocean as well as earth (Grip, 2017). As the ocean is the single largest ecosystem and Bangladesh being a small riverine and coastal state and part of Bay of Bengal(BoB), it is an important stakeholder in world ocean governance.

Bangladesh is a country of Asia with a 710 km long coast exposed to the BoB along with 35 million people inhabiting the Coastal zone, which is under threat of cyclone and climate change. (Reazul et al, 2016). The BoB is the northeastern extension of the Indian Ocean (IO), which carries many oceanic features of the IO including cyclones and monsoons. Bangladesh has the second largest delta, named Ganges Delta formed by the convergence of Ganges-Brahmaputra-Meghna causing huge fresh water discharge about 1.6 trillion cubic meters per year in the BoB (M. Madhuratap et al, 2003). The BoB is one of the freshest seas in the world, which means that the salinity ranging from almost zero near the coast (Chowdhury et al, 2002). Figure 1 shows some salient features of Bangladesh coastal and ocean water.

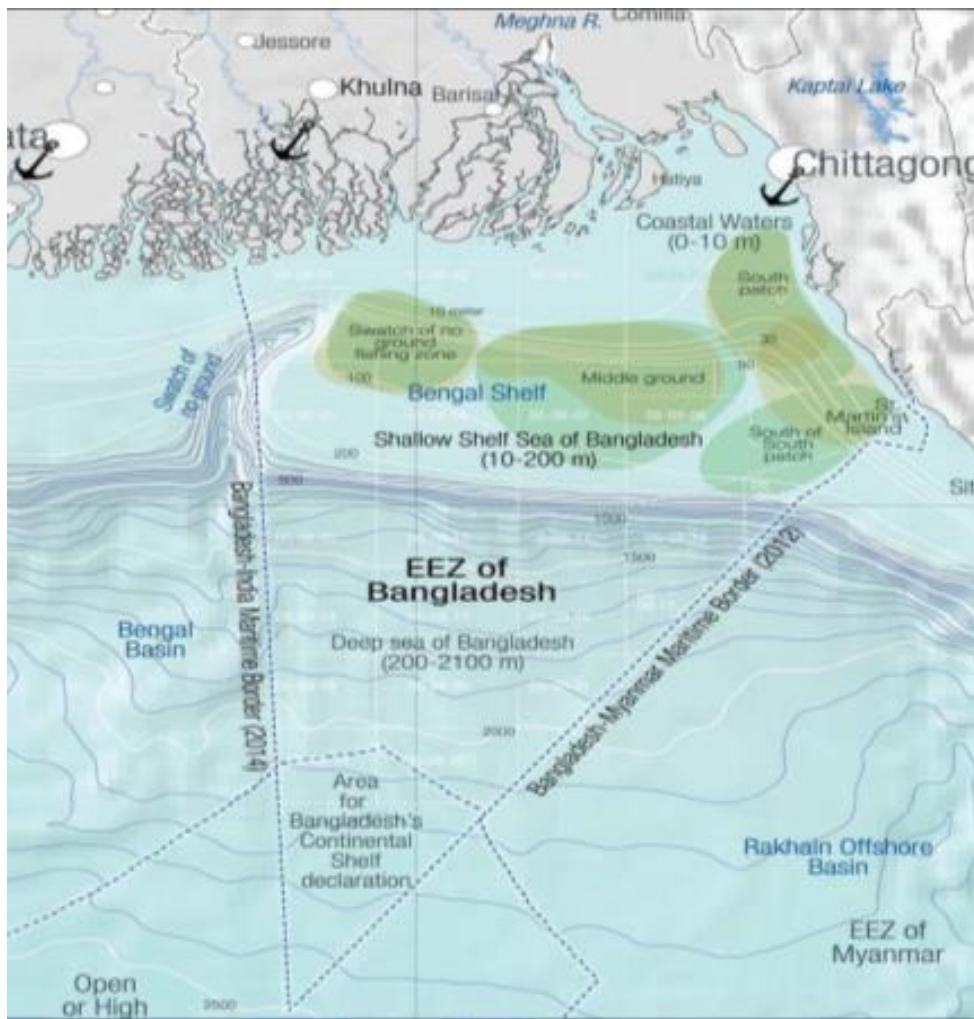


Figure 1 The salient feature of EEZ of Bangladesh (Shahadat Hossain et al, 2014)

The coastal area of the Northern BoB is the largest fluvial-deltaic slope complex, named Bengal Fan, and sitting on the thickest sediment deposits of the world, with an average of about 16.5 km (Wasson, 2003). The BoB receives largest volumes of sediment, which is about 665 million tons per year as a historical average (Wasson, 2003). The turbid seas of Bangladesh's coastal water favor some rare species like Hilsha fish. The turbidity hinders photosynthesis, and make the sea biologically less productive in concert with cloudy skies during the monsoon (Vinayachandran, 2009).

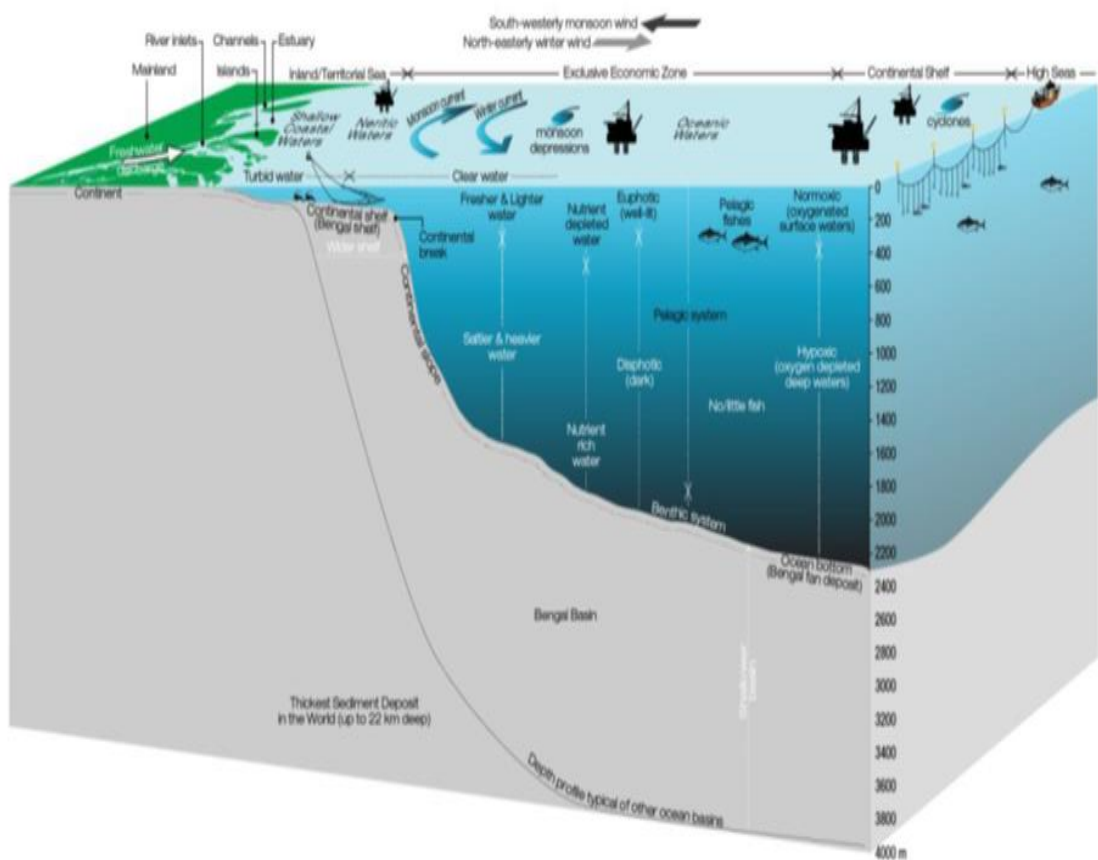


Figure 2 Schematic Diagram of Bangladesh EEZ (Shahadat Hossain et al, 2014)

Bangladesh experienced about 40% of the total global cyclonic storms and two deadliest killer cyclones in the past 50 years in terms of deaths and casualties (Haque et al, 2012). BoB observes Reversal Ocean current, clockwise in SW monsoon and anticlockwise in NE monsoon. The BoB's shallowest (100-200m) water is well

oxygenated but the deeper water is seriously oxygen deficient, a condition referred to as 'hypoxia' or 'oxygen minimum zones', in which animals find it hard to survive (Helly, Levin, 2004). Finally, the BoB, being tropical region is low in productivity, but rich in biodiversity (Shahadat Hossain et al, 2014). The socio-economic status of Bangladesh is a very important factor for conserving bio-diversity in BoB.

According to the World Bank (WB, 2018), Bangladesh has achieved substantial progress in economic growth, with more than 6% GDP growth over the decade. The growth influenced the rapid demand for energy, transportation and urbanization. The successful settlement of ocean dispute (explained in section 2.1 of this study) opened the gate of opportunity for Bangladesh, to utilize the ocean resource and continue with its socio-economic progress. The Government also has taken many policy measures to explore the blue economy and reduce the poverty level. H.E Sheikh Hasina, the Honorable Prime Minister of Bangladesh in addressing the United Nations Assembly in 2016 said that, *“We must preserve our natural resources for our succeeding generations. Bangladesh reaffirms the need for conservation and sustainable use of marine resources for tapping the potential of Blue Economy.”* (UNHQ-GAH, 2016).

The opportunities and challenges for sustainable economic growth by exploring ocean are simultaneously high in Bangladesh. Therefore, this research is timely with real life implications to evaluate the socio-economic contribution and prospects of the coastal and marine resources of Bangladesh, the impact of human pressure on the marine eco-system, and finally the management approach for balancing the economic growth and ocean health.

2.0 BACKGROUND:

Bangladesh acquired the sovereign rights of the EEZ in 2014, through boundary delimitation, which is coupled with responsibility of sustainable use, while extracting marine resources, minerals and getting benefit from ecological goods and services. This study was conducted, focusing on the conception of Blue economy in Bangladesh, analyzing existing institutions, laws and policy and investigating the human impact and anthropogenic pressures on the ocean due to growth of blue economy. The expected outcome of the research is articulation of the best integrated coastal and ocean management for sustainable blue economy suitable for Bangladesh.

2.1 LOSC & Boundary delimitation:

The Law of the Sea Convention is the comprehensive regime on all kinds of ocean uses, including spatial distribution of maritime jurisdiction (Tanaka, 2012). Bangladesh became party to the LOS convention on 27.01.2001 (DOALOS, 2018). Bangladesh pioneered in Southeast Asia to settle the disputes on maritime boundary with its neighbors, Myanmar and India in peaceful manner, in accordance with Part XV of LOSC. On 14 March 2012, ITLOS gave its judgement, in the longstanding dispute of boundary delimitation between Bangladesh and Myanmar (Churchill, 2012). The Arbitral Tribunal constituted under UNCLOS, rendered its award on 07 July 2014, on delimitation between Bangladesh and India, which completes the long journey of Bangladesh, started in 2009 (SUAREZ, 2016). Finally, Bangladesh acquired the rights on the living and non-living resources within its 118813 sq.km of Territorial sea and EEZ (MoFA, 2014).

The Territorial Waters and Maritime Zones Act 1974, limits the territorial waters up to 12 nautical mile from the base line. The act regulates the foreign flagship within Bangladesh water and provides provision on conservation of living resources and controlling of pollution at sea. The establishment of a Maritime Affairs Unit (MAU) in 2009 within the Ministry of Foreign Affairs was a commendable decision, which accelerated the implementation of the LOSC in Bangladesh.

2.2 Blue Economy and Sustainability:

Ocean and coastal related economic activities are increasing significantly around the world. Within last decade, major ocean countries assessed the economic and ecological value of their ocean and coast (Park and Kildow, 2014). Many countries have activated their strategies to develop and protect the ocean resources. The common concept revealed from the definition of ocean economy is, the economic activities that take place in ocean and receive outputs from the ocean (Park and Kildow, 2014). The value of the global ocean economy is about US\$1.5 trillion per annum, which is contributing approximately 2–3% to the world's GDP (Julian Roberts, A.Ali, 2016). Shipping and fisheries are the most ancient sectors of the ocean economy.

Shipping carries over 80 per cent of global cargo by volume and over 70 per cent by its value (UNCTAD, 2017). The global production of marine fish was 81.5 million tons and marine aquaculture was 26.7 million tons in 2014 (FAO-Rome, 2016). Submarine fibre-optic cables carry more than 95 per cent of global data and voice transfer, which is cheaper and quicker than satellite communications (Carter L. Burnett et al, 2009). In 2009, 32% of the worldwide crude oil production accounts for offshore field which is projected to rise up to 34% in 2025 (IEA, 2010). There are total 1332 rigs drilled into seabed to explore gas and oil worldwide (Statista, 2018). Tourism is the third highest international trade of services, which earned about 1.4 trillion USD in 2016. (UNWTO, 2017). A large portion of the world tourist is

attracted by marine and coastal environment and it is set to rise. Cruise tourism is also fastest growing sector in the leisure travel industry. Expanding knowledge on marine biodiversity has provided breakthrough advances in sectors, such as pharmaceuticals, food production, and aquaculture. Tides, waves, currents, and offshore wind are emerging sources of energy that have significant potential to contribute to low-carbon energy (OEC-IEA, 2018).

However, the expansion in blue economy is seriously contingent on sustainable use of the ocean and its ecosystem. According to renowned naturalist Sir David Attenborough, *“the wildlife in our seas is facing its greatest threat in human history. Pollution in our oceans has reached a crisis point”* (McKenna, 2017). Human activities, including intense fishing around the world, are altering ocean ecosystems beyond their natural state. According to numerous scientific studies, fish, shellfish, and other important species are declining in many places (WOR-IOI, 2013). The cumulative impacts to global marine eco-system increased 66% in ocean and 77% in national jurisdiction area, over 5 years period due to fishing, climate change and pollution, which shown in figure 3 (Halpern et al, 2015). These changes are impairing the ocean’s capacity to provide food, protect livelihoods, maintain clean water, and recover from environmental stresses like severe storms. Therefore, it is clear that the economic activities related with ocean should be managed in a sustainable manner to save the ocean as well as the earth.

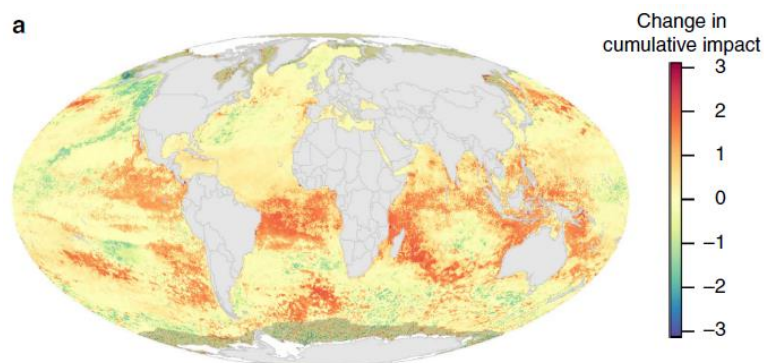


Figure 3 Change in cumulative human impacts in marine ecosystem (Halpern et al, 2015)

The concept of Blue economy was introduced against the unsustainable use of ocean, which is metaphorically described as the brown ocean economy. (P.G. Patil et al, 2018). The Blue Economy breaks the mould of as usual business model and concept of ocean as unlimited resource and waste dumping ground. It integrates the conservation and sustainable use of ocean resource with economic modelling and decision-making process. It refers to the decoupling of socioeconomic development from marine environmental degradation (UNSDG, 2013). The Blue Economy conceptualize the same output as Rio+20 Green Economy initiative framing, *“improved human wellbeing and social equity, while significantly reducing environmental risk and ecological scarcities”*. (UNEP-GER, 2010). The World Bank defined blue economy as *“sustainable use of ocean resources for economic growth, improved livelihoods and jobs, while preserving the health of ocean ecosystem”* (WB-BE, 2017). Finally the World Ocean Summit in 2015 adopted the definition of Blue Economy as, *“A sustainable ocean economy emerges when economic activity is in balance with the long-term capacity of ocean ecosystems to support this activity and remain resilient and healthy”* (EIUL, 2015).

2.3 Integrated Coastal and Ocean Management (ICOM):

Dynamic processes of interaction between land and ocean environment affect the coastal area (Paul and Rashid, 2016). It is supportive to unique and fragile marine ecosystem being areas of great environmental and aesthetic value. A number of human activities like industry, fishing, tourism, and aquaculture take place in the coastal zones. Within the last several decades the ocean activities like gas exploration, deep-sea fishing, shipping also increased significantly (EEA, 2018). With the development of intense activities together in small strip of coastal and ocean area, the conflicts of uses and socio-ecological problems are also enhanced (R.Clark, 1994). Climate change, including sea-level rise, coastal storms and salinity intrusion are also imposing environmental hazards.

However, it is difficult to manage ocean and coastal area due to temporal issues like current, seasons, tides and physical geography like inshore, offshore, shoreline. The various jurisdictions like local, national, regional, global including legal frame work, social mandates makes the coastal and ocean management harder. Single sectoral management has proved inadequate to deal with the compound human-environmental interactions in ocean and coastal areas (R.Clark, 1994). The environmental cost of the traditional approach implies a move towards rational management to coastal development and resource utilization (Harvey and Caton, 2010(republished)). As a result, sectoral management is turning to more integrated strategies attempting over the long period, to be more sustainable, ecologically, socially and economically.

The ICOM is a dynamic and iterative process to promote sustainable management of coastal and ocean zones. It is a full cycle of information collection, planning, decision-making, management, monitoring and evaluation (Biliana Cicin and Robert Knecht, 1998). ICOM uses top down and bottom up approach for active participation of all stakeholders to achieve the desire common goals and objectives (Schernewski, 2002). ICOM means integration of all relevant policy areas, levels of administration and sectors.

3.0 METHOD:

The research work is based on qualitative methodology as it is considered suitable when the researcher intends to ascertain and theorize prominent issues (Jamshed, 2014). Integrated coastal and ocean management is an outstanding concern worldwide. (Meltzer, 1998) To answer the research question and seek a solution to the problem statement, we conducted interviews. The qualitative interview is the best method to record, achieve, and reinforce the practices and standards of the institutions and policies (Oakley, 1998).

3.1 Theoretical Background:

Bangladesh is a promising country in respect of Blue economy (Alam et al, 2017). Fisheries, shipping and coastal tourism are the traditional use of coastal and ocean resources. In addition, there are new sectors like offshore gas exploration, salt production and off shore renewable energy. The old and new sectors of ocean use have high a prospect of growth (Bari, 2017). Together with other ocean uses, Government has taken initiative for huge industrial expansion in the coastal region including coal power plant, deep-sea port, LPG-LNG terminal (JICA, 2016). These economic activities will cause migration of more people towards coast and altogether increase the pollution, destruction and contamination of ocean resource. The prospect of ocean use and urbanization of coastal area in Bangladesh will create a serious threat to the ocean and its ecosystem if not managed properly (P.G. Patil et al, 2018). If the development of coastal area is not carried out by proper assessment, management, monitoring and evaluation of ocean health the long-term sustainability will not persist (EIUL, 2015).

To help identify and organize our analysis of the first part of our research (Blue Economy), we drew on insights from the framework Drivers-Pressures-State change-

Impact-Response(DPSIR), which helps to reveal the conditions to influence the conception of Blue economy in Bangladesh, including the measures to balance the ocean health and economic growth (Patrício et al, 2016). For analyzing the second part of our research (Coastal & Ocean Management), we evoked the theoretical framework of Institutional Analysis Development(IAD), which helps us to find out the institutional and management capacity in Bangladesh including the decision-making process and relationship among sectors in context of integrated coastal and ocean management (Ostrom, 2011).

3.1.1 DPSIR Framework:

The DPSIR framework is a system approach that establishes a chain between human activities and socio-economic or political driving forces, with corresponding pressures, that causes a change of the ecosystems, and causing impacts eventually leading to response (Kristensen, 2004), which is the final actions to be adopted by the managers (EPA, 2015). We used the DPSIR framework in the analysis to identify the driving force for unsustainable use of the coastal and ocean resources and identify the pressure, state and impact on the marine environment and response to balance the blue growth and conservation in Bangladesh.

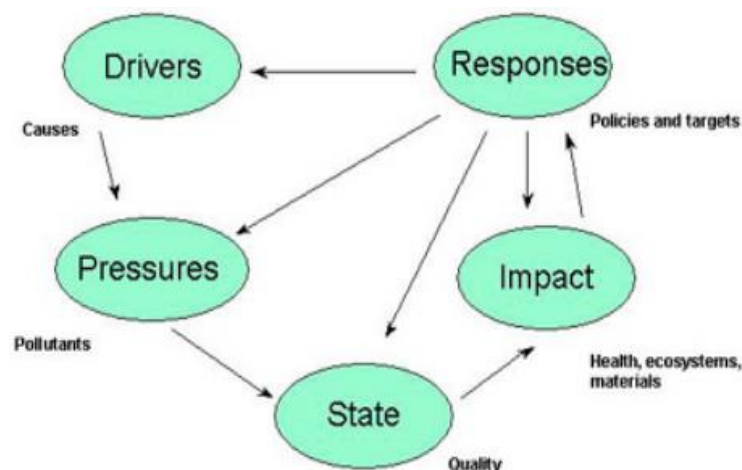


Figure 4 DPSIR Frame work (Patrício et al, 2016)

3.1.2 Institutional Analysis Development Framework:

The Nobel Prize winner Elinor Ostrom conceived the IAD framework to study commons resources and collective action problems that involve social structures, positions, and rules (Nigussie et al, 2018). It is a systematic method for policy analysis functions and to understand how institution operate, perform and adopt over a period of time allowing for greater understanding of institutional arrangements in a wide variety of settings and scales (Sutton and Rudd, 2016).

We use the IAD framework to organize our analysis and help identify the existing institutional arrangement for coastal ad ocean management in Bangladesh. The unit analysis of the action arena, we systematically follow the path of decision-making. Our approach is to analyze the interests of the different sectors, Government initiatives, and administrative set up to evaluate the output of the projects and policy reformation.

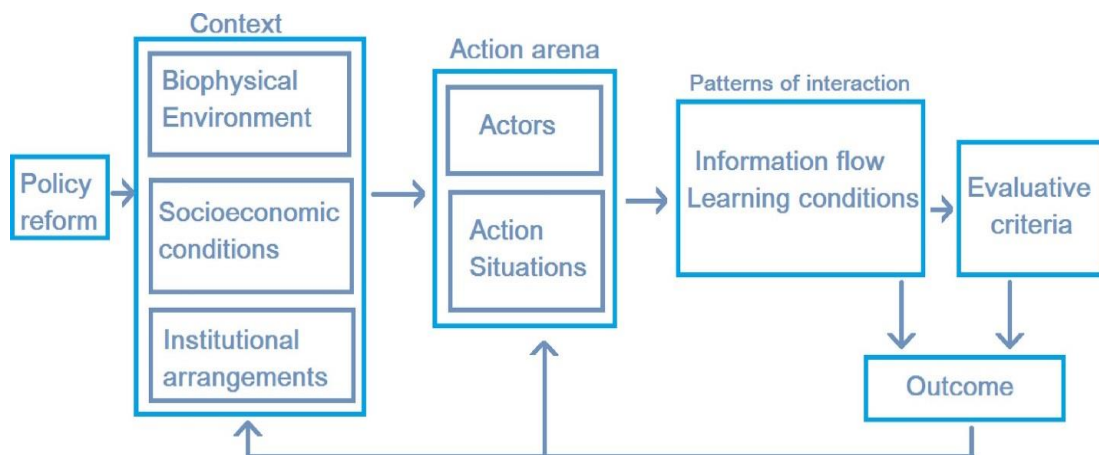


Figure 5 IAD Framework (Nigussie et al, 2018)

3.2 Problem Statement:

The Government of Bangladesh, by signing the LOSC, has accepted the convention obligation that the country will take best practicable measures to protect and prevent the marine environment. The state parties are obliged to prevent, reduce and control pollution of the marine environment from any source. The living resources of the ocean should be exploited in a sustainable manner so that the marine ecosystem and biodiversity is properly maintained. The state parties should establish standard scientific criteria for planning and managing the exploration of ocean resources. The Rio Conference on 1992 and Agenda 21 proposed for application of the integrated management approach for sustainable development instead of sectoral management.

However, in Bangladesh, the management of exploitation of living and non-living resources in the coastal and ocean space is still sectoral, which is managed by about 20 ministries (Shahadat Hossain et al, 2017). The fishing and shipping, as ancient ocean uses, are based on traditional approaches. The newly introduced sectors such as gas exploration, coastal tourism, salt production and renewable energy production, are not well researched or managed holistically (P.G. Patil et al, 2018). Scientific information is fundamental prerequisite of sustainable management, which is insufficient in Bangladesh (OC, 2017) (GED-PC-GoB, 2015). Over exploitation of living resources, land based pollution and coastal habitat degradation are the major concern for marine ecosystem of Bangladesh (BOBLME, 2010). Bangladesh is growing faster in many Socio-economic indicators, but at the same time corruption, weak governance, infrastructure scarcity and over population is creating pressure on its achievement. (WB, 2018). Notwithstanding progress in some areas, the population below poverty level, unemployment, and inequality are the major concern for sustainable economic growth (IMF, 2005).

In response to this problem, our study investigated preparations for successful planning and implementation of integrated coastal and ocean management in Bangladesh. We carried out the interviews with senior level government officials to

reveal the conception and existing blue economy stage of different sectors. We also investigated the balance of economic growth and conservation of existing blue economy sectors. The analysis of our interviews revealed the gap between integrated and sectoral management, including the challenges for sustainable growth. Finally, we propose a holistic management approach suitable for Bangladesh to maintain blue economic growth and marine eco-system.

3.3 Research Questions:

To solve the above problem, we articulated the following research questions to determine the appropriate research methodology and stages of inquiry, analysis, and reporting, focusing the core issues of Blue economy and sustainable management of ocean resources in Bangladesh :-

1. What is the conception of Blue economy among different sectors of Bangladesh?
2. What are the human impacts and pressures upon coastal and ocean areas?
3. What are the responses to balance blue growth and conservation in Bangladesh while exploring ocean resources?
4. What is the gap between sectoral management and integrated ocean and coastal management in Bangladesh?
5. How to formulate the policy for suitable integrated ocean and coastal management for Bangladesh?
6. How to integrate community-based management for effective coastal and ocean management?

3.3 Sampling Approach:

The interviews were conducted using the semi-structure method. As there are several ministries and offices involved with coastal, and ocean management in Bangladesh, we applied the purposeful sampling technique to identify the participants for interview (Palinkas et al, 2015). The sample size was kept small for stronger sample criteria and effective analysis management. We completed eleven interviews from eight different sectors. The Government officers specifically involved with Blue economy or conservation were chosen for interview. We have also tried to ensure balance among the Ministries and executive agencies. We conducted interviews with respondents from the Fisheries Department, Shipping Ministry and Department, Ministry of Local Government, Ministry and Executive agency of Water resource, Ministry of Tourism, Maritime Affairs Unit of Foreign Ministry, Ministry of Environment and Forest, Blue Economy Cell of Energy Division. Interviews were targeted for 30 minutes, which sometimes exceeded over an hour. The interview questions were different for various sectors but maintained the core issues of Blue economy and management approach. The few sample questions are as follows:

- a) What are the challenges of Blue economy growth in your sector?
- b) How you are maintaining the balance between growth and sustainability?
- c) What are the other sectors that create conflicts and pressure with your sector?
- d) How is the co-ordination and cooperation among the sectors?
- e) Do you think, an integrated coastal and ocean management is required for an holistic approach?

The Research Ethics Committee of the World Maritime University approved the interview questions on 3 May 2018. All interviewees signed a consent form and transcripts were stored in a private device.

3.4 Data Collection and analysis:

We provided the respondents with a brief of our research prior to an interview taking place. As all participants are Government officers, for better data collection we made appointments and conducted the interview in their respective office. We used a high quality tape recorder to record the interview. At the same time, we took notes on important points during the interview. We have also collected relevant documents from the interviewees. We have summarized the response of the participants to particular themes and provided selected interview excerpts. The respondents are numbered as R1, R2, and R3 for confidentiality purpose. The opinions and views of the respondents are the major components of the research.

The narrative process mainly analyzed the data collected from the interview (Hunter, 2010). We have gathered the interviews and analyzed each individual story into insights and meanings. We have compared the opinions with existing secondary data and looked for interpretation. The new stage and theoretical contents have been extracted from the data processing. We have also tried to display the findings in graphs, tables or figures.

We have also analyzed the interview data based on a systematic coding, following the approach suggested by Saldaña (Saldana, 2010). This type of analysis consists of a systematic coding of data according to a code list, in such a way as to identify relevant patterns. The coded segments are then grouped and synthesized into categories, which in turn are linked to themes that are more general and theoretical concepts. The result of the interview data are discussed in Section 4 and the discussion with the thematic report is included in section 5.

4.0 RESULTS:

4.1 Institutions in Bangladesh:

Blue Economy is a new and emerging concept, though the use of sea and coast for economic activities is very old in Bangladesh. The political will assisted the administration to focus on blue economy. H.E honorable Prime Minister Sheikh Hasina mentioned in the 2018 G-7 meeting, “*We approach maritime space based on ‘sustainable development’ – to secure peace, stability and well-being of people, everywhere. (BT, 2018)*”. About 36 million people in Bangladesh are directly dependent on the economic activities of the oceans and coastal zone (Ahsan, 2013). The promotion of the blue economy should be a priority development plan for Bangladesh. (Rahman, 2017). Bangladesh integrated the UN 2030 Agenda for Sustainable Development in its seventh FYP (2016-2020) (GED, 2015) and offered an opportunity to implement the SDG 14, “*Conserve and sustainably use the oceans, seas and marine resources for sustainable development*”, with its seven targets and three provisions.

Table 1 lists the institutions, laws and policies, that are directly or indirectly related with coastal, and ocean management in Bangladesh (OC, 2017) (Shamsuddoha & Islam, 2016).

Sl	Name of the Ministry	Related Organization	List of Policy/Act etc.
01	Ministry of Power, Energy and Mineral Resources	SREDA, Petrobangla, BPC, Bureau of Mineral Development	National Energy Policy 2005, Renewable Energy Policy 2008, Action Plan for Energy Efficiency Conservation 2013

02	Ministry of Industries	National Productivity Organization, Bangladesh Sugar and Food Industry Corporation	National Industry Policy 2016, National Salt Policy 2016
03	Ministry of Agriculture	Bangladesh Agricultural Development Corporation, Soil Resources Development Institute, Bangladesh Agricultural Research Institute, Bangladesh Jute Research Institute	National Agriculture Policy 2018, National Organic Agriculture Policy 2016
04	Ministry of Local Government and Rural Development and Co-operative	Bangladesh Rural Development Board	National Rural Development Policy 2001,
05	Ministry of Civil Aviation and Tourism	Bangladesh Tourism Corporation, Bangladesh Tourism Board	National Tourism Policy 2010,
06	Ministry of Fisheries and Livestock	Department of Fisheries, Bangladesh Fisheries Research Institute, Bangladesh Fisheries Development Corporation, Marine Fisheries Academy	National Shrimp Policy, 2014, National Fisheries Policy, 1998
07	Ministry of Water Resources	Bangladesh Water Development Board, River Research Institute,	Coastal Zone Policy 2005, National Water Policy 1999, Bangladesh Water Acts 2013
08	Ministry of Environment and Forest	Bangladesh Climate Change Trust, Department of Environment, Department of Forest, Bangladesh Forest Research Institute	National Forest Policy 2016, National Environment Policy, National Biodiversity Rule 2012
09	Ministry of Shipping	Department of Shipping, Bangladesh shipping Corporation, Chittagong Port Authority, Mongla Port Authority, Payra Port Authority	National Shipping Policy 2000
10	Ministry of Science and Technology	National Institute of Biotechnology, Bangladesh Oceanographic Research Institute	National Biotechnology Policy 2012, Bangladesh Oceanographic Research Institute Rule 2015

11	Ministry of Disaster Management and Relief	Department of Disaster Management	National Plan for Disaster Management 2010-2015, Disaster Management Rules 2014
13	Ministry of Foreign Affairs	Maritime Affairs Unit	Bangladesh Foreign Policy
14	Ministry of Home Affairs	Bangladesh Coast Guard	Citizen Charter of Coast Guard
15	Ministry of Land	Land Reformation Board	National Land Policy 2016
16	Prime Minister Office	SDG Cell, BEZA	BEZA Law, SDG Mapping
17	Ministry of Planning	Planning Commission, IMED,	National Sustainable Development Strategy, National Social Protection Strategy (NSPS) , 7 th Five Year Plan

Table 1 List of Institutions, laws & Policies related with coastal & Ocean management (Edited by Harun Or Rashid) (Source bd.gov web site) (Shamsuddoha & Islam, 2016)

4.2 Interviews:

4.2.1 The Concept and prospect of Blue Economy:

Despite the variety of economic activities depending on the ocean and coastal environment, there is no unique segmented measurement of blue economy and its potential growth in Bangladesh (P.G. Patil et al, 2018). The economic activities and asset valuation come together in the coastal and ocean region as a cluster of individual economic system (Pawan G. Patil et al, 2016).

R11 emphasized, “The fisheries and shipping sector has long history of economic contribution in Bangladesh, which need to be modernize and updated for future growth. Off Shore gas and coastal tourism is the recent blue economy sector, which

appeared to be prospectus in Bangladesh. The sea salt and off shore renewable energy production is in very small scale. The Government initiative and research may support the sectors to convert into industrial level. The marine biotechnology, marine genetic resource, deep-sea minerals and rare marine species aquaculture is the future blue economy sector which are still in theory level at present”.

Regarding shipping R11 has given a clear picture, which is synchronized with R1, mentioning that, “Bangladesh have 75 million USD trade annually (WITS, 2015). We are paying 5 million USD as freight. Chittagong Port handled 3092 ships in 2017 (CPA, 2018). If we can grab 40% of our trade, our ship owning, chartering, other shipping related business would grow enormously. Only with this one step our GDP can grow more 1%.”

R11 emphasized on another shipping sector and mentioned that, shipbuilding is a promising sector in Bangladesh and its contribution in the countries national economy is increasing. Two large shipyards have delivered more than 20 ships to European countries since 2005 (Rahman, 2017). There are 10 international standard shipyards capable of constructing class ships for foreign buyers (Rahman, 2017). He showed expectation that, “at present we do only 0.7% ship building of world demand, if it reach 1% we can earn 200 billion USD”.

R11 mentioned that, Bangladesh became the top ship recycling country in the world in 2015 (Ahammad & Sujauddin, 2017), with overall contribution to the national economy about US\$ 2 billion and employment of approximately 200,000 direct worker (Hossain, 2015).

R4 showed a strong in depth conception of Blue economy growth of Bangladesh. He emphasized that, “actually BE is a concept. If we wish to utilize the concept of BE, at first we should know what are the resources available in our ocean, and then we should plan for exploration to get economic benefit. At the same time it should be environmentally and socially acceptable, cost effective and finally sustainable in long term utilization. We cannot ignore any possibilities in BE.”

From the interview of R4 and R11 and documents provided by them, we found that, marine fisheries and aquaculture contributes directly to the food safety and economy of Bangladesh through revenue, employment and foreign trading. Bangladesh is one of the world’s leading fish producing countries with a total production of 4.134 million MT (DoF, 2017), where the contribution of marine fisheries and aquaculture is about 15.42% and 56.44% (DoF, 2017). More than 11% of total population of Bangladesh is engaged with this sector on full time and part time basis for their livelihoods (Serajul Islam et al, 2016). Bangladesh is not only self-sufficient in fish production but also earning considerable amount of foreign currency by exporting shrimp, fish and other fishery product which is about 3% of the total revenue earning from foreign trade. The average growth of this sector is almost 5.43 percent over the last 10 years (Shamsuzzaman et al, 2017). From table 1 we find that the growth of marine fisheries is steady in comparison to a sharp rise of aquaculture during last decade. Both the respondents R11 and R4 emphasized strongly that, “we are presently fishing within 200 meter depth that is only 40 nautical miles from the coast line. If we can proceed further towards seaward side and catch fish from deeper water up to minimum 200 nautical miles our marine fisheries production will raise drastically.”

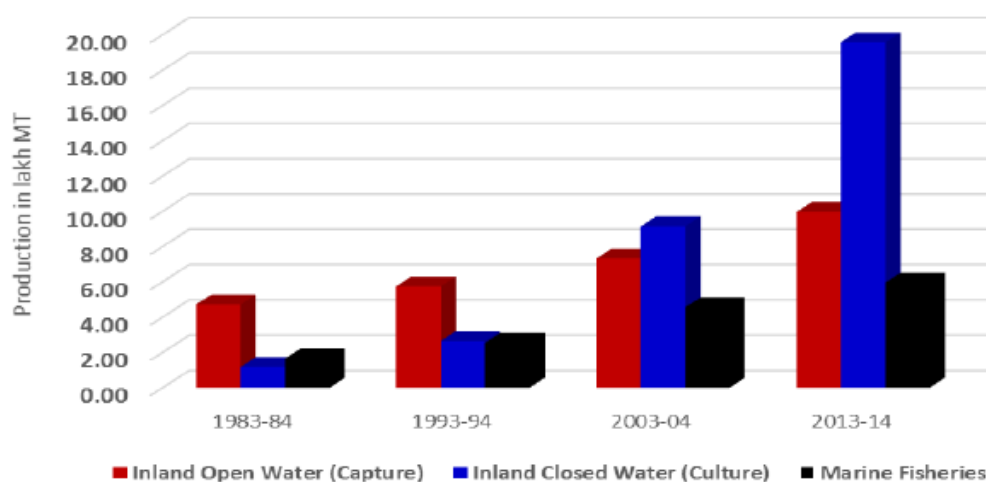


Figure 6 Sector wise fish production in last four decades (DoF(a), 2015)

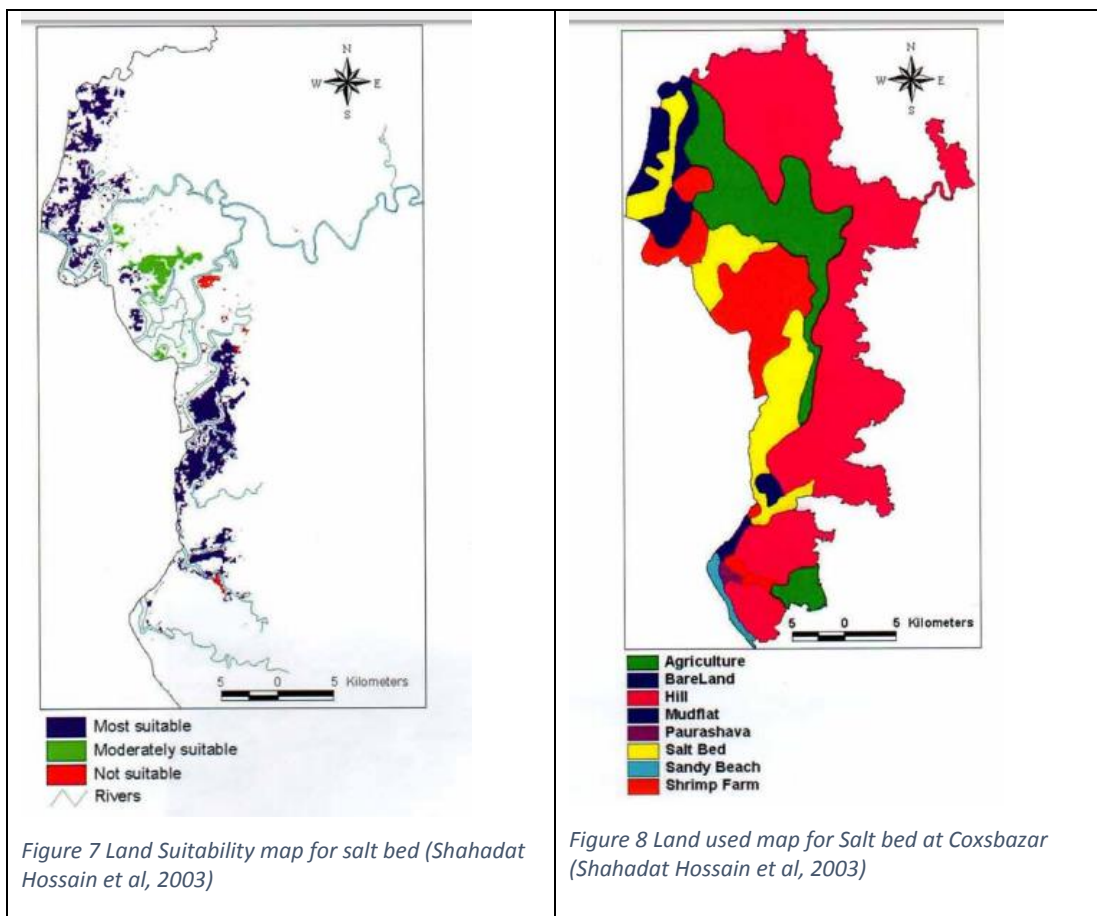
R4 and R11 also emphasized that, “we have aquaculture in the coastal region, mainly shrimp. At present, the production efficiency is 250-300 kg/ha, which has the opportunity to increase up to 1000 MT/ha (Mohammad Chhiddikur Rahman et al, 2013). In addition, our salt water and brackish water has the prospect to do aquaculture of oysters, mussels, seaweed, aquatic plants, ornamental fish and crab. We can earn foreign currency by exporting unconventional species those have no value in our country.”

R11 mentioned that, Bangladesh is yet to measure the accurate potential of its offshore gas projections. There are 26 shallow and deep-water offshore blocks in Bangladesh among which only two offshore discoveries so far exploited (JICA, 2016). R11 and R10 strongly conceived that, “Due to near proximity to the exposed gas fields of Myanmar, some blocks of Bangladesh are likely to have similar gas prospects and geological structures. The preliminary tender and negotiation on six blocks completed, where within short time exploration will be started.”

The direct contribution of tourism to GDP was 5.3 billion USD, which was the 2.2% of the total GDP (WTTC, 2017). The direct and indirect employment in tourism sector was 2.18 million, which was the 3.8% of the total employment (WTTC, 2017). R7 and R11 mentioned that we have a beautiful scenario coastal belt that consists of river, hill, forest, and estuary. The south side of Bangladesh is open to the Bay of Bengal, which has huge potential for coastal tourism. The long sandy beach of Coxbazar, the coral island of Saint Martin, dense mangrove forest of Sundarban and estuarine corner of Kuakata are the prominent place for exploring coastal tourism. The R11 emphasized that, “The tourist are concentrated in few spots (Mukharjee, Abir, 2017). If we can spread the tourist throughout the coastal belt, our coastal tourism may expand three or four fold times. There is no amusement facilities including sports, diving, skiing, snookering, etc. If we can introduce those activities, we can expect good growth in coastal tourism. Different size of luxury sea-cruise and catamaran ships including construction of modern cottages, hotels, and restaurants

may boost up tourism sector which could be one of the significant sources of revenue in Bangladesh like other coastal states of the world. ”

R11 emphasized that due to salinity intrusion at the southeast side, huge areas of coastal land became unusable for agricultural use. The local farmer community started salt production from ocean water by the drying method. Bangladesh produced 1.4 million MT salt per year (BGS, 2012) from about 7000 ha of land since 2012, which fulfills the country’s demand. The use of mechanical equipment, community-focused land leasing systems, reliable weather forecasting and sufficient credit facilities can increase salt production, which we can export and earn huge foreign currency (Zinnat, 2016). Professor Shahadat Hossain et al conducted a survey and revealed the most suitable area for salt bed production in Coxsbazar district in 2003 as shown in figure 3 (Shahadat Hossain et al, 2003).



R11 mentioned that there are three wind power plants located in Mohurichar, Kutubdia and Coxsbazar with a capacity of 2 MW, which is the debut of the utilization of marine resources for clean and renewable energy in Bangladesh (Saifullah et al, 2016). He emphasized, “Although Bangladesh is a cyclone prone area, and the scope of wind power generation is presently limited due to low wind speed (Faijer, 2017)”. The SRDEA study estimates that Bangladesh has the prospect of wind power generation up to 624 MW (JICA, 2016). From figure 7 we find that the suitable place for off shore wind firm is around the southeast and southwest coastal and shallow water area of Bangladesh (Faijer, 2017).

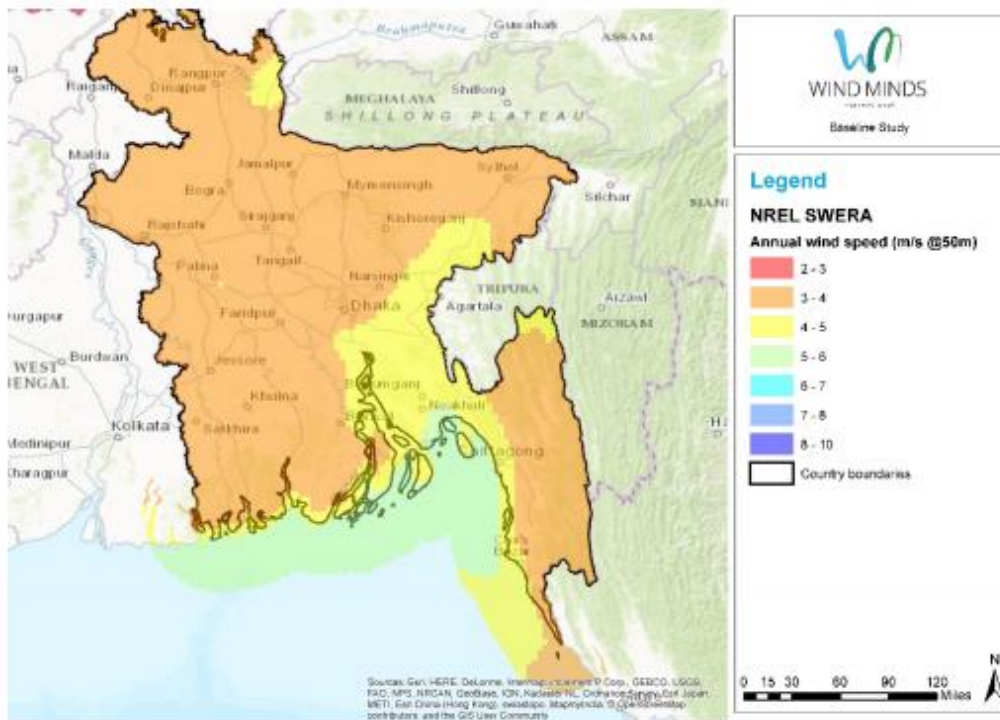


Figure 9 Annual Wind Speeds in Bangladesh (Faijer, 2017)

Finally, to understand the prospect and activities of the Blue Economy in Bangladesh we can quote the statement of R11, “we have prospect and expectation of blue economy is sky high but the activities are at present below the ground level.”

4.2.2 Conflicts and challenges of Blue Economy:

The concept of Blue economy triggered the policy process to move forward in Bangladesh after getting the sovereign right to utilize the living and non-living resources from EEZ area in 2014. Almost all respondents agreed that the first challenge of the blue economy growth is to identify and assess the resources that we have and evaluate the price of those resources. The second challenges is to assess the institutional, scientific, human resource and financial capacity of Bangladesh to explore the resources in a sustainable manner. R4 mentioned, “We should know first what the existing status of the present available resources is. Then we should identify the other resources available in our sea area and then we should know how we can explore as much as possible to get economic benefit.”

R11 mentioned, “The growth of the shipping sector is unstable in Bangladesh, due to the lack of sustainable maritime policy. The number of merchant ships peaked in 2013 at 63 but reduced to 38 in 2017 (Hoque, 2017). The demand for Bangladeshi seafarers and the status of other maritime clusters also fluctuated within last five years. The role of port and inland logistic service is also vital for successful shipping operation and economic growth.”

R11 and R1 both mentioned that, two sea ports of Bangladesh are suffering from draft restriction, causing lighterage operation of substantial portion of the import trade from anchorage in the bay to the berth of the seaport or inland river ports. R11 mentioned, “Unplanned growth and lack of management capacity is causing hindrance to the prospects of the shipping sector. Pangaon Inland Container Terminal is an example, which failed to be operated at full capacity since its inception on 2013”.

R11 and R1 mentioned that Bangladesh Government has taken initiative to develop the port facilities including building new ports and terminals. R11 and R5 emphasized that, “although the projects conducted EIAs prior to approval, the

conflicts of sharing ocean space and resources and cumulative impact assessment remain unnoticed”.

R4 mentioned the conflicts and challenges of marine fisheries in Bangladesh. He emphasized, “Though we are not yet called a fishing nation, we have a big fisher’s community living at coastal area. About 600,000 fishers directly depend on artisanal fishing and 200,000 depends of shrimp culture for livelihood (Shamsuzzaman et al, 2017). Our fisher community is extremely poor and they do not have any resource, education or employment opportunity. As such, they do not have any alternate livelihood except fisheries. The high problem is the people engaged in fishing are increasing and eventually the fishing pressure in some specific area i.e. within 30-40 meter of coastline are increasing”.

After analyzing the R4 interview data and yearly fisheries statistics, we prepared figure which revealed that artisanal fisheries was about eight times more than industrial fishing in 2010-11, but the difference reduced to twice within six years, which revealed that the growth of artisanal fisheries is negligible in respect of growth of industrial fishing. R4 mentioned, “Artisanal fisheries contribute 85% in the total marine catch (DoF, 2017). The catch per unit effort is increasing in artisanal fisheries which appears that the specific fishes are exploited is shallow coastal area. He also mentioned that for sustainable production, the growth in terms of amount is not possible, but adding value to the fisheries growth may be maintained by catching the same amount of fish. The most challenging part for that is to motivate, create awareness and educate the fishers”.

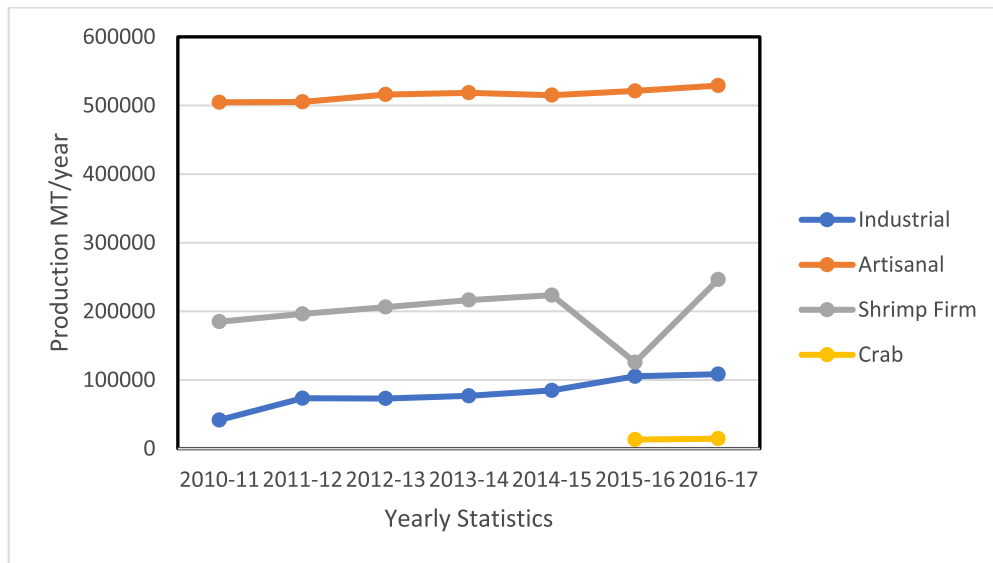


Figure 10 The yearly turnover of marine fisheries and Aquaculture (Edited by Sabbir Mahmood, Source: Yearly Fisheries Statistics from 2011-2017)

R4 mentioned, “The human resource and institutional capacity of the Fisheries Department is not sufficient to make a data base, or monitor and control the artisanal fisheries in Bangladesh. For sustainable fisheries management we need accurate data of fishers, boats, family members, socio-economic conditions, fish catch, landing, and marketing.”

R4 mentioned that, although the harvesting of shrimps in coastal areas is common, production levels are low due to increasing epidemics and mortality, poor water quality, and unscientific use of crop resources by farmers (Paul and Vogl, 2012). From Table 2 we find that the growth of shrimp production is steady, which is about 5.5% annually, except for a sharp decline in 2015-16 (DoF, 2017). Accordingly, mud crab fattening in cages or pens, which gained consideration recently, holds great promise if hatchery expertise for artificial propagation and fry invention can be guaranteed.

R11 emphasized, “The exploration of gas from offshore blocks is slow due to lower pricing of gas to buy from the contractor. Myanmar started exploration from the adjacent blocks. Strong political commitment and transparent analysis are required to get the benefit from offshore gas exploration”.

R7 mentioned, “The challenges of coastal tourism is multifold. The better communication system, infrastructure, and facilities at tourist spots are very important to expand in this sector. The law and order situation, including security and emergency services, is still to be developed in coastal areas. In fact, the coastal tourism is completely dependent on the co-operation and co-ordination of many other ministries and departments”.

4.2.3 Environmental Sustainability:

The development of Blue economy is merged with many conflicts and challenges. Especially in the developing country, the economic growth and environmental protection are the pair of contradictions as the environment worsens with the high speed of economic activities, particularly with industrial growth. (Guo, Ma, 2008). About 40% of the world oceans are heavily stressed by human activities, including depleted fisheries, marine and land-based pollution and loss of coastal habitats (EC-BE, 2017). According to FAO, about 80% marine fish stocks of the world is either fully exploited or over exploited (FAO-FishStcok, 2008). There will be more plastic than the fish by weight within 2050 (EarthDay, 2018). Plastic causes fatalities to fish, mammals and sea birds because of ingestion, suffocation, infection, and entanglement (CWA, 2018).

The potential of Blue economy growth in Bangladesh is high, however the risk of damage to marine ecosystems through unsustainable use of marine resources, physical alterations of coastal and marine habitats, pollution and climate change is high (BOBLME, 2010).

R2 responded that the operational and accidental pollution from coastal and inland vessels is the main challenge of environmental sustainability in the shipping sector. After analyzing the data collected from Mercantile Marine Department web site (MMD, 2018), we have prepared Figure 11 , which reveals that, tanker vessel fleet in respect of total Gross tonnage is the highest, which indicates the higher risk factor of

oil pollution due to accidental or operational failure. In 9 December 2014, the wrecked oil tanker MT Southern Star VII spilled about 94000 gallons of furnace oil into the Shela River, (Rahman, Rakhimov, 2015) which is mentioned as wakeup call by UN in their report. (UNEP-OCHA, 2015). There are many casualty of sinking, collision and grounding, which causes pollution from hazardous and harmful substances like coal, potash fertilizer and cement clinker (Imran Uddin et al, 2017).

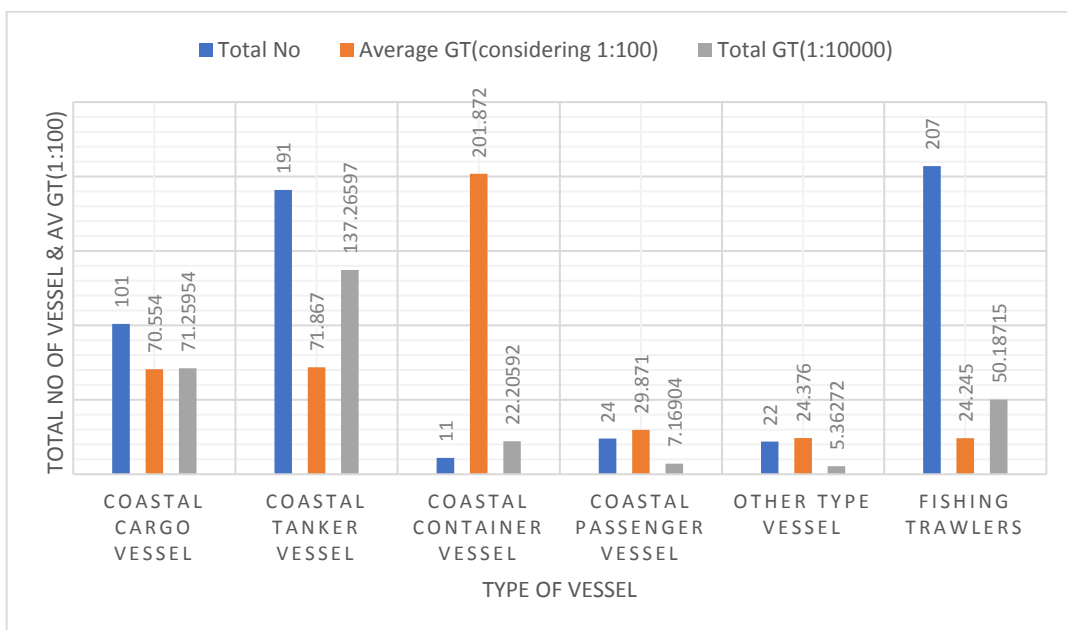


Figure 11 Comparison of various fleet size as on 2018 (Edited by Sabbir Mahmood) Source: (MMD, 2018)

R2 provided the number of inland and coastal vessel accidents that occurred since 1991 within Bangladesh water (Appendix 1). We have analyzed the data and prepared figure 12, which revealed that the number of accidents remain the same as 26 years earlier, after many fluctuations. However, there are no records of oil or hazardous cargo spillage during those accidents but it is easily presumed that there would be a substantial amount of oil discharge from sunken vessels.

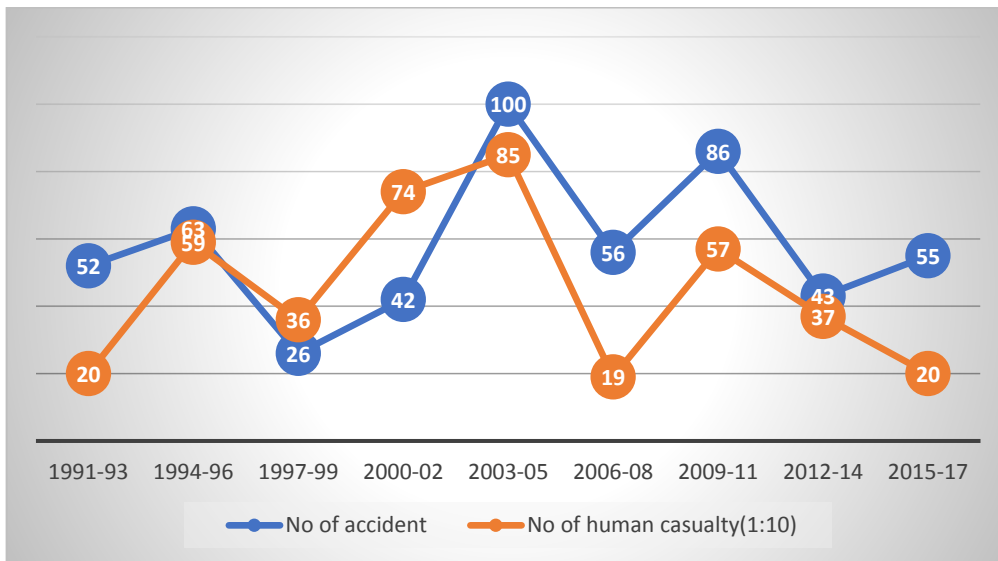


Figure 12 Human Casualty and accident of inland vessel in 26 years (Edited by Sabbir Mahmood, Source DOS)

R11 emphasized that, the ship-recycling sector in Bangladesh started without any planning and supervision. The oil and hazardous material of scarped vessels are causing pollution of coastal and ocean water (Rabbi and Rahman, 2017). Presently, the Ministry of Industry is monitoring the activities for safety and pollution prevention from ship recycling yards. Department of Environment, Explosive Department and Department of Shipping, are also working together for sustainable recycling practice in Bangladesh.

R4 emphasized, “Our drawback is the stock of marine fisheries is already exploited or over-exploited. The catch per unit effort has doubled up within last few years. The fish population is downward.”

R5 mentioned that, to develop the shrimp aquaculture firm at Cakaria, in the southeast coastal zone of Bangladesh, the farmers destroyed about 10 hectares of mangrove forest (Iftekhar Islam, 2004) (MFF, 2018). Similar impact observed at north of Sundarban mangrove forest. The overfishing of brood stock of shrimpfish for hatchery, over harvesting of post-larvae shrimp from nature for firms, larvae and juveniles of fish and crustaceans loss during harvesting shrimp larvae as bycatch, and

indiscriminate natural harvesting of adult and juvenile mud crab from the Sundarbans and adjacent rivers is causing loss of marine bio-diversity and damage to ecosystem. The chemical and antibiotic wastewater of shrimp farms contaminate the near coastal waters (Shamsuddoha & Islam, 2016).

Offshore gas exploration have potential impact on the environment at various stages of the process, depending on the size and complexity of the project and the proximity of sensitive or critical environment. Drilling fluids, well-treatment chemicals, spillage, leakage and physical disturbance are the major impacts to marine ecosystem caused by offshore rigs (UNEP-IE, 1997).

From Figure 10, we revealed that the proposed shallow water sites (SS 4, 9 and 11) for off shore drilling are creating conflict with fishing ground and Hilsa Sanctuary zone (Mahmudul et al, 2016). Some blocks are near to the marine Park, marine reserve and ecologically critical area (JICA, 2016). The already exhausted drilling rig of Sangu Gas Field is to be decommissioned to free the ocean space (Fowler et al, 2014). Accidental spillage is the main risk of off shore rigs.

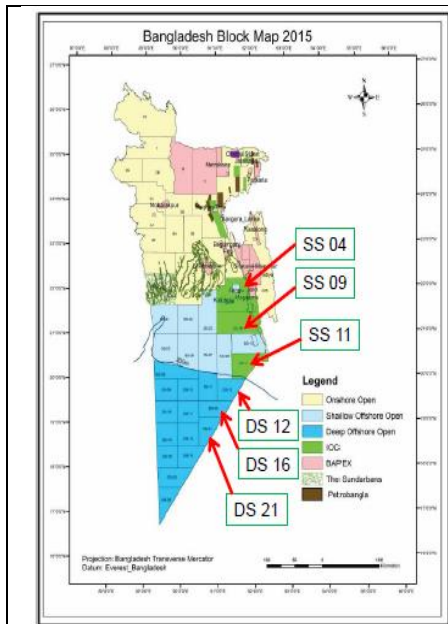


Figure 13 Bangladesh Gas Blocks Map (JICA, 2016)

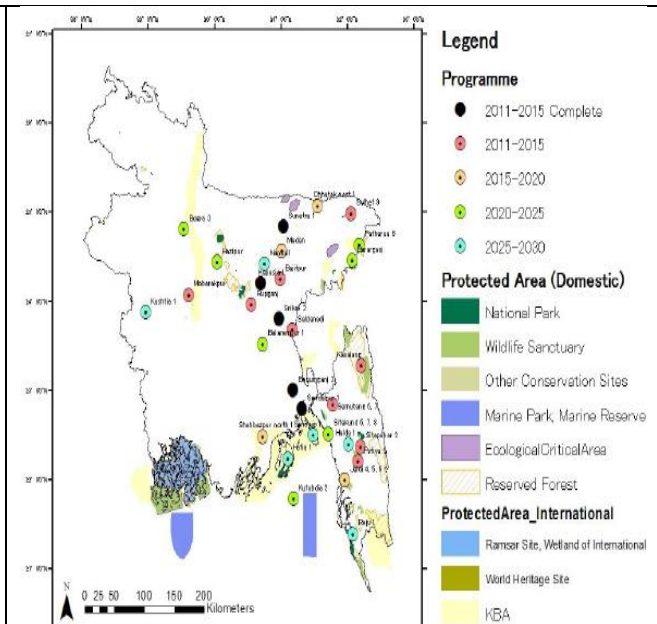
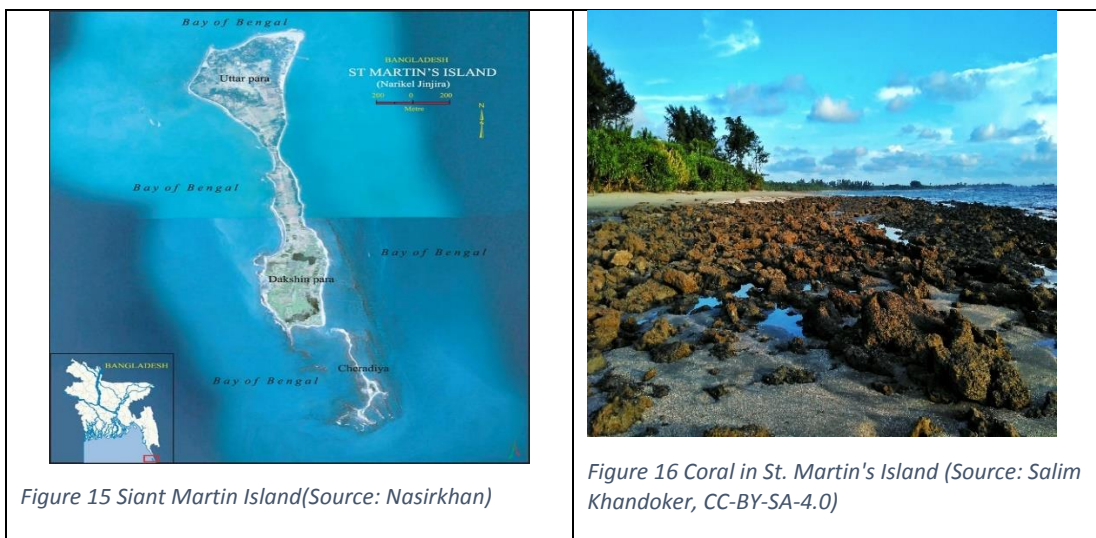


Figure 14 The conflict of gas block and protected area (JICA, 2016)

Coastal tourism can cause loss of biodiversity and damage to the richest and most fragile ecosystems on earth, particularly mangroves and coral reefs in Bangladesh. A massive influx of tourist in a small area caused huge impact of pollution and loss of local resources including cultural and social disruption (Hasan et al, 2014). Saint Martin’s Island is the only coral island situated at the extreme south east of Bangladesh, which is only 8 sq km in size. The enhancement of mass tourism in recent years has caused detrimental impact on the coral environment. About 3,500 people visit this island daily in peak season (Nafi, Ahmed, 2017). R5 mentioned, “The total number of tourists allowed is 2,000 to visit Saint Martin in one day (Hasan, Thompson, 2014). Control of the number of tourists in Saint Martin in a day often failed, due to the lack of supervision and strict enforcement by police and coast guard”. The tour operators brought an average of 210 trips consisting about 5600 tourists per year in the Sundarbans during September 2001 – March 2004 (Shahida et al, 2011).



The salt works have several environmental impacts including; corrosion of iron sheets, rise in temperatures, deforestation, loss of pasture, salinity of fresh water, air pollution, reduction of rainfall in the area, land degradation and increased dustiness in the area. (Ocholla et al, 2013). To prepare the salt pans the local people gradually destroyed the mangrove forest in Bangladesh (Shahadat, Zakir, 2006).

The socio-economic impacts of offshore energy generation is high as it may create employment opportunities and reduce the dependence of coastal community on fishing. The spatial conflict is the major issue while planning the utilization of marine energy resource including offshore wind power. The physical disturbance, noise pollution, infrastructure in seabed will create stress on marine ecosystem and biodiversity.

4.2.4 Sectoral Management:

According to section 4.2.3 of this research, it apparent that the multiple human pressures on small ocean space in Bangladesh is causing cumulative impacts on marine ecosystem and species. The intensity of impacts and declining ocean health have real bearing on how effective management should be undertaken. However, unfortunately still in Bangladesh, the management of marine and coastal areas employ the primarily old sectoral model. Fisheries, shipping, energy and tourism are the sectors exploiting the ocean resource directly and creating potential pressure on marine environment.

The primary zonal division for water resource management is the coastal and marine water. R8 and R9 mentioned, “The water resource ministry and executive agency are working for the policymaking and management of the water resource up to the coastal belt. So far, they do not have a mandate to work for ocean resource management”. In Bangladesh, about one third of the land territory belongs to coastal the zone. A total of 19 districts and 48 sub-districts are considered as coastal zone, determined on the influence of tidal waters, sea-level rise, salinity intrusion, cyclonic and storm surges. The coastal zone of Bangladesh has natural resources including coastal fisheries, aquaculture, forest, salt and minerals. The coastal area of

Bangladesh also contains various critical marine habitats like mangrove forest, coral reefs, estuarine delta, sand dunes, sea grass and salt marshes.

R9 emphasized that the Bangladesh Government has called for distinctive coastal management for preparedness for disaster management and socio-economic development (GoB-MoWR, 2005). The coastal people's livelihood and industrial development has impact on coastal and marine ecosystems. From the interview of R8, R9 and the coastal administrative data, we have prepared the GIS map for quick analysis of the coastal zone in relation with factors creating pressure on coastal and ocean waters.

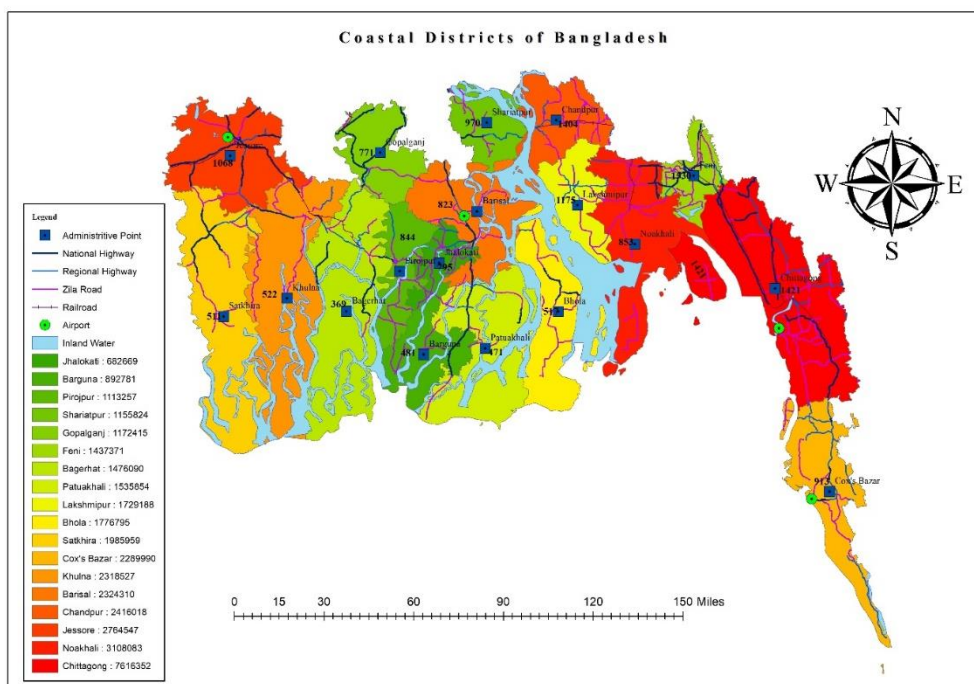


Figure 17 The features of coastal districts in Bangladesh (prepared by Sabbir Mahmood) Source gov.bd web site

The impact of shipping in Bangladesh estuarine, coastal and ocean waters increased adversely within the last decade, due to economic growth and increased shipping traffic. R1 mentioned that Department of Shipping is responsible for environmental protection, which is managed according to the international conventions and guidelines prescribed by IMO. Bangladesh is signatory to the MARPOL Convention,

which provides regulation to control the pollution of oil, sewage, garbage, chemicals, and hazardous substances from ships (IMO-Convention, 2018). R1 further emphasized that, though converting the convention into national law is a complex and slow process, DOS can prepare rules to implement the convention in time (Hasan S. M., 2008). R1 mentioned that Bangladesh has protocol agreements with India and Srilanka for co-operation of coastal trade (Padmaja, 2016). To combat the oil pollution Bangladesh has an agreement with neighboring state India for preparedness and response in case of accidental oil pollution.

R2 emphasized that DOS is trying to implement a double hull rule for coastal tankers carrying heavy fuel oil. R2 mentioned, “Inland ship owners were reluctant to convert the tankers into double hull due to financial reason, but recently some owners found encouraged after getting motivation from DOS through seminar and workshop about the environmental impact of oil in case of any casualty.” He also mentioned that the Mercantile Marine Department of Bangladesh is conducting the flag state, port state and coastal state survey to prevent oil and hazardous material pollution from ships within Bangladesh waters (MMD, 2018).

R4 mentioned, “There are about 68000 mechanized and non-mechanized boats are engaged in artisanal fisheries. Government has not given proper attention earlier to the artisanal fisheries” (Hussain, 2016). The conception was that the ocean space is free for all, there are fishes and the local fishers are catching and maintaining their livelihood by fisheries activities. As such, no management practices have been implemented (Mahmudul et al, 2017). R4 emphasized that after 2014, few measures have been taken by fisheries department, such as catching any kind of marine fish prohibited for 65 days, and prohibition of Hilsha catch for 22 days during spawning period (Mahmudul et al, 2017). R4 expressed satisfaction that, “we are observing the output of those conservation strategies and found positive result. The annual marine catch increased after implementation of the conservation strategies. R4 further mentioned that, at present the institutional capacity is not sufficient for monitoring and controlling the artisanal fisheries. The MMO of DOS are conducting some

activities for registering fishing boats at remote rural areas (MMD, 2018). The local government and local administration are often participating in creating awareness, data collection of fishers at coastal area.

R4 mentioned that, “FD has given license to 247 trawlers out of which presently 235 are in operation. There are some MCS (monitoring controlling and surveillance) activities for industrial fishing. The record of fish catch, area of fishing and other data collected from trawlers is in an analogue system. The auto tracking or reporting system did not established in Bangladesh for industrial fishing”.

R4 emphasized that, “Since 2008 Bangladesh adopted EAFM for sustainable approach to marine living resources. The scientist agreed that if ecosystem cannot maintained the whole fisheries would be depleted. Assessment, planning, conservation, harvesting is the key principle of EAFM. Monitoring, controlling and surveillance are the implementation side of EAFM”.

R11 mentioned that, initially ship recycling has grown without any formal planning and management. Recently, due to the continuous voice of environment groups, a prescribed committee is inspecting the ships prior to beaching. The yards are also bound to provide a management plan for safety and environmental protection while breaking the ships.

4.2.5 Integrated Coastal and Ocean Management:

For effective management of the various sectors involved with coastal and ocean activities including conservation and protection of marine ecosystems, they should work together under a single umbrella, while maintaining their independent identity. The integration of land-based, coastal and marine sectors, which affect the ocean environment, is also required. Inter-governmental integration is the vertical integration among the different levels of Government (Biliana Cicin and Robert Knecht, 1998).

Almost all respondents commented on the importance of co-operation and co-ordination among various government levels and sectors in Bangladesh. R3 focused on formation of a Blue Economy Authority, which may work to integrate all activities horizontally and vertically. R1, R11, R10 and R4 mentioned that there is a high-level committee “Ocean Resource Exploitation and Proper Management Committee” to supervise the sectoral activities in context of Blue Economy growth (Appendix 2). R10 stated that under the auspicious guidance of the Prime Minister the Blue Economy cell started its journey on 09 June 2016. The BEC is working as the lead ministry to work for integration in respect of exploration of resources from marine space (Appendix 3). R11 differed on both approach. He discussed the lack of institutional capacity and human resources within the Government sector regarding blue economy. He also mentioned that there are two types of challenges, one is the already existing blue economy sectors to be reshaped and developed and another is the newly introduced and prospective sectors to be formed. He opined to create a high-level inter-ministerial council or commission for coastal and ocean management. The R1 and R4 respondents showed their satisfaction on recent activities of OREPMC, which was formed under the leadership of Prime Minister on 20-08-2014. The committee consists of 25 members of Secretary-level officers of different ministries and departments. The committee is presided over by the Cabinet Secretary of the Prime Minister’s office. The terms of reference of the Committee are to monitor the short-term, middle-term and long-term planning of various ministries and department for sustainable blue economy growth, every three months.

R4 encouraged presenting the short-middle-long-term plan in terms of blue economy growth of all different sectors in one meeting, so that all the departments may be aware about the other sectors activities. Subsequently if any conflicts arise in the planning period, an alternate approach may be created through discussion. He showed dissatisfaction that, some sectors have not yet studied what resources, prospects and challenges they have in respect of BE growth. He also mentioned that after completion of primary study only cumulative assessment maybe prepared.

4.2.6 Community-based Management:

From the interviews, we have revealed that, 50% of the total respondents have basic understanding and practice of participatory governance and community-based management. R5 asserted that they have a pilot project in the Sundarban Mangrove forest for co-management with local people to protect the forest. R4 highlighted that in sustainable marine fisheries projects, they have a target to train and implement a community based management system in some fisher's village. R6 mentioned that Bangladesh local government has started some road and other infrastructure projects on participatory management. R9 mentioned that the Water Development Board utilize the embankment edges by plantation and polders for fishing, sharing with local people through community-based management.

4.2.7 Policy Process

During the interviews of 11 respondents, only R4 and R11 emphasized an integrated policy setting for sustainable blue economy growth. From both participants we received the opinion of a specific holistic framework for extracting the coastal and ocean resources. They suggested that the process should be effective for long-term benefit sharing and protecting the coastal and marine environment. Almost all respondents pronounced that the first step for our policy process should be identification of resources available in ocean space, including new and existing socio-economic developments that offer opportunities to forward the implementation of the national programmes.

The State minister of MoEM mentioned in his speech while opening Blue Economy cell, "the sea has enormous resources but, we don't know much information about those resources. More and more surveys and studies should be conducted on the Bangladesh's territorial area of Bay of Bengal. The BEC should help us consulting

on how the survey should be conducted and selecting proper ship for seabed surveys (TDO, 2017)".

R4 mentioned, "The future aspects of population growth, economic activities, human impacts, industrialization and all other projected source of pollution should be taken into account while assessing the cumulative impact". R10 focused on setting up programmes for the short, middle and long term. The programme should be prepared after compiling, integrating and analyzing information including economic, social and institutional information, emanating from monitoring and inventory activities at the first stage. R11 strongly recommended the identification of needs for successful implementation of programme. He emphasized on capacity building including technical, financial, legal, administrative and human resources. The education and training institutes should be functioning properly for positive output of Blue economy growth within the next decade.

5.0 DISCUSSION:

5.1 Bangladeshi Institutions:

There are many institutions involved at different levels, and they interact differently in coastal and ocean management in Bangladesh (Shahadat Hossain et al, 2014). Some institutions are working directly for economic growth, some are creating pressures, and some institutions are working to support the sectors to achieve the sustainable goals (Shamsuddoha & Islam, 2016). Adequate capacity, clear mandates and distinct boundaries will enhance strong collaboration to implement the blue economy policy (Zacharias, 2014). The planning of Integrated Coastal and Ocean Management (ICOM) should be structured in such a way to allow involvement of all relevant stakeholders at different geographical levels and have clear mechanisms for inclusive decision-making on common resource management (Cicin-Sain, 2015). All relevant sectors in Bangladesh would be included in ICOM and have clear incentives in place to ensure compliance and self-regulation for successful coastal and ocean resource management in sustainable manner (Shahadat Hossain et al, 2014). Based on the results of the interviews and secondary data we have prepared Figure 18 to indicate the level and interaction of various institutions in Bangladesh in coastal and ocean management.

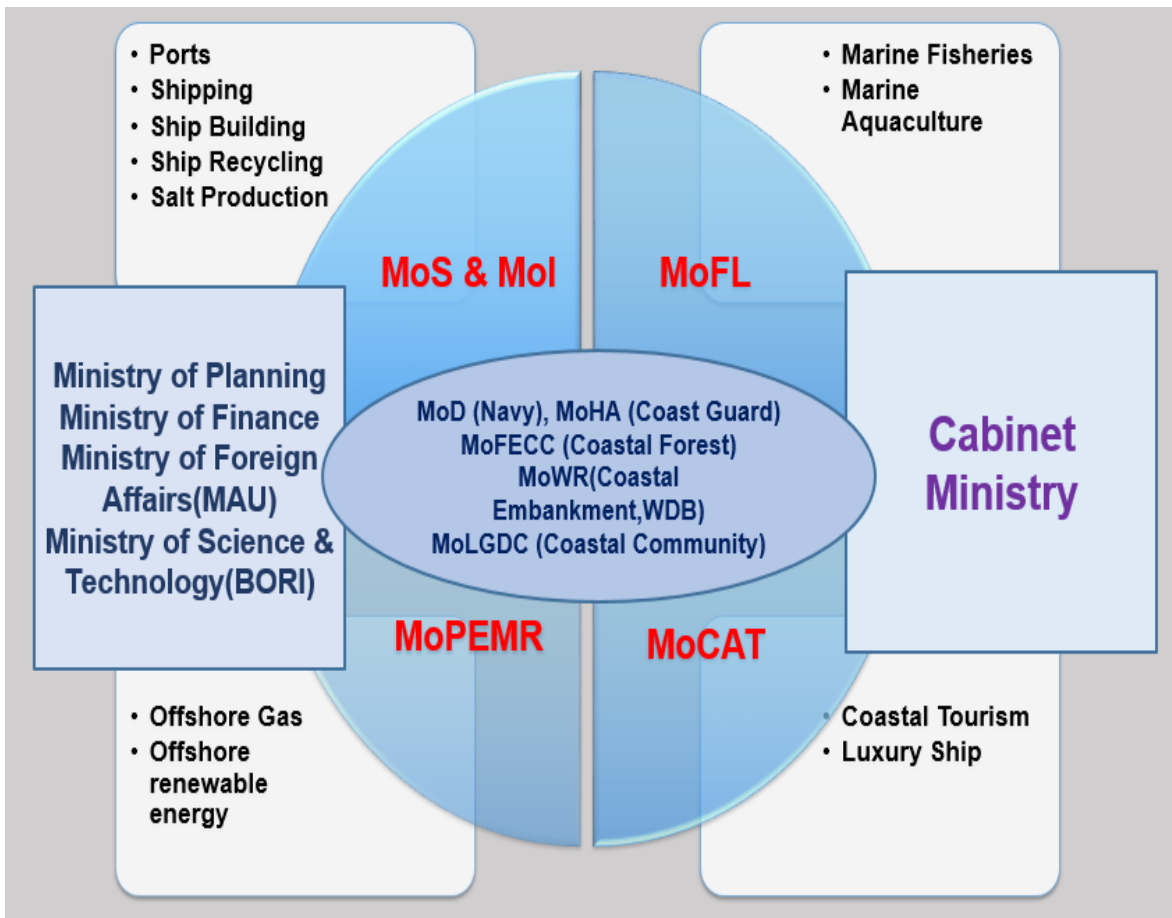


Figure 18 Interaction of Institutions and agency in respect of ICOM (Prepared by Sabbir Mahmood) Source: gov.bd web site & (Shahadat Hossain et al, 2014)

5.2 Themes from Interview Results

There are eleven themes that emerged from the analysis of interview data and results, which represents a level of specific response or meaning that is supporting the answer to the research questions. By using the themes, we determined broad patterns and provide an understanding of big picture of blue economy and management of marine resources in Bangladesh (Nowell et al). The contextual exploration of themes in relation to the existing literature is given below:-

5.2.1 Blue Economy Conception

The ‘Blue Economy’ is a popular modern concept that seeks to convert the careless use of marine resources into sustainable utilization for economic benefit with environmental stewardship and protection (WB-BE, 2017).

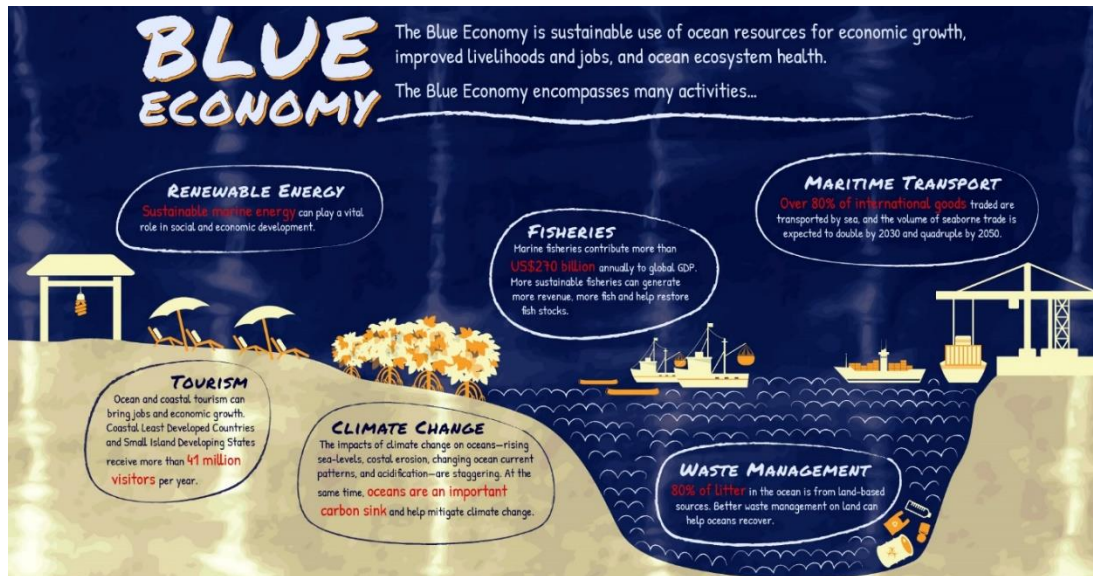


Figure 19 Blue Economy Conception (WB-BE, 2017)

The contribution of the ocean economy is measured through the estimates of value derived from the natural resources (OECD-OE, 2016). However, many of the estimates do not incorporate the tangible services provided by the ocean’s ecosystem, such as carbon sequestration, coastal protection, waste disposal, and the existence of biodiversity (TEEB, 2018). Despite many limitations, quantitative measurement of the eco-system services, to ascertain the economic value, has started recently (P.G. Patil et al, 2018). The natural ocean resources are further divided into two category, renewable stocks or living resources and non-renewable stocks.

The composition of the Bangladesh ocean economy shown in Figure 19, the gross value added is derived evenly from all sectors except from shipbuilding, ship breaking and minerals. The ocean economy contributed US\$6.2 billion in GVA to

the Bangladesh economy in 2015, which is approximately 3% of GDP (P.G. Patil et al, 2018).

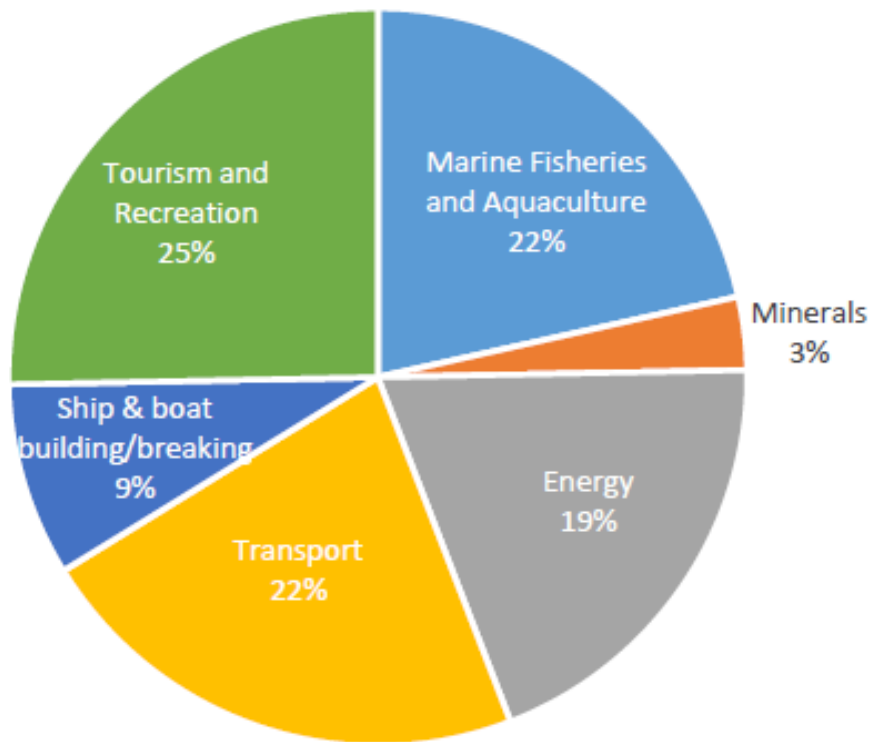


Figure 20 Share of various sectors in BE (P.G. Patil et al, 2018)

Blue economy is an emerging and new concept in Bangladesh (Bari, 2017). There have been only a few seminars held on blue economy and some preliminary studies found on this issue (Appendix 2). After analyzing the results of 6 seminars and 14 related research papers (Appendix 2), we found around 60% of the discussion was related to economic benefit, 25% related to sustainability and 15% related to recommendations. We have taken 11 interviews of high-level Government officers from Ministries and Agencies. From the interviews and our analysis, we revealed that the discussion of Blue economy is still rolling with the dream of economic benefit, with partial focus on sustainability and conservation.

5.2.2 Identifying Coastal and Offshore activities:

The ocean and coastal environment is the integral part of marine environment. As such, identifying the onshore and offshore activities is important for harmonized management. Moreover, the land-based activities is responsible for 80% of the marine pollution, which are primarily agricultural, industrial and urban (VanderZwaag and Powers, 2008). The National Programme of Action for Protection of the Coastal and Marine Environment from Land-Based Activities identified several major issues as the main source of coastal and marine pollution in Bangladesh which shown in figure 20 (DOE, 1999).

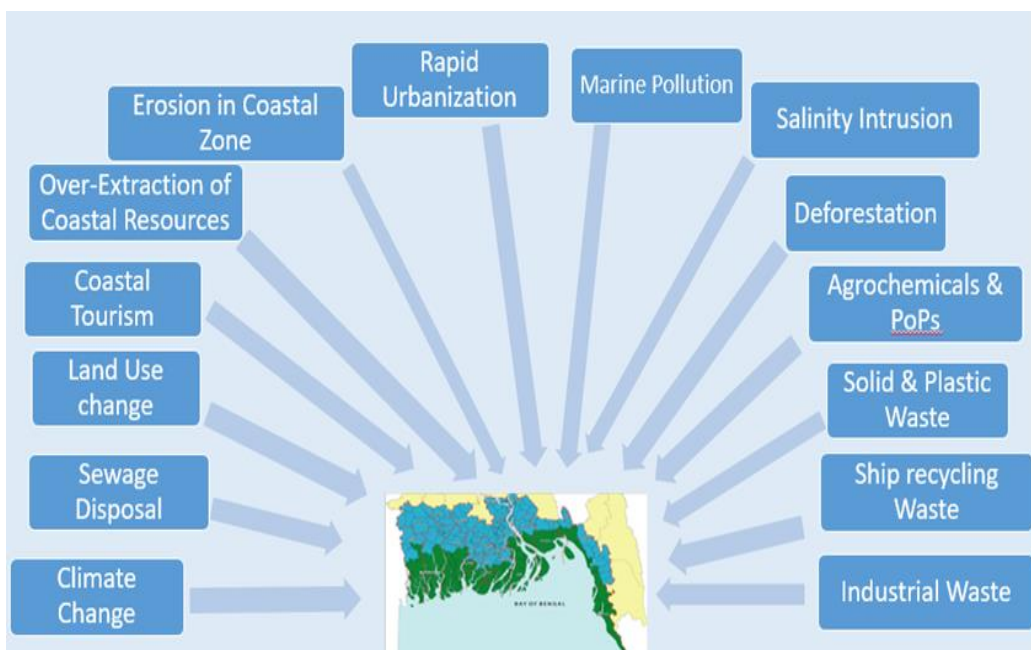


Figure 21 Sources of Land based pollution to marine environment in Bangladesh (Edited by Sabbir Mahmood) (DOE, 1999)

Analyzing the interviews of the respondents and the framework published in the World Ocean review Volume 5, 2017 we have edited Figure 21 to identify the coastal and offshore activities in Bangladesh.

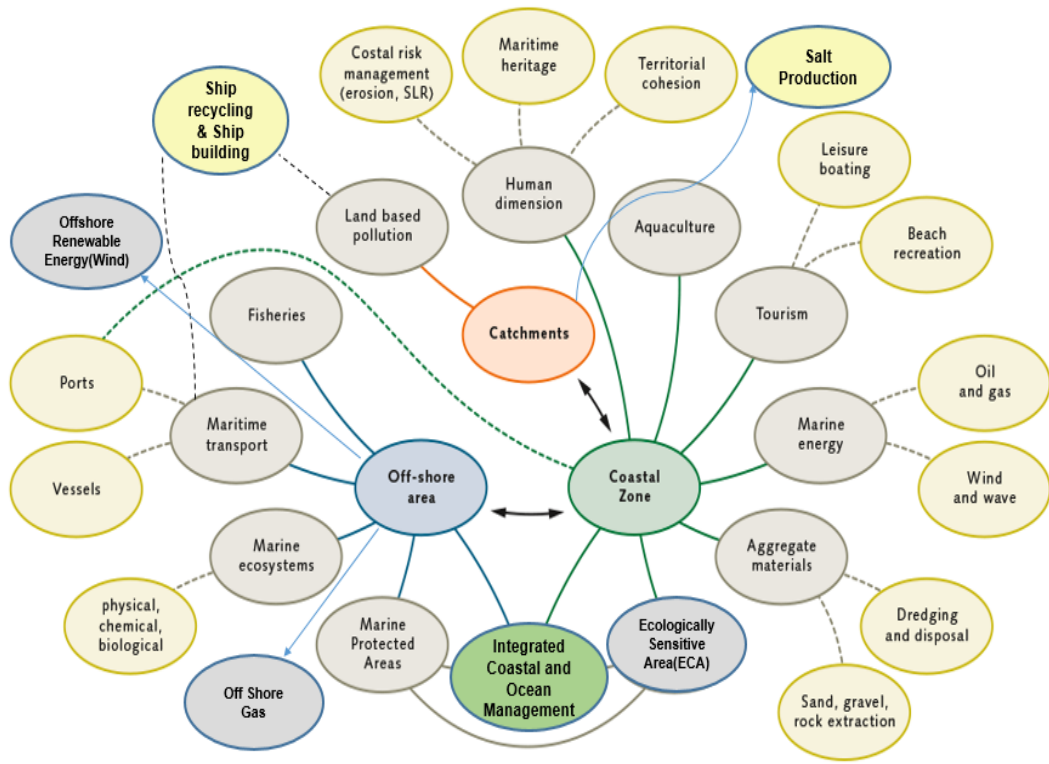


Figure 22 The Blue Economy activities (Edited by Sabbir Mahmood) (WOR-Vol-5, 2017)

5.2.3 Importance and Identification of stakeholders:

The governance of marine spaces is the management of stakeholder activities in these spaces (Sutherland, Nichols, 2010), as they are the actors on use, non-use or combination use of ocean (Douve, 2008). Stakeholder analysis is a tool for the identification and determination of involvement of stakeholders on the basis of their influence, attributes, historical involvement, interrelationships, and interests related to a given issue or resource (Maguire et al, 2012).

To regain confidence, communication and sharing of information should be highest from initial level (OECD, 2018). There should be legal bindings for participation of certain amount of stakeholders in policy process (OECD, 2018). The inshore and offshore activities generate two different categories of stakeholder. In Bangladesh,

based on interview data and the above analysis we prepared Table 2 to identify the appropriate stakeholders and their involvement in the policy process of ICOM.

	Inshore Activities (A):	Offshore activities (B):
01	Chittagong Port Authority, Mongla Port Authority, Pyra Port Authority	Ship-owners of International Ship
02	Owners of Ship breaking yards	Ship-owners of Coastal and Inland Ship
03	Owners of Shipbuilding, ship repair yards and dry-docks	Owners of Fishing vessel (Trawlers)
04	The local authority of 19 Districts and 48 Upzilla (Sub-districts)	Artisanal fisheries community Fishing vessel officer & Crew
05	Forest & Environment Department	Coast Guard & Bangladesh Navy
06	Owners of Shrimp farms	Dredging and sand extraction
07	Buyers of fish at fish landing station	Mercantile marine office
08	Coastal communities about 34.8 million people	Recreational boating, diving and other activities
09	Hotels and business centers in coastal tourism including cruising boats	Ships engaged in coastal tourism
10	Marine clusters (surveyors, P&I)	Oil and Gas Exploration company
11	Fish processing and fisheries related business	Supply vessel for Oil and Gas exploration
12	Salt Production farmers and businessman	Wind Firms company
13	Marine related Educational Institute	Environment Department
14	NGOs and Consultant groups	Military and defense activities
15	Fisheries department	Deep sea port
16	LPG and LNG Terminal	Single mooring Buoy Terminal
17	Water Resource Department	Seafarers

Table 2 The stakeholders related with ICOM (Prepared by Sabbir Mahmood)

5.2.4 Cumulative Impact Assessment:

CIA is a wider approach than the single-project EIA to evaluate the accumulated human impact in valued ecosystem components across space and over time in interactive or additive manner (X. Xue et al., 2004), which is important to maintain the healthy marine ecosystem and supporting the blue economy. The CIA should consider multiple threats, climate change, coincident threat and the vulnerabilities of different ecosystem to those threats (E. Willsted et al, 2017).

The CIA components are base line assessment, setting boundaries, identifying valued ecosystems and indicators, identifying the source of impacts, and prediction of impacts on vulnerable ecosystem components(VEC) through identified pathways (Roger Morris et al, 2010). Spatial CIA is being used to evaluate the effects of multiple anthropogenic pressure on ecosystems. The both approaches of measuring intensity of threat on ecosystems and spatial exposure is important to support ICOM to counter multiple threats, rather than single threats in isolation (Alice R. Jones et al, 2018).

In Bangladesh, the vulnerable marine habitats are mangrove forest, coral reefs and sea grass and estuaries. From the interview results and other documents, (DOE, 1999) (Shahadat Hossain et al, 2017) we have prepared Figure 23 and Table 3 to identify the high, medium and low cumulative impact area and the pressures exerted on those area.

SI	Category	location	Pressures
01	High	South East coast, Chittagong-SaintMartin, appx 20 nm towards sea along the coast.	Chittagong port, proposed Kutubdia LPG terminal, Sonadia Deep Sea Port, Matarbari Coal Terminal, Shipping Route, Submarine cable route and landing station, Sangu Gas Pipe line, South Patch Fishing Ground for

			trawlers, Artisanal fisheries, Shrimp farms, Salt Farms, Coral Island, Coastal Tourism at Coxsbazar, Saintmartin and Chittagong, longest sandy sea beach, Firing exercise, lighterage operation, ecological critical area beside kutubdia, hatchery brooding, proposed offshore wind farm, proposed Mariculture farm, Declared Marine Protected area, risk of hitting cyclonic storm, rise of sea level, salinity intrusion, industrial development
02	High	South West Coast, Bagerhat, Khulna district appx 40-50 nm towards sea from coast	Sundarban - largest single tract mangrove forest, UNESCO world heritage site. Ecologically Sensitive area, Declared Marine Protected Area at Swatch of No Ground, Mongla Sea Port, Sea route, Lighterage operation, Proposed Rampal Coal power plant and huge industrialization, Marine Mammals breeding ground, salinity intrusion, marine geological research, firing area, submarine landing station, fisheries ground, water logging, shrimp farm, inland shipping route through Sundarban,
03	Medium	At centre area, Potuakhali, Barishal	Meghna estuary, Hilsha Sanctuary, proposed Pyra Sea port, Proposed coal power plant, land reclamation, fish harbor, coastal embankment, risk of hitting cyclonic storm, inland port, inland shipping route, sedimentation, coastal erosion, inland brackish water aquaculture, fish breeding ground.
04	Medium	North of Chittagong	Ship Recycling yard, Proposed container terminal, Inland shipping route, land reclamation, coastal erosion.
05	Low	South and centre	Shipping route, fishing ground, firing area.

Table 3 Cumulative Impact Assessment for ICOM in Bangladesh (edited by Sabbir Mahmood) (Shahadat Hossain et al, 2017)

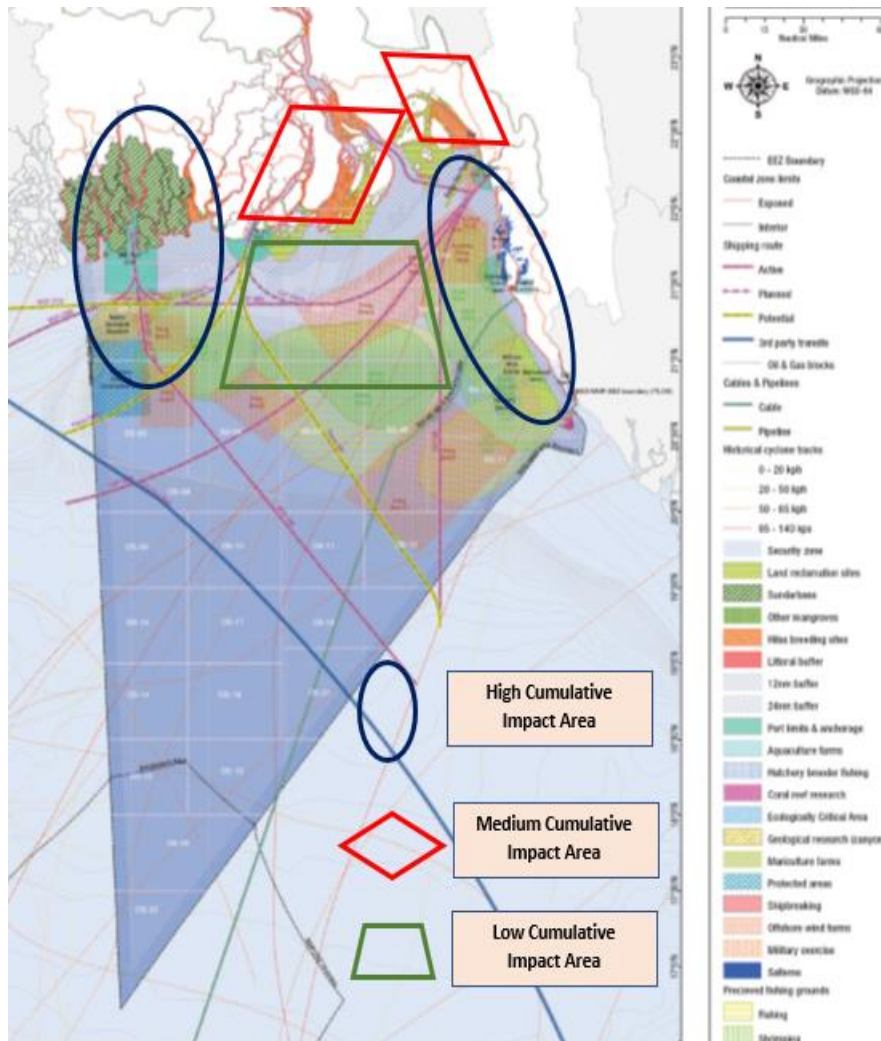


Figure 23 Spatial Cumulative Impact Assessment (Edited By Sabbir Mahmood) (Shahadat Hossain et al, 2017)

4.2.5 Driving force for unsustainable use:

Bangladesh is the ninth most populous country, with about 166.34 million people, and the tenth most densely populated country, with 1115.62 people living per square kilometer (WPR, 2018). About a quarter of the total population in Bangladesh are still living below the poverty line (FYP, 2016). By 2020, there will be about 9.9 million additional people in the work force, all looking to find jobs to support their livelihood (FYP, 2016). Therefore, many people at coastal areas are dependent directly on natural resources (Friedman, 2016). The coastal population is expected to

grow up to 50 million in 2050 (Reazul et al, 2016). As such, the socio economic situation and population status is the main driving force for unsustainable use of natural resources.

The primary driving force of reckless use and destruction of marine habitats and resources is the superstitious belief of poor and uneducated people that the ocean and nature is so big to cause any damage by regular consumption (Razzaque, 2017). We have scarcity of scientific data on physical oceanography, marine biology, and specific value of our resources available in coastal and marine area (GED-PC-GoB, 2015).

Corruption in Bangladesh spread all over the organs of government and state apparatuses and is used for personal and group benefits at the cost of citizens and the state. There are low accountability and transparency in public sector and its decision-making is mostly opaque (Saha, 2014). R11 mentioned, “Corruption and weak governance are the root causes of the unsustainable use of marine resources. The form of bureaucratic administration of Bangladesh is top-heavy. The horizontal and vertical connectivity in administration is weak. In consequence the lack of intra- and inter-departmental co-ordination and co-operation causes a serious threat in ocean governance”.

5.2.6 EAFM and EBM:

Among all sectors, managing the fisheries is the most challenging in Bangladesh as artisanal fisheries represents 85% of the total marine catch (DoF, 2017). Typically, fisheries management is about maintaining the stock size that gives the maximum sustainable yield (or catch) through rules, regulations and management technique (WOR-Fisheries, 2010). Catch limits or a total allowable catch (TAC), fishing effort limits, restrictions on the size of fish that can be caught or retained, gear restrictions, access controls, allocation of shares in a fishery and time-area-gear type closures are few management techniques (FAO-UN, 2007).

From the interview results we learned that, Bangladesh applied prohibition of destructive fishing, banned the monofilament gill- net, and declared temporal and spatial fishing bans in estuaries for fisheries management (Mahmudul et al, 2017). The industrial fishing is regulated through licensing, limited to particular fish and type of fishing gear including methods of fishing (Mahmudul et al, 2017). The ordinance also prohibits fishing in designated areas, restricts mesh size of net and bans fishing in specified periods (GoB, 1983). There are provision to restrict fishing in 40 m depth and encouraged the industrial fish fleets to catch outside 500m depth within 200 nm EEZ (Mahmudul et al, 2017). Hilsha is the single highest marine catch, which is about half of the total marine catch (Shohidullah, 2015). The Hilsha spawning area have three conservation rules, area closed to fishing, restriction on fishing gear and restriction on fishing season (Monirul et al, 2016)

While there is good output from temporal and spatial fisheries management in Bangladesh, the single-species fisheries management approach is not yet sufficient to achieve long-term goal in perspective of marine eco-system and socio-economic wellbeing of coastal community (Heenan et al, 2015). As such, Bangladesh adopted the Ecosystem Approach to Fisheries Management (EAFM) in collaboration with the FAO Regional Office for Asia and the Pacific as a member state (FAO-ROAP, 2018).

The EAFM is a practical approach to implement sustainable fisheries management by establishing balance between ecological and social requirement through good governance (Heenan et al, 2013). The ultimate objective of EAFM is to ensure healthy ecosystems, sustainable fish stocks and protect the socio-economic wellbeing of communities and stakeholders depending on them (Antoni Quetglas et al, 2017). Therefore, EAFM goes beyond regulating fishing activities by employing a holistic approach of ecological and social systems (Long Chu and Tom Kompas, 2014). For the purpose of EAFM in Bangladesh, we have prepared Figure 24 showing the interactions of component of animals (including humans), plants, micro-organisms, and non-living substances.

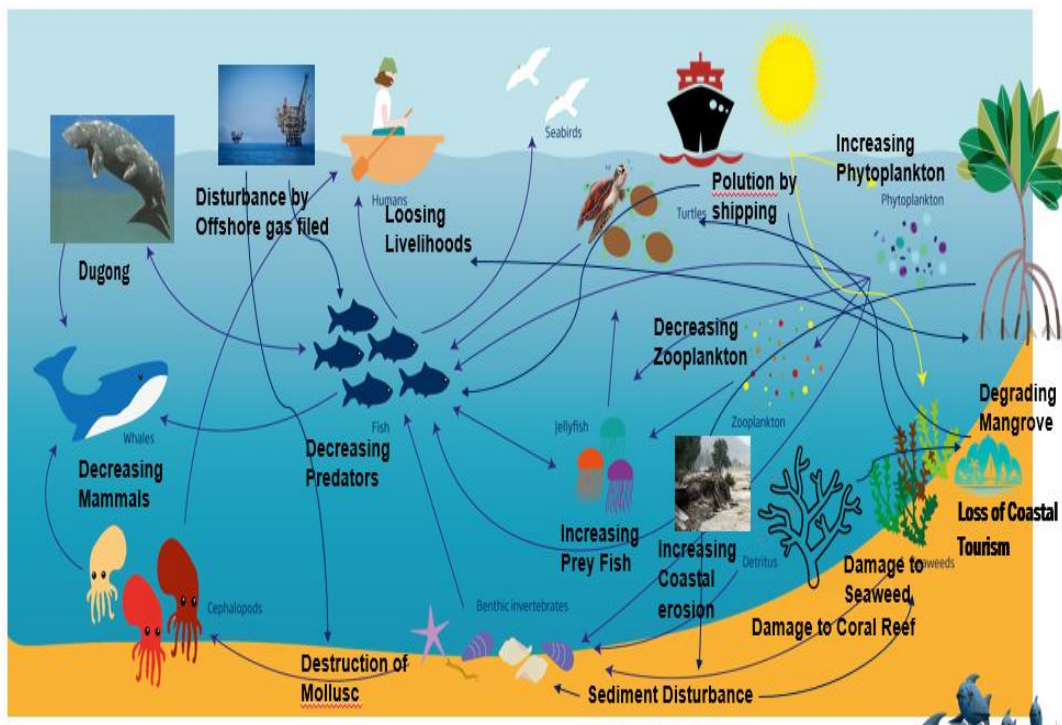


Figure 24 Interaction of marine ecosystem components in Bangladesh (Edited by Sabbir Mahmood)

The National Fisheries Policy, 1998 and the National Fisheries Strategy, 2006 noted that within the preceding twenty years, the ownership of resources has shifted from poor fishers to the traders. As such, the strategy emphasized, “Ensuring the sustainable management of the marine sector through the allocation of fishing rights and its management to communities and relevant fishing groups and by providing the regulatory framework for this management” (DOF, 2006)

This study reveals that to protect our ocean we have to come out from single minded management focus to ecosystem-based management. To understand the EBM, we have prepared a conceptual scenario, analyzing interview results and other documents, (Hoq & Wodeyar, 2002) (Shamsuddin, 2011) (Carson, 2013) (Iftekhara Islam, 2004) (Majumder et al, 2017) (Quader et al, 2017) (Spalding et al, 2014) Figure 25 for Mangrove Ecosystem management in Bangladesh. The indicators of the state of marine ecosystem, is the triggering point of the controlling mechanism,

which should be adjusted with the variations of ecosystem. For example, if nutrient concentration increased the tourism quota may be reduced. For successful implementation of EBM, the cumulative assessment should be done on large spatial scales and in case of uncertainty or scarcity of information to predict cumulative effects, the precautionary approach should be followed (FAO-FTC, 2003).

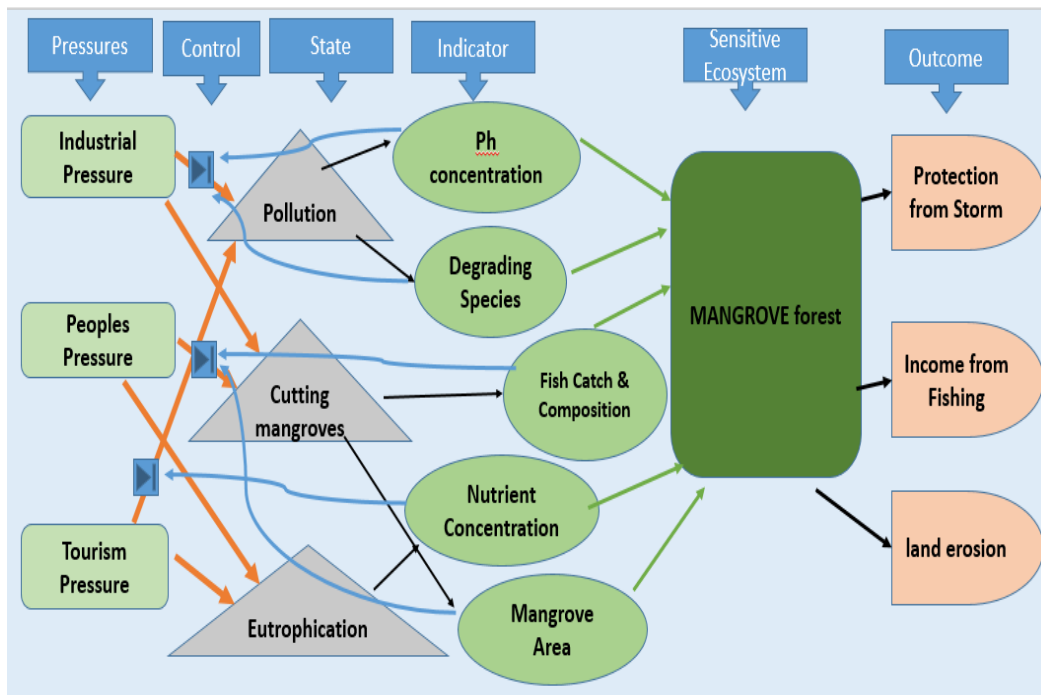


Figure 25 Example of EBM for Mangrove forest in Bangladesh (Prepared by Sabbir Mahmood) (MFF, 2018)

5.2.7 Sustainable Maritime Transport System:

The concept of a Sustainable Maritime Transport System (SMTS) unveiled in 2013 during celebration of World Maritime Day by IMO was declared as “Sustainable Development: IMO’s Contribution Beyond Rio+20” (IMO-WMD, 2013). The key points emphasized for SMTS are: well-organized administration, coordinated support from shipping clusters, maintaining international standards on safety and environmental protection, addressing technical and operational requirements, and appropriate MET for seafarers. The SMTS should reflect protection of marine

biodiversity, pollution prevention and principles of ocean governance from cradle to grave of a ship. To achieve SMTS worldwide, IMO targeted 10 Goals with various activities, among which safety and environmental stewardship, new technology and innovation and ocean governance strongly linked with coastal and ocean management (IMO-WMD, 2013).

Bangladesh has signed 25 conventions and Protocols out of 59 international instruments of IMO as a member state (IMO-Convention, 2018) and party of the Indian Ocean MOU for PSC regime (IOMOU-PSC, 2018). From the interview results, we found that the Maritime Administration in Bangladesh, is fully complying with international regulations through incorporating the conventions into national law or issuing rules from DOS. The awareness of stakeholders, effective implementation of rules, and co-operation with other sectors is the prime challenge to achieve the sustainable maritime transport system. There are many agencies working for environmental sustainability, which we depicted in Figure 26.

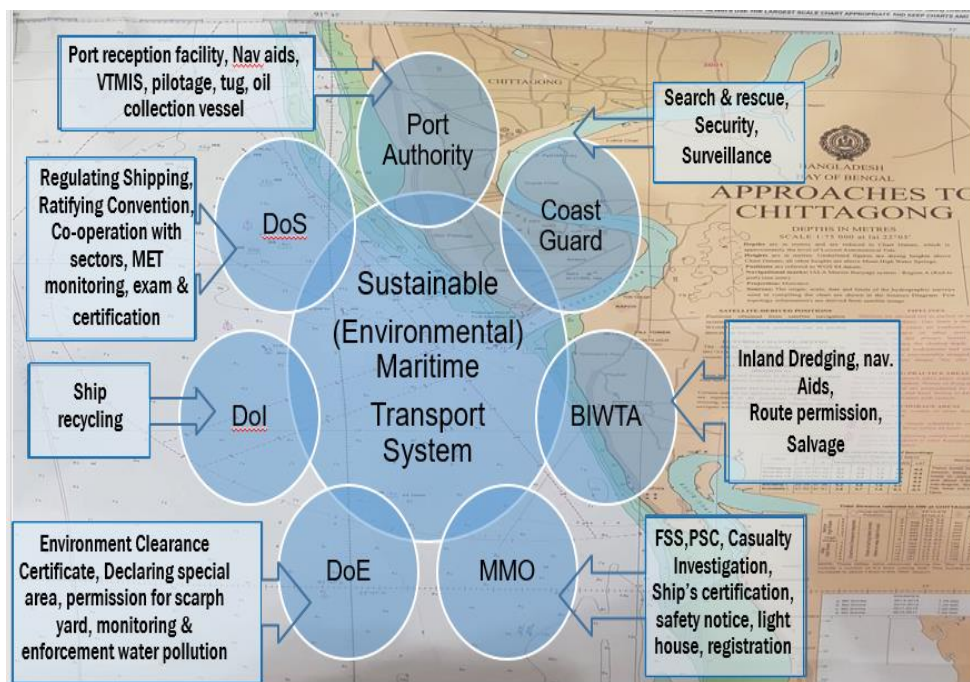


Figure 26 Institutional linkage for SMTS(environmental) in Bangladesh (Prepared by Sabbir Mahmood) (Source: Interview result)

5.2.8 Cross-sectoral management:

Cross-sectoral management is the second step towards holistic ecosystem based management and integrated governance, which require a greater level of scientific knowledge and other information.(WWF, 2017). Cross-sectoral efforts are paramount to achieve the SDGs and prevent pollution and stress on the coastal and ocean environment. The Cross-sectoral co-operation must be enhanced for actions required by the sectors associated with the activities, such as shipping, mining, fisheries, aquaculture, agriculture, industry. The UNEP and European Commission promoted cross-sectoral approach for integrated management at various level, such as local, national, regional, sub-regional and global. (UNEP-EU, 2017)

After analyzing the interview data, we have prepared the Table 4 mentioning the ministries and departments are working with various sectors for sustainable growth of blue economy and proper coastal and ocean management:

SI No	Institues	Related Sectors	Activities
01	Environment Department	Ship Recycling, Port, Industry, Offshore projects.	Provide certificate for any development project.
02	Water resource Department	Coastal People, Fisheries, Shipping	Create embankment, Poddlers, maintain scientific data of coastal rivers.
03	Local Government	Fisheries, Tourism	Create awareness, maintain data, assist in co-management
04	Ministry of Planning	All sectors	Approve projects for budget.
05	Maritime Affairs Unit, MoFA	All sectors related with Blue Economy	Maintain transboundary, regional and international issues.

06	Local Administration	Fisheries, Tourism	Participate in various committee
07	Coast Guard and Navy	All blue economy sector	Provide security
08	Ministry of Science and Technology	All Blue Economy sector	Research, provide scientific data, capacity building.

*Table 4 The cross sectoral institutions, activities and linkage with other sector(Prepared by Sabbir Mahmood)
(Source: Interview results)*

5.2.9 Integrated Coastal and Ocean Management:

Stefano Belfiore et al defined Integrated Coastal and Ocean Management (ICOM) as, “Dynamic, multidisciplinary, iterative and participatory process to promote sustainable management of coastal and ocean areas balancing environmental, economic, social, cultural and recreational objectives over the long-term. ICOM entails the integration of all relevant policy areas, sectors, and levels of administration. It means integration of the terrestrial and marine components of the target territory, in both time and space. ICOM, therefore, is an approach to manage not only coastal areas but exclusive economic zones and large marine ecosystems, serving the purposes of national ocean policies” (Belfiore et al, 2006). About half of the ICOM initiative could not succeed, mainly due to weakness in monitoring and evaluation system (Sorensen, 2002). The nexus between coastal and ocean management indicates a continuity and long-term pressure on oceans posed by human population of coastal cities and climate change (Cicin-Sain, 2015). Therefore, the management of coastal zone and ocean are interlinked for sustainable services and resources of the ocean. (CherdsakVirapat, 2011) The management of the ocean is always critical for its magnitude, fluidity, and geographic scope. Lack of data, remoteness and various uses of coastal and ocean resources are key factors for lack of management. The sectoral and traditional management imposes many difficulties as the ocean absorbs both upstream and downstream human impacts.

The findings from this study show that, in Bangladesh the transformation of CZM into ICOM has been triggered by multiple catalysts, such as the thrust for economic growth, decline and degradation of marine resources and habitats, boundary delimitation and international encouragement.

At the national level, integration of different sectors and integration among different Government level is prime requisite for ICOM. The integration of coastal and ocean issues and various disciplines is import factor for ICOM.

Some options for establishing coordinating mechanisms include creating an interagency committee, naming a lead agency, creating a new agency, and training agency personnel to instill an integrated rather than a sectoral perspective. These four conditions, if fulfilled, would enhance the effectiveness of the integrated coastal management process (Balgos et al, 2015). The ICOM entity and process should be at a higher bureaucratic level than those of the sectoral agencies so it has the necessary power to harmonize sectoral actions; the effort should be adequately financed and separately staffed; and the planning aspect of integrated coastal management should be integrated into national development planning (Balgos et al, 2015).

The goals of ICOM for Bangladesh should be set as identical with the broader goals of the country's seventh five-year plan prepared in 2015 (FYP, 2016). We suggest the goals of IOCM for Bangladesh as, "To contribute into national GDP growth acceleration, employment generation and poverty reduction, through a sustainable development pathway and sustainable use of coastal and ocean resources and ensuring high levels of biodiversity with real conservation of marine habitats".

The main findings of this study show that, the initiative of horizontal integration i.e. inter-sectoral co-ordination, and vertical integration i.e. inter-governmental co-ordination has been established for ICOM of Bangladesh. Figure 27 compiled based on the findings of the data analysis that shows the structure for horizontal and vertical integration in Bangladesh. The integration at top-level is done by a high-level committee supervised by the Prime Minister's Office (Appendix ...). It is suggested that the coordination entity should be at a level higher than the agencies

(Balgos et al, 2015). The Energy Division has been selected as the leading agency for co-operation and the Prime Minister herself looks after co-ordination being the Minister of Energy, Power and Minerals (Appendix) . The sectors involved in Blue Economy activities, together with other inland operations, created the sectoral blue economy cell within the Ministry and Agency for better co-operation and co-ordination including easy locating and accessing the focal persons. The Inter Ministerial and Inter Agency Committee is working for mutual understanding and co-operation. The local Government and administration works for integration at the field level.

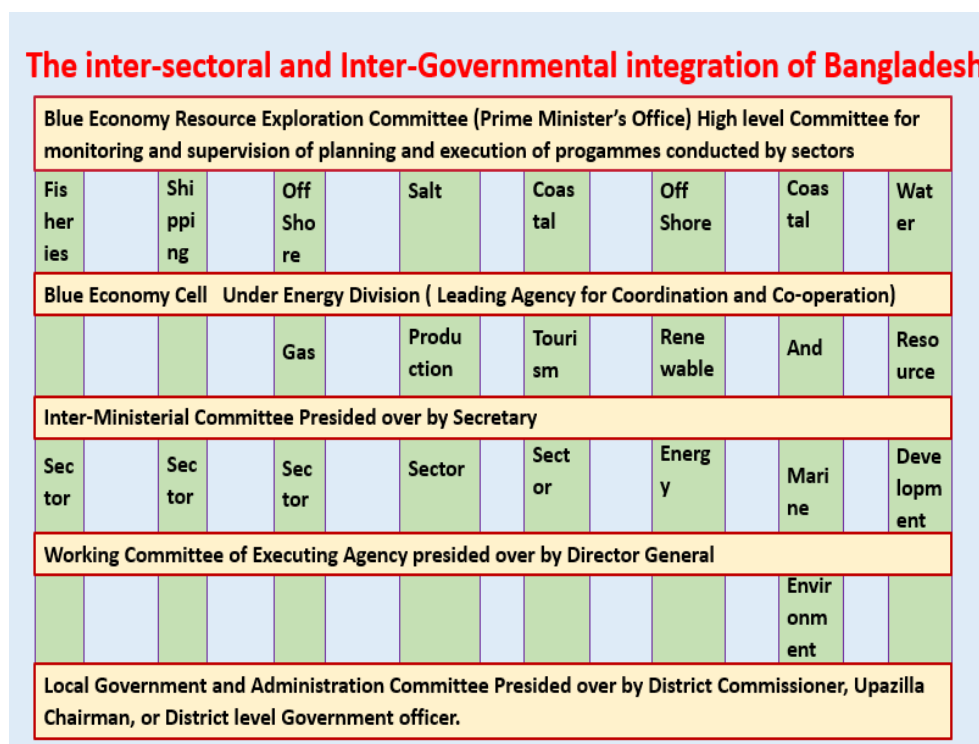


Figure 27 Intersectoral & Inter Governmental integration in ICOM of Bangladesh (Compiled by Sabbir Mahmood)(Source gov.bd web site)

5.2.10 Community-based Management:

Participatory governance is the effort to achieve change through actions that are more effective and equitable than normally possible through representative

government and bureaucratic administration by inviting citizens to a deep and sustained participation in decision-making (Stich and Finger, 2003). Community-based management (CBM) is the most widespread form of participatory governance applied to natural resource management problems. (Agrawal and Gibson, 1999)

Community-based management (CBM) is a bottom up approach that aims for local stakeholder participation in the planning, research, development and management for a community as a whole (WB-CBM, 2001). The decentralization of managing tactics enables local people to deal with the unique social, political and ecological problems their community might face and find solutions ideal to their situation (Agrawal and Gibson, 1999).

The governance model proposed for Integrated Management is based on collaboration. It involves ocean management decisions based on shared information, on consultation with stakeholders, and on their advisory or management participation in the planning process (J.S.Gruber, 2010). True collaboration is intrinsically linked to decision-making (Green, 2007). To demonstrate this relationship graphically, Figure 28 shows that higher levels of community and citizen participation in collaborative processes with government should result in greater decision-making powers for those communities, moving them from an advisory capacity to inclusive governance in a participatory and citizen empowered democracy (KEARNEY et al, 2007).

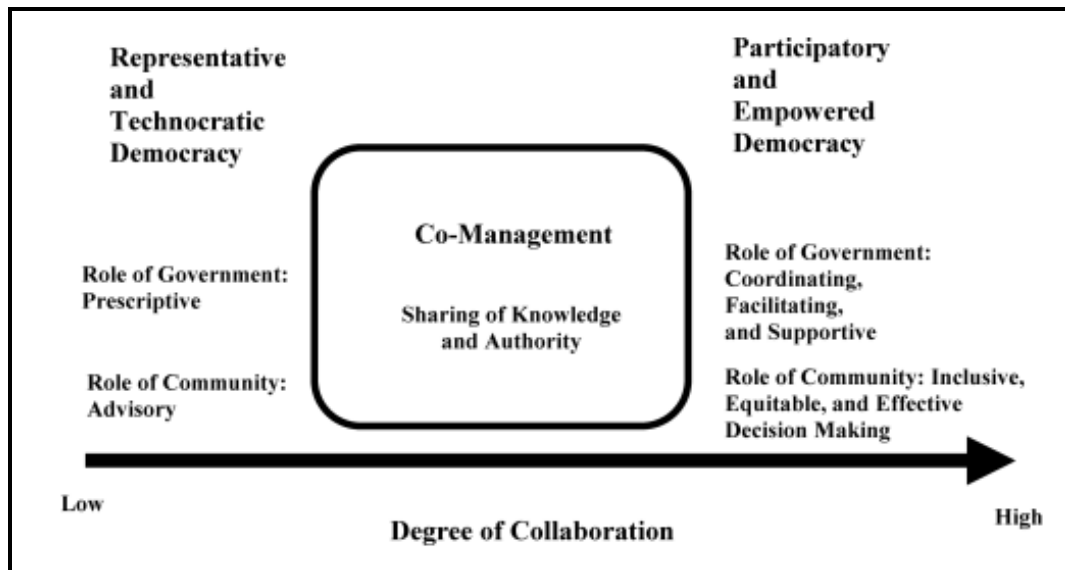


Figure 28 The co-management model of democracy (KEARNEY et al, 2007)

A study and research by (Roy, 2016) showed that villagers' participated willingly in co-management programme of Sundarban Mangrove forest. The community people involved in the resource management and planning programmes under a designated Co-Management structure. There were co-management councils, consisting of 65 members and a co-management committee of 19 members from all stakeholder as shown in Figure 29 and 30. The CMC was responsible for management and sharing the common natural assets as guidance from the finance department. The CoMC was responsible for preparing forums those will select Community patrol groups and eco-tour guides from villagers. (Tariqul, 2012). Considering the (KEARNEY et al, 2007) model of community management, the example of Sundarban mangrove forest co-management is a highly participatory and empowered the villagers to inclusive, equitable and effective decision making.

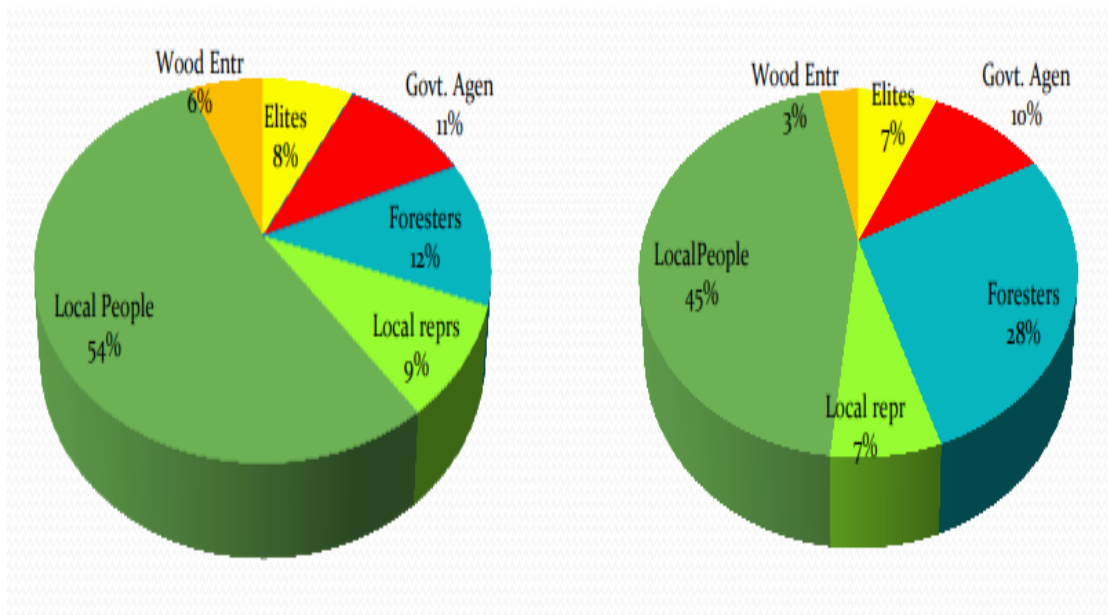


Figure 29 The Co council and committee for community management in Sundarban (Tariqul, 2012)

5.2.11 Policy Process:

Policy setting is a widely used tool when developing integrated policies, for providing multi-sectoral and trans-disciplinary advice to environmental managers and policy-makers to improve the zone's ecological sustainability, economic efficiency, and social equity (Creary, 2003). Sustainability relates to the capability of an ecosystem to go on supplying humans with 'goods and services'. Efficiency is about making the best use of those resources for the satisfaction of human needs. Equity is about the fair distribution of such satisfaction. The policy setting of ICOM is a dynamic, multidisciplinary and iterative process, covers the full cycle of information collection, planning (in its broadest sense), decision-making, management and monitoring of implementation (Australalia-SOE, 2016). This study shows that, there are eight stages (Figure 30) in the development of an ICOM policy process in Bangladesh, which is typical to the other development programs worldwide and international guidelines prepared by World Bank (J.C.Post & C.G.Lundin, 1996).

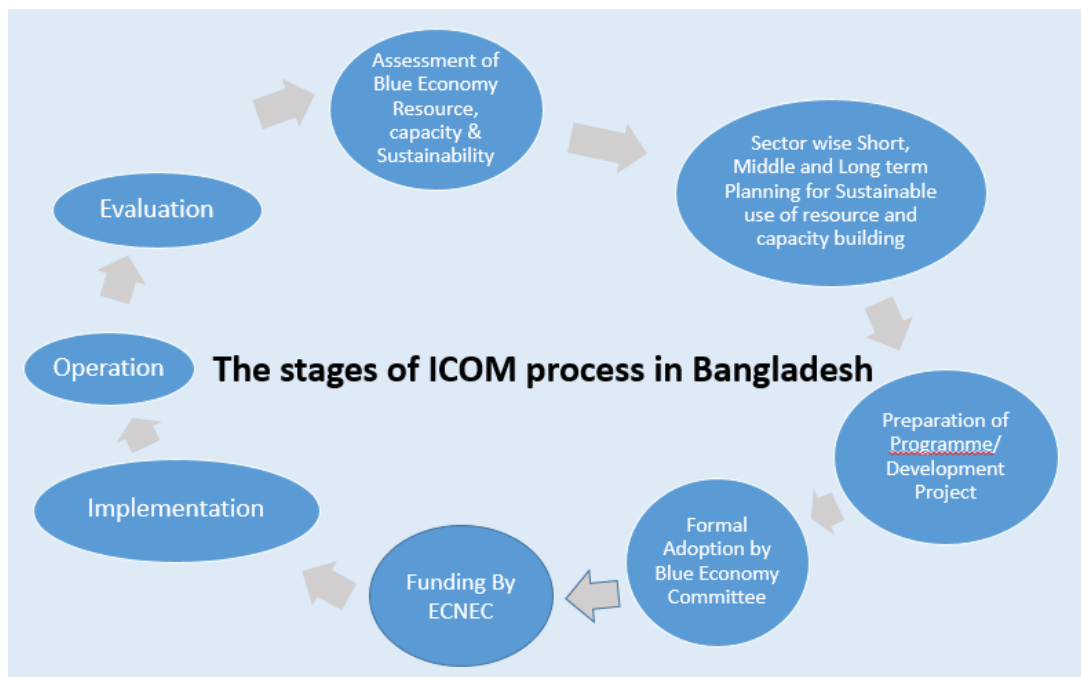


Figure 30 The stages of ICOM in Bangladesh (edited by Sabbir Mahmood) (Source: (Biliana Cicin and Robert Knecht, 1998)

The process of policy-setting for integrated coastal and ocean management is cyclic, evolves in time and can be described in a number of phases. Each cycle addresses problem identification, planning, implementation, and evaluation. Each of these phases in the cycle can be subdivided in a number of different steps. (IOC-UNESCO, 2001)

This study shows that Bangladesh has completed phase two. The first one triggered after initial political will and context of socio-economic environment. The issues identification, prospects and challenges of Blue economy discussed in various level. The players and stakeholders identification completes the first phase. The second phase starts with assessment, which in reality, is in progress for all sectors. The Ministry of planning and blue economy cell set the goals and strategies for BE growth. The short-, middle-, and long-term targets prepared by sectors are awaiting approval. The Management plan and whole phase three of monitoring and evaluation is to be done.

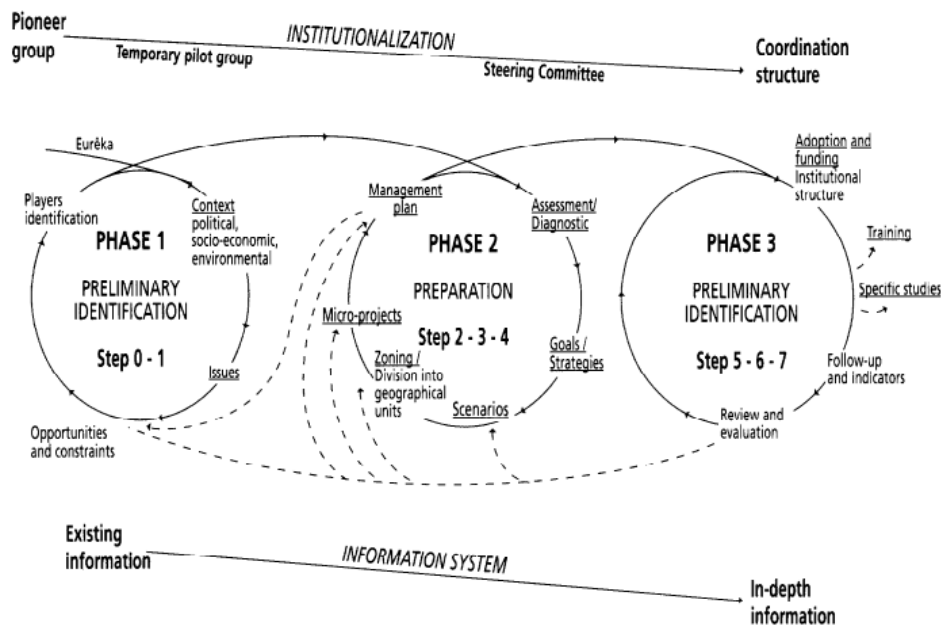


Figure 31 Interconnections and cycles in ICZM planning process (IOC-UNESCO, 2001)

5.3 Cross Cutting Issues

This study revealed that there are eight cross cutting issues, act as bridges between the thematic issues. Some cross cutting issues directly support ICOM activities, while others develop discrete things separately from the thematic issues. Human resource capacity building, public awareness, co-operation and co-ordination, scientific research, data information management and financial capacity are the major cross cutting issues identified from the interview results.

The Bangladesh Government has taken many initiatives to develop the qualified scientists, technologists, managers, users and leaders for ICOM. Presently there are 22 institutes, which are providing higher education on marine knowledge among which, one Maritime University and one research institute named BORI (Shahadat Hossain et al, 2014).

The Bangladesh Government presented call for action in Ocean Conference on June 2017, and the proposals were, capacity enhancement of the local fishers through

training and education, continuous research and building innovative partnership for sustainable ocean management. (OC, 2017).

5.4 Caveat:

Our research would have been strengthened if more time and sample access was available. To understand in more depth, the conception and stages of blue economy sector in Bangladesh, further research, with more sampling should be carried out. Research on implementation, monitoring and evaluation of ICOM to be done in future for understating the effectiveness of ocean policy. Finally, the major limitation of this study as well as proper management set up in Bangladesh, is the shortage of scientific and socio-economic data (OC, 2017). The World Bank Report of 2016 titled Blue Economy Development Framework, confirmed our research findings, mentioning that, “Countries increasingly recognize that they need more knowledge about the biophysical characteristics, carrying capacity, synergies or trade-offs between sectors to ensure an efficient and sustainable management of different activities” (WBG, 2016)

5.5 Alternative Approaches

The Blue Economy Exploration and Proper Management Co-ordination Committee is a high-level integration body (Appendix ...). Some important ministries and agencies representative were not included in the committee, i.e. Ministry of Water Resource, Ministry of Local Government, Ministry of Science and technology, Bangladesh Institute of Ocean research (OC, 2017). According to the terms of reference, the committee may co-opt any more member. The committee members may be grouped in accordance with the connectivity as sectoral or cross-sectoral for the convenience of work.

A designated agency may be established to deal with the coastal and marine water, like SwAM (Swedish Agency for Marine and Water Management) for managing the use and preventing the overuse of marine and freshwater environments (SwAM, 2018).

Participatory governance and community based management is very effective for managing natural resource in rural coastal areas (Agrawal and Gibson, 1999). Bangladesh has already taken steps for that, but without empowering the local government, the success of co-management is not possible (Ahmed, 1991). As such, community-based management should be established involving the local government at coastal regions.

For sustainability in Marine Fisheries alternate employment and value addition to the fish catch and marketing is prime requisite (WOR, 2013). R4 mentioned, “Bangladesh is presently assessing fish stock within its territorial water and EEZ. After completion of the assessment, the MSY will be fixed based on fish stock. There is a plan to increase MEY through efficient fish processing, technical innovation and marketing. The creation of alternate employment among fishers through backward linkage of fisheries industry and other sectors will enhance the social condition of fisher community and reduce the pressure on fisheries”.

6.0 CONCLUSION:

The aim of this study was to gain a more in-depth understanding of the status of the blue economy prospect and challenges of Bangladesh. The balance between blue economy and marine conservation is very important to protect the world ocean. This study helps to understand the integration of the coastal and ocean management in Bangladesh. The study has provided insights on the various steps of management practice in term of coastal and ocean resource exploitation and environment protection by managers in Bangladesh.

A qualitative approach was employed, using a range of complementary methods. The semi-structured interview method was used to collect data and the thematic concept was used for data analysis. However, due to shortage of time, we could not take the interview of more senior level policy makers, academicians and political leaders of this sector. Our journey was started with vision to find out the gaps in effective ocean governance. However, when we have started the literature review and collecting the data, we realized that Bangladesh is still in the initial stage of coastal and ocean management. As such, subsequently after consultation with our supervisors, we focused on the integrated management issue for blue economy growth.

The conclusive findings of this study is, Bangladesh has started collecting scientific information to ascertain the new prospect and challenges of blue economy (OC, 2017). The over exploitation of marine fisheries, land and marine pollution, and destruction of marine habitat, creates huge pressure on the Bay of Bengal (BOBLME, 2010). Though the new sectors like coastal tourism, salt production, offshore gas exploration and offshore renewable energy production, have minimum contribution to the economy, yet they also have negative impact on environment (Shamsuddoha & Islam, 2016). Especially tourism caused damage to the Coral reefs and Mangrove forest at Southeast and South west of Bangladesh. On top of existing environmental pressure, more offshore activities and huge industrial development at coastal zone will create cumulative impacts on the ocean.

Since 2014, after acquiring of its EEZ, the Bangladesh Government realized the importance and requirement of integrated coastal and ocean management. Pursuant to that, one highest-level committee has been formed to conduct the horizontal integration (Appendix 2). In addition, for inter-sectoral co-operation and co-ordination, one lead agency has been formed in 2016 (Appendix 3) . The Environment department is working at cross-sectoral management and making bridges to ensure the protection and conservation of marine ecosystem. There was a Coastal Zone policy enacted in 2005, but with the enhancement of sea area and marine activities, the focus has been extended from coast, towards sea. The management stage has been in practice and identified for the projects of Blue Economy. The principles of sustainable use of coastal and marine resources have adopted for IOCM in Bangladesh.

Iceland's President Gudni Jóhannesson spoke at the World Ocean Summit in 2018 that, "It is clear that what was previously tolerated, won't be going forward". Human impacts on marine ecosystems are becoming more intense and widespread each year. About 13% of the world ocean is now free from intense human activities (Jones et al, 2018). Bangladesh is now in the primary stage of conducting ICOM, yet the regulatory framework, institutional capacity, implementation and evaluation stages are the greatest challenges remaining ahead for successful ICOM (BEC-EMRD, 2018). The involvement of stakeholders in decision-making and community-based management need to be enhanced for effective implementation of ocean policy.

We would like to Quote R4 as the concluding remark of the study, "If you want to conserve, maintain and explore the blue resource, you have to stand at the coast and look far to the ocean and decide what you want to do and how to do. If you plan to invest, you should consider the risk of security, storm, climate change, and remoteness together with ecological vulnerability, uncertainty and multi-sectoral involvement."

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APPENDIX 1 : ACCIDENT REPORT

SI No	Year	No of Accident				Dead	Injured	Missing
		Passenger ship	Good carrier	Others	Total			
1	1991	07	01	03	11	19	03	-
2	1992	14	01	02	17	05	03	-
3	1993	08	03	13	24	183	24	-
4	1994	18	3	3	24	303	20	-
5	1995	11	2	5	19	40	79	60
6	1996	04	4	12	20	147	5	47
7	1997	05	3	2	10	102	36	02
8	1998	07	-	3	10	91	91	58
9	1999	02	-	4	6	104	-	11
10	2000	07	-	2	9	353	50	50
11	2001	08	1	7	16	33	3	13
12	2002	11	2	4	17	297	11	-
13	2003	23	3	6	32	468	3	7
14	2004	14	12	15	41	127	31	-
15	2005	11	4	12	27	248	7	4
16	2006	11	3	9	23	51	50	10
17	2007	04	4	3	11	2	-	-
18	2008	08	5	9	22	120	26	10
19	2009	10	7	17	34	260	12	22
20	2010	05	7	16	28	118	22	73
21	2011	03	11	10	24	74	-	25
22	2012	02	4	8	14	163	3	-
23	2013	03	7	3	13	22	-	3
24	2014	08	6	2	16	123	1	67
25	2015	06	10	6	22	120	-	-
26	2016	02	3	3	8	35	-	2
27	2017	08	15	2	25	45	-	-
28	2018/April	-	05	-	5		-	-
Total		218	126	128	528	3649	280	464

(The inland vessel accident statistics from 1991-2018, collected from Department of Shipping, The original document was in Bengali, translated by researcher)

APPENDIX 2 : BE HIGH LEVEL COMMITTEE

(The committee notice, collected from BEC of Energy and Mineral Resource Division,
Original was in Bengali, Translated into English by researcher)

Registered No. D A - 1

Bangladesh



Gazette

DIRECTIVES

Published by Authority

Sunday, October 26, 2014

Government of People Republic of Bangladesh

The Prime Minister's Office

Gazette

Date, 07 Kartik 1421/22 October 2014

No. 03.071.006.03.00.001.2014-281/(30)- After acquiring EEZ through the judgement of United Nation's International Tribunal for Law of the Sea and Arbitration Tribunal, to explore and proper management of ocean resources from Bangladesh waters, from the decision of the meeting presided over by Honorable Prime Minister on 20.08.2014 a " Blue economy exploration and proper management committee" has been formed consists of relevant Ministries, Divisions and departments :

- | | | |
|--|---|-----------------------|
| 1. Principal Secretary, Prime Minister's Office, Tejgaon, Dhaka | - | Coordinator |
| 2. Senior Secretary, Prime Minister's Office, Tejgaon, Dhaka | - | Joint-
Coordinator |
| 3. Representative of Chief of Naval Staff, Headquarter, Bonani, Dhaka | - | Member |
| 4. Senior Secretary, Ministry of Land, Secretariat, Dhaka | - | Member |
| 5. Senior Secretary, Ministry of Home Affairs, Secretariat, Dhaka | - | Member |
| 6. Senior Secretary, Finance Division, Ministry of Finance,
Secretariat, Dhaka | - | Member |
| 7. Secretary, Ministry of Defense, Gonobhaban Complex,
Sherebangla Nogor, Dhaka | - | Member |
| 8. Secretary, Ministry of Shipping, Secretariat, Dhaka | - | Member |

9. Secretary, Energy and Mineral Resources Division, Secretariat, Dhaka	-	Member
10. Secretary, Ministry of Science and Technology, Secretariat, Dhaka	-	Member
11. Secretary, Maritime Affairs Unit, Ministry of Foreign Affairs, Secretariat, Dhaka	-	Member
12. Secretary, Ministry of Fisheries and Livestock, Secretariat, Dhaka	-	Member
13. Secretary, Planning Division, Ministry of Planning, Sherebangla Nogor, Dhaka	-	Member
14. Secretary, Ministry of Environment and Forest, Secretariat, Dhaka	-	Member
15. Secretary, Legislative and Parliamentary Affairs Division, Secretariat, Dhaka.	-	Member
16. Secretary, Ministry of Civil Aviation and Tourism, Secretariat, Dhaka	-	Member
17. Secretary, Ministry of Industries, Shilpo Bhaban, Motijheel Commercial Area, Dhaka	-	Member
18. Director General, Coast Guard, Dhaka	-	Member
19. Director General, Department of Environment, Dhaka	-	Member
20. Chairman, Petrobangla, Karwan Bazar, Dhaka	-	Member
21. Chairman, Sparso, Agargao, Dhaka	-	Member
22. Director General, The Department of Fisheries, Segun Bagicha, Dhaka	-	Member
23. Director General, Cartography Jorip Odhidoptor	-	Member
24. Chairman, Department of Soil Science, Dhaka University	-	Member
25. Surveyor General of Bangladesh	-	Member

2. Terms of reference:

- a) This committee will monitor the short, middle and long term planning and implementation of the Ministries, Divisions and Departments.
- b) If required, the committee may co-opt one/more persons/officers
- c) This committee will sit every three months

Md Ashraf Uddin
Director

APPENDIX 3 : BLUE ECONOMY CELL

(The meeting notice and members of the Blue Economy Cell, collected from BEC of Energy and Mineral Resource Division, Original was in Bengali, Translated into English by researcher)

Government of People Republic of Bangladesh
Energy and Mineral Resources Division
Blue Economy Cell
Petrocentre (9th Floor), Karwan Bazar
Dhaka.

No. 28.10.0000.000.03.001.17.335

Date: 06/08/2018.

Notice for meeting

For establishment of Blue Economy in Bangladesh, a meeting will be held with all the focal point officers/Ministry/Department on 16-08-2018, Thursday at 1000 hours in Blue Economy Cell Board Room. In that meeting all focal point officers/representative are requested to be present at that time.

(Hamida Edris)
Deputy Secretary
Phone: 02 5501

3315

blueeconomy@emrd.gov.bd

Distribution for necessary action:

26. Secretary, Ministry of Water Resources, Secretariat, Dhaka.
27. Secretary, Ministry of Finance, Secretariat, Dhaka.
28. Secretary, Road Transport and Highway Division, Ministry of Road Transport and Bridges, Secretariat, Dhaka.
29. Secretary, Ministry of Commerce, Secretariat, Dhaka.
30. Secretary, Legislative and Parliamentary Affairs Division, Secretariat, Dhaka.
31. Secretary, Ministry of Industries, Secretariat, Dhaka.
32. Secretary, Ministry of Foreign affairs, Secretariat, Dhaka.
33. Secretary, Technical and Madrasah Education Board, Ministry of Education, Secretariat, Dhaka.
34. Secretary, Ministry of Defense, Secretariat, Dhaka.

35. Secretary, Ministry of Land, Secretariat, Dhaka.
36. Secretary, Ministry of Public Administration, Secretariat, Dhaka.
37. Secretary, Maritime Affairs Unit, Ministry of Foreign Affairs, Secretariat, Dhaka.
38. Secretary, Planning Department, Ministry of Planning, Secretariat, Dhaka.
39. Secretary, Ministry of Fisheries and Livestock, Secretariat, Dhaka.
40. Secretary, Ministry of Shipping, Secretariat, Dhaka.
41. Secretary, Ministry of Civil Aviation and Tourism, Secretariat, Dhaka.
42. Secretary, Secondary and Higher Education Division, Ministry of Education, Secretariat, Dhaka.
43. Secretary, Ministry of Science and Technology, Secretariat, Dhaka.
44. Secretary, Ministry of Expatriate' Welfare and Overseas Employment, Secretariat, Dhaka.
45. Secretary, Ministry of Environment, Forest and Climate Change, Secretariat, Dhaka.
46. Secretary, Power Division, Secretariat, Dhaka.
47. Chairman, Petrobangla, Karwan Bazar, Dhaka.
48. Chairman, Sparso, Agargao, Dhaka.
49. Director General, The Department of Fisheries, Segun Bagicha, Dhaka.
50. Director General, Department of Environment, Shere Bangla Nogor, Agargao, Dhaka.
51. Director General, GSB, Segun Bagicha, Dhaka.
52. Director General, Hydrocarbon Unit, Karwan Bazar, Dhaka.
53. Director General, Bangladesh Coast Guard, Shere Bangla Nogor, Agargao, Dhaka.
54. Managing Director, BAPEX, Karwan Bazar, Dhaka.
55. Bangladesh Navy Office, Operation Branch, Director, Blue Economy Poridoptor (Ad hok), Bonani, Dhaka.

For kind information:

1. Secretary, Prime Minister Office, Tejgao, Dhaka.
2. Personal Secretary of Secretary, Energy and Mineral Resources Division, Secretariat, Dhaka.

Chief Accounts Officer, Energy and Mineral Resources Division, AGB Bhaban, Segun Bagicha, Dhaka.