

Planning for Blue Economy: Prospects of Maritime Spatial Planning in Bangladesh.

Kawshik Saha, Afsana Alam

Abstract— Over the years, there has been a growing concern to adopt new strategies for sustainable marine resource management. Coastal countries are implementing new policies, methods and plans to develop long term vision and secure financial investments for their coastal and marine spaces. Recently maritime spatial planning (MSP) is gaining attention as a new approach to sustainable marine resource management by integrating economic, environmental and social concerns is same management platform. In many countries, MSP has been proved as an effective tool to implement ecosystem based approach of planning to achieve long term maritime vision. Bangladesh, with growing economic interest on coastal and marine resources, is looking to adopt best strategies for achieving blue economy goals. However, degrading ocean health due to anthropogenic pressure and impact of climate change are major challenges that need to be faced. This paper explores implication of Maritime Spatial Planning for ocean resource management to achieve blue economy goals and overcome future environmental constraints as well. The authors aim to introduce maritime spatial planning (MSP) as potential tool for sustainable marine resource management to wide range of researchers, professionals working with coastal and marine issues in Bangladesh to encourage further research and exploration.

Keywords— *Maritime Spatial Planning, Coastal Zone Management, Marine Resource Management, Ecosystem based Approach, Blue Economy.*

I. INTRODUCTION

Spatial planning is a key instrument to establish holistic, long-term, sustainable framework for social, territorial and economic development both within and between countries. Its primary role is to enhance the integration between sectors by taking into account environmental considerations. Spatial planning is spatially explicated approach with zonation to define physical boundaries of human interventions to nature. In Bangladesh, traditional application of spatial planning is

mostly known as land use planning or terrestrial spatial planning (TSP) where government uses this tool to manage land based development within national jurisdictional areas. Maritime spatial planning is a new emerging instrument for spatial planning to manage activities on the sea. MSP is a shifting paradigm of planning concept from land based space management to marine space management. Sue Kidd commenced a comparative argument where TSP has been mentioned as land based cousin of MSP [1]. However, the biophysical characteristics of the marine environment and three dimensionality of marine space are making fundamental differences from terrestrial context. This discourse over planning systems has influenced this article to give a generic conception of MSP as a new emerging planning method. The author highlighted key elements of MSP process by giving discussion on simple generic questions like what, why, how and by whom.

Secondly, the over growing interest on blue economy by Bangladesh government gives a substitute base for justifying this work. In many coastal counties, MSP has been successfully implemented as a tool for achieving long term economic interest using marine resources. For example, countries like Australia, Germany, and Belgium have implemented spatial planning in their national water to boost marine based resource management. Learning from other nations, this is obvious that MSP can deliver a framework for achieving Blue Economy goals for Bangladesh. In order to further develop the issue, this work outlines recommendations for developing a framework to implement MSP with relevant to Bangladesh maritime scenario. The data, maps used for this article has been collected from secondary data resources in form of MSP related publications, journals, case studies, websites. The author expects that this work will give an introductory knowledge of marine spatial planning to professionals, researchers, academics working in coastal-marine sectors to inspire further work.

II. MARITIME SPATIAL PLANNING: DEFINITION

Maritime spatial planning is often termed as marine spatial planning or sea use planning. United Nations Educational, Scientific, and Cultural Organization (UNESCO) define MSP as ‘a public process of analyzing and allocating the spatial and temporal distribution of human activities in marine areas to achieve ecological, economic and social objectives that are usually specified through a political process’ [2]. MSP

Kawshik Saha

Shahjalal University of Science & Technology,
Sylhet, Bangladesh.
kawshik.saha@gmail.com

Afsana Alam

Khulna University,
Bangladesh
afsana.alam.arch@gmail.com

facilitate sustainable use of the marine environment by addressing multiple, cumulative and potentially conflicting uses of the sea. MSP is a spatial approach used to identify the most appropriate area for different uses to reduce and to mitigate environmental impacts and facilitate marine resources with reasonable utilization, as well as increase socio-economic efficiency and ecological security. The Department of Food and Rural Affairs (DEFRA) has defined marine spatial plan as "a strategic plan for regulating, managing and protecting the marine environment that addresses the multiple, cumulative and potentially conflicting uses of the sea"[3]. Moreover, MSP is a future-oriented, adaptive, science-based tool that requires fundamental understanding of physical, biogeochemical and ecological patterns and processes and human interactions in the ocean. MSP need to forecast all of this condition to ensure a wisely developed plan for future sea resource management. Based on Ehler and Douvère, [2] MSP characteristics include:

- Integrated across economic sectors and governmental agencies, and among levels of government.
- Strategic and future-oriented, focused on the long-term.
- Participatory, including stakeholders actively in the process.
- Adaptive, capable of learning by doing.
- Ecosystem-based, balancing ecological, economic, social, and cultural goals and Objectives toward sustainable development and the maintenance of ecosystem services.
- Place-based or area-based, i.e., integrated management of all human activities within a spatially demarcated area identified through ecological, socio-economic, and jurisdictional considerations.

III. BENEFITS OF MSP IN SEA USE MANAGEMENT

One of the key reasons for making any plan is to deliver a future projection of regulated activities guided by vision and specific objectives. This is common that each of sectors have own plan with specific development goals. Apart from sectorial interests, MSP is a holistic approach of planning that include all sectorial goals and develop a common vision towards effective utilization of marine space .MSP connects sector to sector, people to place, development to biodiversity conservation. Evaluation of existing MSP cases shows that specific benefits including economic, ecological and administrative sectors have been noticed few years after implementing MSP [4].Following discussion shows why MSP is more beneficial as resources management tool than most of traditional planning approaches.

- MSP resolve conflict of uses: Overlapping interest on same geographic area create conflicts between uses. One of the major objectives of MSP is to resolve this conflict between existing and new uses by delimiting use based zoning. Spatial zones permit a specific activity within a physical boundary to reduce over lapping with other uses. For example installation of offshore LNG stations might

have conflict with fisheries, so zoning can limit fishing area to make space for hydrocarbon infrastructures.

- MSP reduce impact on biodiversity: Rapid declination of marine ecosystem due to human interventions is one of the major concerns of these days. One of the biggest challenges is to reduce this use-environment conflict in marine ecosystem. Ecosystem based approach (EBM) is an essential measure to manage development strategies in coastal and marine area [5] The goal of ecosystem-based management is to maintain an ecosystem in a healthy, productive and resilient condition so that it can provide the services humans want and need [6]. To conserve biodiversity, MSP has got considerable success elsewhere as an effective tool for EBM. For example, in Chanel Island (USA) death rate of cetaceans due to heavy marine traffic was decreased by implementing MSP. MSP with its plan led integrated approach to manage environment gives a better understanding and long term vision for future ocean [7].
- MSP build resilience against Climate change: Increasing change of sea surface temperature due to climate change is influencing physical, biological and chemical properties of seas around the world. Changing climate is affecting all marine uses including fisheries, tourism, aquaculture, recreation as well as biodiversity degradation. Climate informed MSP can be an effective tool to adopt future challenges and uncertainties with inclusion of climate-related disturbances in marine conservation planning [8].
- MSP improves connectivity among other plans: One of the administrative benefits of MSP is it improves management capacity by linking different authorities for good governance. A lack of connection between the various authorities responsible for individual activities can led to serious uncertainty over future development objective. For example, a single spatial scale can contain multiple plans like water management plan, municipality plan, urban plan, biodiversity conservation plan and various sectorial plans (fisheries, tourism, and energy) led by different authorities. MSP acts as a connecting agent among different sectorial plans and there authorities as well. MSP with an ability to deal with multiple objectives improve decision making and accountability to coordinate between different plans, sectors to achieve a cumulative result [4].

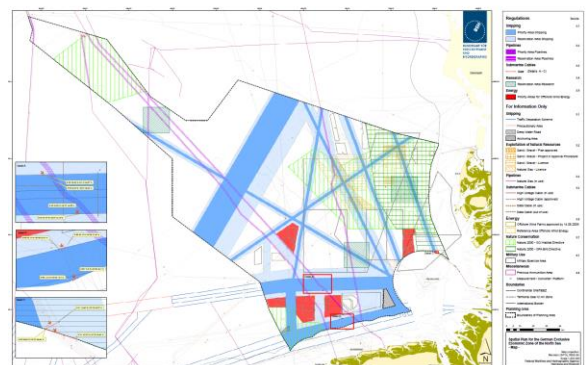


Fig. 1. Overlapping Uses in German EEZ.

- MSP is a people centric approach: Effective stakeholder engagement in every step of planning and implementation process makes MSP more connected to users groups and community. A focus on effective stakeholder involvement gives the provision to adopt bottom-up approach for decision making which is more inclusive than conventional top down approach.
- MSP enhance regional cooperation: Since all oceans are connected and marine ecosystem do not follow any political boundary, MSP gives a provision to plan beyond national jurisdictional water in an international scale [9]. Many joint initiatives for cross border MSP are taking place which help to make better regional coordination between countries to develop common vision sustainable future. Planning Bothnia Sea, Maritime spatial planning in Adriatic sea, ESPON between Portugal and Spain are some example of ongoing cross border MSP projects.

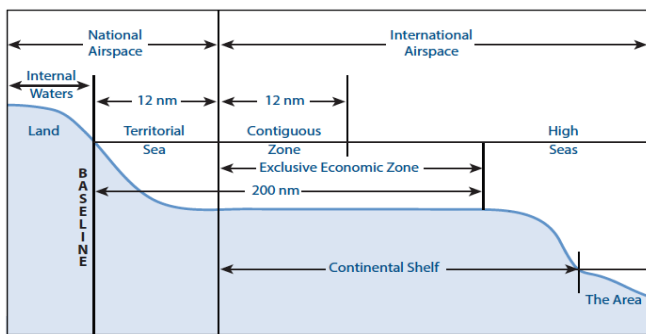


Fig. 2. Maritime zones based on Law of the Sea.

IV. GEOGRAPHIC BOUNDERY AND SCALE FOR MSP

For example, MSP can be developed in national jurisdictional area inside EEZ or large ecological scale of connecting more than one country or within territorial water of an small island. MSP boundary can extend from landward to seaward limit including intertidal zone, estuarine, internal water, territorial sea and Exclusive Economic Zone [10]. On the other hand, spatial scale for MSP can vary according to type of use and ecological scale of the marine environment. For instance, scale of international shipping route is much bigger than artisanal fishing boat roots.

V. METHODS FOR DEVELOPING MSP

Comparable to most of spatial planning processes, MSP encompasses a methodological approach including different

phases with set of activities. In most of the cases, MSP usually consist of three planning phases; pre-planning, planning and implementation. There have been several efforts to develop methodological guidelines for MSP. Out of them, probably the most influential guideline has been published by Intergovernmental Oceanographic Commission UNESCO as ‘Marine Spatial Planning: A Step-by-Step Approach toward Ecosystem-based Management’ [11]. This guide gives a methodological outline of maritime spatial planning process including ten steps that could be adopted any spatial context. Moreover, several EU pilot projects, for example Balt Sea Plan, Plan Coast, Shape also provide methodological guidelines for developing MSP in different scenarios [12].

VI. MSP AROUND THE WORLD:INTERNATONAL POLICY PERSPECTIVE AND AGENDA 2030

Idea of MSP can be a new concept for most of countries, but some have adopted it before. Whereas earlier attempts of MSP were more concerned with establishing marine protected areas (MPA), recent efforts show tend to manage multipurpose uses on marine space [7]. Australia’s Great Barrier Reef Marin\Park is one of the earliest examples for adopting MSP and followed by other countries. Florida keys (USA), Waddenseaplan (Netherland, Denmark, Germany), Marine functional zoning (China), Irish EEA pilot project (UK), Master plan for the Belgian part of the North Sea (Belgium), Spatial plan for North sea and Baltic sea (Germany) are key examples of MSP in national and international context. On 2014 ,European Commission has made a ground breaking move to implement MSP at regional level by adopting a directive ‘Establishing a framework for maritime spatial planning’ [13]. This directive enforce a legal bounded obligation for EU states to draw up MSP by 2021.

Globally the Intergovernmental Oceanographic Commission of UNESCO is playing the leading role .To foster MSP process worldwide IOC-UNESCO organized the first ever conference on MSP in 2006 [14]. IOC is working with an expectation to cover at least half of worldwide EEZ under MSP by the year 2030. So, It is inevitable that MSP is a potential tool for achieving Sustainable Development Goal agenda14 for global ocean governance by 2030 [15]. Very recently IOC-UNESCO and the Directorate-General for Maritime Affairs and Fisheries of the European Commission (DG MARE) adopted on "Joint Roadmap to accelerate Maritime/Marine Spatial Planning processes worldwide". The roadmap indicates common challenges and proposals for actions to be implemented in the coming years by collaboration with other UN bodies and Member States to achieve SDG14 [14].

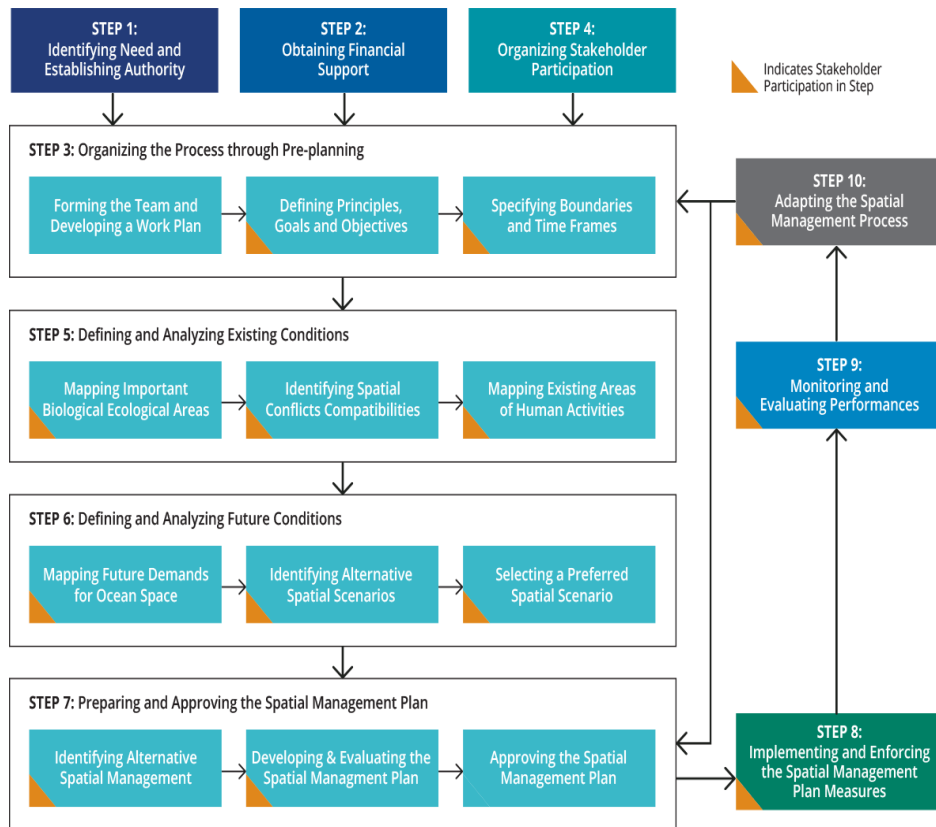


Fig. 3. Step by step approach for MSP by Ehler & Douvère.

VII. BANGLADESH ROADMAP TO BLUE ECONOMY: PROSPECTS OF MSP

Blue economy refers to ocean economy that is sum of all economic activities around coastal and marine areas. Blue economy explores potentiality of ocean resources for economic development by creating jobs and economic turn over. All the sectors of blue economy are independent but they depend on common skills and share infrastructures [16]. The blue economy concept promotes economic growth, livelihood improvement, social inclusion, while conserving environmental sustainability of coastal and ocean areas. The term blue economy is often understood as comprising ranges of economic sectors and relevant policies for sustainable ocean resource management. Blue economy is consisted of diverse components including traditional maritime uses like fisheries, coastal aquaculture, and tourism, shipping and emerging new uses like renewable energy, marine biotechnology, and sea bed exploration.

Like most of recent countries Bangladesh is rethinking ocean ecosystem based economics to promote Blue economy concept. Recently two verdicts over delimitation of EEZ boundary with Myanmar and India [17], have settled Bangladesh with a permanent maritime boundary (fig 4) [18]. With a resourceful marine space, an urge to promote blue economy and international commitment to achieve SDG14 are major driving forces to shape the future seascape of Bangladesh. However, blue economy needs to be sustainable and to respect potential environmental concerns to consider fragile nature of marine environment [16]. Efforts are needed to reduce environmental impacts of maritime activities, for example, over exploitation, pollution, invasive species etc.

VIII. CONFLICTS AND SYNERGIES IN MARINE SPACE OF BANGLADESH

Coast of Bangladesh is a part of Bay of Bengal large marine ecosystem, one of the sixty four large marine

ecosystems of the world. Following the verdict Bangladesh achieved jurisdictional right over 118,813sq km with 200 nm EEZ and 354 nm of continental shelf [19]. Moreover; the coastal zone covers 710 km coastline and 47,201 square kilometer land area, which is 32 percent of total landmass of the country. Coastal estuaries and marine area in Bangladesh contain very rich biodiversity of flora and fauna. The IUCN Bangladesh Red Data Book (2000) has listed 442 marine fishes, 22 amphibians, 17 marine reptiles, 388 resident birds, 240 migratory birds, and 3 species of marine mammals in coast [20]. The coastline also hold features like longest sea beach on earth and largest single block mangrove forest Sundarban, which are a unique biodiversity features for Bangladesh. Apart from biodiversity richness, offshore areas are major source for hydro carbon deposit including 24 offshore blocks [19]. Moreover, coastal beach sand dunes are also potential sources for mineral extraction. Wind and tidal waves also could have good scope for developing renewable energy sector in Bangladesh. Regarding socio economic activities, uses like artisanal

fisheries, commercial fisheries, shipping, oil and gas exploration, under water cable, ship breaking, and tourism are major activities along coast and marine space. Recently Bangladesh Conservation Strategy report on coastal and marine resources [21] gives assessment of coastal and marine resources of Bay of Bengal and could be useful for preliminary data.

To develop a holistic vision of marine space and to achieve blue economy goals, deeper understand of use-environment and use-use interaction is a necessity. As all the sectorial activities are fighting for space allocation, overlapping conflicts should be resolved by sensible zoning. Use-environment conflicts can be addressed by establishing marine protected areas where economic activities would be limiter or prohibited. Data obtained from biodiversity analysis, sector analysis and socio-cultural analysis need to be converted through spatially explicit mapping for better spatial analysis among uses and environment.

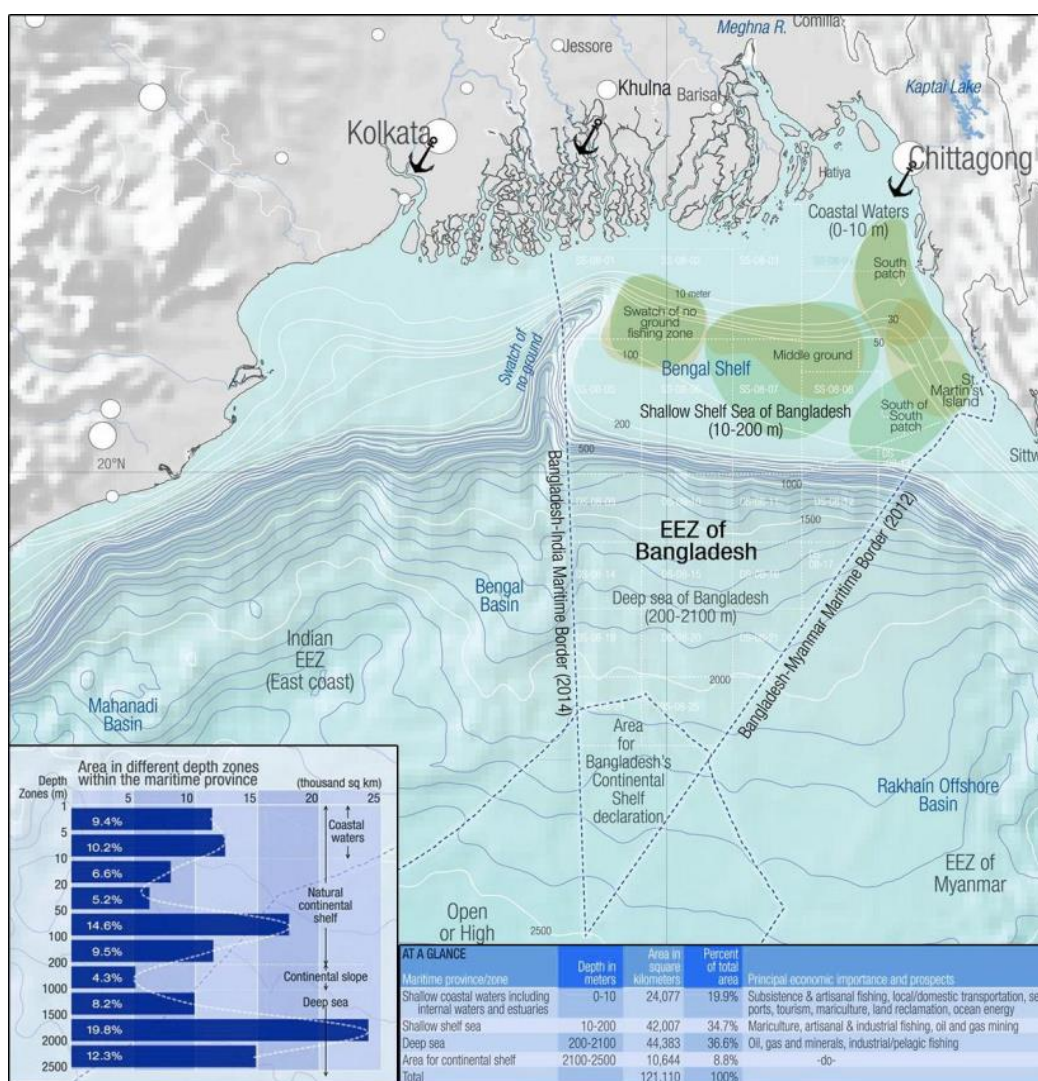


Fig. 4. Marine Province of Bangladesh (Chowdhury 2014)

Tab. 1. Matrix of compatibility and conflicts between maritime uses in Bay of Bengal (By Author).

	Coastal and maritime uses														
	Oil & Gas extraction	Offshore wind Farm	Underwater Cable	Fisheries	Tourism	Coastal aquaculture	Offshore Ship breaking	Port Limit Anchorage	Salt farm	Shipping Route	Sand Extraction	Military use	Mangrove site	Hilsha Breeding site	Protected Area
Oil & Gas extraction	x	x	x			x		x		x	x	x		x	x
Offshore Wind farm				x				x		x	x			x	x
Underwater Cable	x	x						x		x	x	x			
Fisheries								x		x	x			x	x
Tourism	x	x						x	x						
Coastal aquaculture							x	x		x		x			
Offshore Ship breaking					x				x					x	
Port Limit Anchorage		x	x	x	x	x				x	x	x		x	x
Salt farm						x	x							x	
Shipping Route	x	x		x		x								x	x
Sand Extraction	x	x	x			x		x		x				x	x
Military use	x		x		x			x		x	x				
Mangrove								x	x						
Hilsha Breeding	x	x		x		x		x		x	x				
Protected Area	x	x		x		x	x	x		x	x	x			

IX. CONCEPTUAL FRAMEWORK FOR MSP IN BANGLADESH

As it was mentioned in earlier discussion, developing MSP is a step ward methodological process with interdisciplinary activities. Wide range participants from different sectors are needed to form MSP process. An efficient team building should include planners, scientists, conservationists, social workers, politicians, administrators, ecologists, sectorial representations, NGOs to facilitate different stages of plan making and implementation.

A. Plan development framework

In case of Bangladesh, following methodological steps can be taken into consideration for preparing maritime spatial planning (Table 2).The methodology is consisted of set of phases, where every phase should be carried out by some specific task by relevant actors.

Phase 01 – Defining mission, vision and goals for marine space:

The initial phase of MSP is to determine the need of it. Defining and declaring a vision and specific objective is necessary for any maritime time spatial planning .The vision and mission should be linked to national development policy and planning. In case of Bangladesh SDG goals can be a starting point to establish the goal to initiate MSP process. Vision can exist in different scale, from national to local level.

Phase 02 – Evaluating Management effectiveness:

This phase includes setting up MSP process by empowering relevant authorities to initiate planning. Usually a national level authority holds the responsibility to coordinate the MSP process. In case of Bangladesh, a ministerial authority like

ministry of environment can be effective. In absence of national legislation to support MSP, one of effective way to select authority is making new legislation to empower any national authority to implement MSP. A multidisciplinary team consisting of various ministries, research institutes, sectoral stakeholders, environmental organizations should be involved in making the plan. After the initial strategic analysis several issues need to be approached including step ward work plan, identifying area and scale of MSP, organization of stakeholder participation.

Phase 03 – Assessment of existing context:

The goal of this phase is to make an overview of existing context or inventory. This assessments comprise of gathering spatial data on ecological resources, social scenario and economic activities on the planning area. Usually three types of spatial information is required. Firstly, biological and ecological distribution of important species on the area. Secondly, spatial distribution of human activities concerning both economic and cultural. Thirdly, Oceanographic process of the area including bathymetry and physical environment. Jurisdictional boundary should be mapped to identify the scale. For Bay of Bengal, areas of ecological interest can include Hilsha breeding ground, Marine protected areas, cetacean moving area, reefs, mangroves. Economical uses including fisheries, ports, shipping lanes, tourism, natural gas blocks should be spatially mapped.

Phase 04 – Analyzing existing marine context:

Based on spatial data of both ecological and economic resources, advanced computational spatial analysis should be done to identify potential conflicts and compatibility zones among existing human uses and between existing human uses and environment (Table 1). For example, in Bay of Bengal Hilsha breeding zone clearly conflicts with fisheries activities, same as marine protected areas conflict with maritime traffic. Overlapping of different uses and overlapping between human uses with ecological areas need to identify to resolve the problems.

Phase 05 – Developing plan:

Planning is a future oriented act. The key aim of any plan is optimization of present to achieve a future desired goal. Major task of maritime spatial planning is to resolve existing problems by controlling human uses and ensure sustainable resource management for achieving future desired goal. This is why, in initial phase of planning, his necessary to generate future alternative spatial scenarios of marine scape. Choosing the right scenario depends on MSP goal and objectives. A maritime spatial plan mainly consist of two Parts: a) Map showing zoning of specific uses with both ecological and economic concern, b) Regulation for management of identified zones. For zoning, different types of areas are identified based on their priority and management issue. For

example, In case of Bangladesh, marine areas can be divided in to priority areas for specific uses (shipping lane, ship anchorage, sand extraction), reserved areas with spatial permission and attention. Strictly prohibited No-Go zones can be identified for areas with major ecological concern (Hilsha fish breeding zone, MPAs).Some areas should be left as all uses zone to allow all the economic activities to be carried out inside it. Different zones should come out with specific management policy and permission process. Zoning should be determined based on spatial data mapping and effective communication with stakeholders.

Phase 06 – Plan Implementation, monitoring and evaluation:

Planning goals and objectives can only be achieved by effecting implementation strategy for the plan. Implementation means converting MSP plans to actual operating programs with tasks. Under implementation process, responsibilities are distributed among government organizations, stakeholders, communities to carry out management actions on field. Management actions should be clearly identified to enforce MSP in desired area and scale. To ensure effective implementation in Bangladesh, it is better to use existing management authorities rather than creating new ones (Table 2). Moreover, MSP is a continuous process and should be evaluated in periodic interval based on their outcome. In most of the cases worldwide, MSP is evaluated in every 5 years to review the desired outcome

Table 2 Possible MSP development framework In Bangladesh (by Author)

	TASKS	ACTORS
1	DEFINING VISION AND GOAL FOR MARINE SPACE	<ul style="list-style-type: none"> Ministries ,State authorities National Stakeholders Experts
2	EVALUATION OF MANAGEMENT EFFECTIVENESS OF MSP PROJECT	<ul style="list-style-type: none"> Ministries ,State authorities National Stakeholders Experts
3	ASSESSING EXISTING MARIN CON TEXT	<ul style="list-style-type: none"> Scientific institutes Assessment of socio –economic conditions ,activities Professional Experts
4	ANALYZING EXISTING MARIN CON TEXT	<ul style="list-style-type: none"> Local Government Engaging with Stakeholders Setting specific objectives Defining current and possible future conditions Professional Experts
5	DEVELOPING PLAN, SCENARIO	<ul style="list-style-type: none"> University, Institutes Identifying key issues Developing alternative scenario Developing draft plan Stakeholders Professional Experts
6	DEFINING MANGEMENT PLANS ELABORATING WHELY BY WHOM,HOW ,BY WHEN	<ul style="list-style-type: none"> Local Government Developing and evaluating management actions Defining potential actors Defining indicator and time frame NGOs, social workers Research Institutes

many ways and types to include stakeholder elements in planning process. Proper consultation in decision making and informing stakeholders after completing every phase is required.

B. Governnace framework

In national level, National administration should be concerned with development and implementation of broad marine management policy, and designate a lead agency for

coastal management at the national level (e.g. a ministry). The policy should be formulated in a basic plan which can be used to inform lower authorities about the intentions of the national government. In regional level, Regional administration must, depending on its authority, make more detailed but integrated planning. They also have to co-ordinate the activities of local authorities. In local or municipal level, Local administration has detailed planning, development and implementation tasks in municipal level (Fig 6).

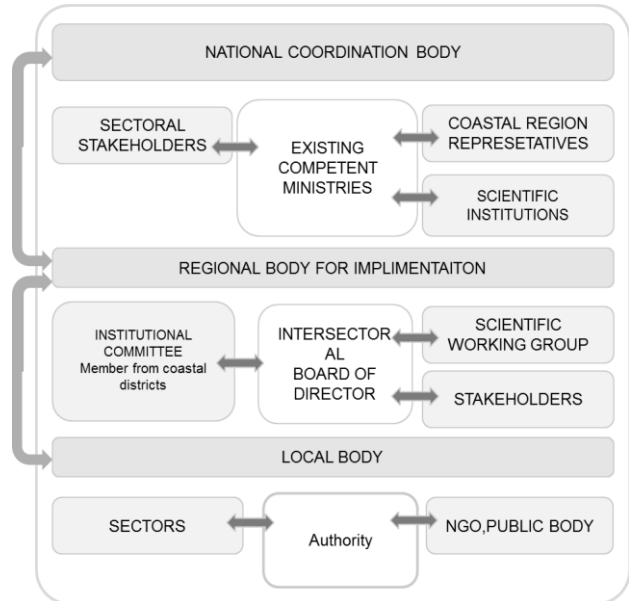


Fig. 5. Prospective Implementation framework for MSP in Bangladesh by author.[22].

X. CONCLUSION

7th Five year Plan (2016-2020) of the Government of Bangladesh stated MSP as key tool to attain sustainable ocean resource management [23]. Marine spatial planning is powerful tool to foster decision making among sectors, stake holders, and administrative authorities. Successful management of ocean resources needs the capacity to understand, predict biophysical, ecosystem interaction through long term observation. This is important to monitor, evaluate MSP process in regular interval and be adaptive. From above discussion, Marine spatial planning (MSP) holds much promise to encompass the large geographic scales of the ecological processes and human impacts that influence coastal ecosystems and adjacent lands. It is obvious that Bangladesh is in a rigorous need to adopt ocean management tool with long term planning policy. However, lacking of scientific knowledge, institutional capacity and governance skill required for successful ocean management are potential drawbacks. Henceforth, a statutory, legally binding MSP initiative based on scientific knowledge and coordination with stakeholders can unveil the new horizon of marine landscape in Bangladesh.

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Kawshik Saha is an architect and conservation planner. He is currently working as an assistant professor in architecture department of Shahjalal University of Science & technology, Bangladesh. Saha received Bachelor of Architecture degree from Khulna University.He also received Erasmus Mundus joint Master’s degree on Maritime Spatial Planning in IUAV University of Venice along with University of Sevilla, and University of Azores. Saha was granted for Global Heritage Fund fellowship in 2010.Saha worked for CORILA as a research assistant in EU funded project ‘ADRIPLAN. Saha’s current research interest includes conservation planning of cultural and natural heritage, sustainability of vernacular settlements, coastal and marine planning.



Afsana Alam (MIAB-189) received Bachelor of Architecture (B.Arch.) degree from Khulna University, Bangladesh in 2008. She was a faculty member (2011-2013) in the Department of Architecture, Leading University, Sylhet. She was also a Lecturer (November 2013 to January 2014) in the Pabna University of Science and Technology (PUST), Bangladesh. Her research interest is focused on Environmental Sustainability and Energy Efficiency in Building Design. Currently she is working as an Architect, Boshot Barri Builders, Jessore, Khulna. Alam’s research interest include sustainable habitat design and planning.