



MARINE TENURE AND SMALL-SCALE FISHERIES

LEARNING FROM THE BANGLADESH EXPERIENCE AND
RECOMMENDATIONS FOR THE HILSA FISHERY



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Cover Photo: Hilsa fishing in Bangladesh

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ACRONYMS AND ABBREVIATIONS

AAS	Aquatic Agricultural System
AIGA	Alternative Income-Generating Activities
CBD	Convention on Biological Diversity
CBFM	Community-Based Fisheries Management
CBO	Community-Based Organization
CDCS	Country Development Cooperation Strategy
CGIAR	Consultative Group on International Agricultural Research
CITES	Convention on International Trade in Endangered Species
CMS	Convention on Migratory Species
CREL	Climate Resilient Ecosystem and Livelihoods
DFID	Department for International Development
DO	Development Objective
DoE	Department of Environment
DoF	Department of Fisheries
EAFM	Ecosystem Approach to Fisheries Management
ECA	Ecologically Critical Area
ECOFISH ^{BD}	Enhanced Coastal Fisheries in Bangladesh
FAO	Food and Agricultural Organization of the United Nations
GDP	Gross Domestic Product
HFMAP	Hilsa Fisheries Management Action Plan
ICM	Integrated Coastal Management
IR	Intermediate Result
IUCN	International Union for Conservation of Nature
MACH	Management of Aquatic Ecosystems Through Community Husbandry
MCS	Monitoring, Control, and Surveillance
MoEF	Ministry of Environment and Forest
MoFL	Ministry of Fisheries and Livestock
MOU	Memorandum of Understanding

MPA	Marine Protected Area
MSP	Marine Spatial Planning
NBSAP	National Biodiversity Strategy and Action Plan
NFMP	New Fisheries Management Policy
NGO	Non-Governmental Organization
RMO	Resource Management Organization
SSF Guidelines	<i>Voluntary Guidelines for Securing Small-scale Fisheries in the Context of Food Security and Poverty Eradication</i>
TGCC	Tenure and Global Climate Change
UFC	<i>Upazila</i> Fisheries Committee
UNDP/GEF	United Nations Development Programme/Global Environment Facility
USAID	U.S. Agency for International Development
VCG	Village Conservation Group
WHC	Wildlife Habitat Council

EXECUTIVE SUMMARY

Through its commitment to addressing extreme poverty, the U.S. Agency for International Development (USAID) is focused on integrating a deeper understanding of the importance of small-scale fisheries and the role marine tenure plays in achieving food security, inclusive economic growth, biodiversity conservation, and other priority development objectives. Small-scale fishing communities are among the poorest and most vulnerable groups in developing countries, highly dependent on wild fish stocks for food and livelihood. These communities are largely landless, residing in coastal areas vulnerable to threats, especially those related to climate change. Small-scale fisheries employ more than 90 percent of the world's capture fisheries workforce and receive few if any subsidies. With fish stocks declining globally due to open access and poor governance of both land and sea, small-scale fishers and their families continue to be marginalized to a life of extreme poverty.

USAID/Bangladesh requested technical assistance to determine if responsible governance of tenure should be considered in future programming and in an existing project, Enhanced Coastal Fisheries (ECOFISH^{BD}). ECOFISH^{BD} supports fishing communities and other key stakeholders reliant on the hilsa shad (*Tenualosailisha*) fishery to improve the resilience of the Meghna River ecosystem and communities. This desk study provides a summary of the Bangladesh experience in small-scale fisheries and marine tenure and addresses the following questions:

- Is there a model for tenure/co-management arrangements in the Bangladesh that can be applied to the hilsa shad, a migratory species whose life cycle requires river, estuarine, and marine ecosystems?
- What are examples of tenure/co-management arrangements that have been applied/worked for this type of fish species?
- Does Bangladesh have a legal/institutional enabling framework to support these arrangements?
- Is tenure/co-management an appropriate approach for this species, based on experience in Bangladesh and elsewhere?
- What types of interventions should ECOFISH^{BD} focus on?
- What types of approaches should USAID focus on? What are implications to the broader fishery of the management options, if USAID focuses on one particular migratory species?

The coastal and marine fishery of Bangladesh is very diverse and based on over 400 species considered to be “marine” fish. Historically, fish supplied 80 percent of the animal protein consumed in the national diet. Although this has fallen, fish still probably supply 50 – 60percent of animal protein. However, most domestic fish consumption is of freshwater species. This was originally from inland capture fisheries, but increasingly since the 1980s pond aquaculture has been a major source of fish in domestic markets. The boundaries between marine and inland fisheries are blurred in Bangladesh, and the zones targeted by the ECOFISH^{BD} project straddles a largely estuarine ecosystem, which combines inland and coastal fisheries. This has important implications for tenure and regulation of fishing. The hilsa fishery is largely estuarine, and the majority of fishers, who are considered small-scale, catch fish in coastal and estuarine waters.

A review of the literature for marine tenure in Bangladesh found almost no information. This is in contrast to inland fisheries in the country where there is a considerable experience on fisheries tenure.

There is no mention of security of marine tenure rights in any areas of Bangladesh. There is also no mention of traditional/customary marine tenure institutions for marine fishing. While community-based fisheries management (CBFM) for inland waters is well established in Bangladesh, CBFM for coastal and marine fisheries is almost non-existent, with only a few examples. Although policy statements supporting CBFM and community-based integrated coastal management exist (for example, the coastal zone policy, national water policy, national fisheries policy, inland capture fisheries sub-strategy and marine and coastal sub-strategy under the national fisheries strategy and action plan, and national adaptation plans of action), these have not been developed into formal instruments or implemented. The literature makes no mention of local governance institutions that determine rules about how key tenure issues such as access, use, management, and exclusion of a defined fishing area are developed and implemented and how these are administered by community-based marine tenure institutions. Similarly, there is no mention of application of fishing rights or community rights in marine fishing areas. Some of these tenure concepts have been applied to public bodies of water based on co-management and exclusive use rights through leases. It is possible that community-based marine tenure institutions exist in coastal areas of Bangladesh, but these have not been formally documented.

Bangladesh has many laws that may impact on coastal and marine fisheries in some way, but there are few that directly regulate inland or coastal fisheries. In general, implementation of environmental laws and regulations in Bangladesh is compromised by overlapping responsibilities between different agencies, lack of delegated clear responsibilities, lack of resources, and the ability of those with influence to bypass laws or adapt their application to their own benefit.

Although there have been a number of research and development projects from the late 1980s onwards, but particularly from the late 1990s to the mid-2000s, that worked to improve management of inland capture fisheries, none focused exclusively on management of riverine or coastal fisheries. Rather most of these initiatives focused more on fisher livelihoods. Fisheries management in isolated waterbodies are likely to be less relevant to ECOFISH^{BD} than experiences in riverine-estuarine fisheries and in large wetland systems with their wide ranging migratory species composition. This is because isolated waterbodies are less dependent on migratory fishes, use rights are more easily defined, and rights holders are more likely to benefit from adopting sustainable practices since the catch spends most of its life cycle within the waterbody. Experience in large haor wetlands of Northern Bangladesh also provides some useful insights.

Project-Level Recommendations. Recommendations to enhance the current ECOFISH^{BD} approach include:

- Estuarine fisheries are only part of the wider marine environment. Interactions of the fishery with other sectors, such as agriculture, will usually need to be managed at an ecosystem level. Hilsa fish, which migrate around the full estuarine/marine system, must also be managed at this level. It is recommended that an ecosystem approach to fisheries management (EAFM) be utilized.
- There is no obvious model of co-management institutional arrangement for the entire coastal-marine ecosystem and stock of hilsa. Globally migratory stocks are managed through multi-level institutional arrangements. The wider challenges of coastal zone co-management are best addressed at the USAID programmatic level, beyond the scope of ECOFISH^{BD}, given that the project is half way through its life.
- Piloting co-management in the greater Andarmanik area is appropriate based on tenure through the existing hilsa conservation area there. However, piloting co-management in the lower Meghna will present an institutional challenge that is unlikely to progress far unless issues of management and administrative boundaries and cooperation are resolved. Proposals to develop

a new marine protected area at/near NijhumDweep appear not to be well informed by USAID's existing support in the past four years to establish co-management in the existing national park there. There is scope to modify plans if the Department of Fisheries can work with fishing communities there to improve management of the fishery within and outside the national park (subject to cooperation with the Forest Department), although this may face challenges over unclear rights to limit fishing and difficulties in establishing community rights.

- To support the resolution of these challenges, ECOFISH^{BD} should focus on completing its spatial analysis of the hilsa lifecycle, including fishery activities, which would cover key social-ecological-governance attributes of the hilsa fishery, including spawning, nursery, feeding grounds, areas of extreme poverty, institutional jurisdictions, sanctuaries etc. This will inform planning, form the basis for strengthening tenure rights, and provide a river-estuarine-marine spatial planning opportunity at an ecosystem/national level.
- There is a need to better examine the market-credit relationship between fishers and *arats* (commissioning agents) and *mohajans* (moneylenders) in the hilsa fishery to understand the relationship and linkages between the agents, moneylenders, and fishers. The strong influence of these agents and moneylenders on fishers could be having an impact on fishing practices and the ability to manage the fishery sustainably. There is also a need to examine post-harvest facilities and infrastructure in the fishery as better quality fish and improved prices for fishers could be obtained and used as a means for more sustainable fishing.
- The existing fisheries laws and policies have not been properly implemented and non-compliance is widespread (Islam, Shamsuzzaman, Sunny, & Islam, 2016b; Murshed-e-Jahan et al., 2014). The lack of adequate monitoring, control, and surveillance (MCS) affects the sustainability of the coastal and marine ecosystem of Bangladesh.
- Fisheries stakeholders need to be consulted and involved in all stages of the conception, formulation, and implementation, preferably through co-management, of any new marine protected areas (MPAs) or sanctuaries, as these changing rights regimes have the possibility of either alienating stakeholders or bringing them together around management.
- A learning exchange needs to be established to share experiences and lessons learned between inland and marine fisheries, and the establishment of rights and responsibilities associated with management.
- For the hilsa fishery, trans-boundary initiatives with neighboring countries may serve as a vital aspect of conserving fisheries resource of Bangladesh. Transboundary cooperation will require forums in which to facilitate dialogue between the various stakeholders, and a comparison of existing legal frameworks.

Program-Level Recommendations. The update of a Country Development Cooperation Strategy (CDCS) as part of USAID programming provides an opportunity to suggest enhancements in program strategy and focus. Based on the legal and policy review for marine tenure and co-management in the ECOFISH^{BD} zones and on marine tenure frameworks and concepts, the following approaches are recommended to improve management of the Meghna River estuarine ecosystem and fishery.

- Share management between a range of different fishery stakeholders;
- Consider an ecosystem-based approach to management;
- Determine the need to invest in the “blue development space”;

- Diversify investment portfolios to address multiple development objectives within small-scale fishing communities;
- Consider responsible governance of tenure in small-scale fisheries explicitly in project design;
- Acquire knowledge on social-ecological system around the distribution of rights and responsibilities governing the local fisheries; and,
- Strengthen marine tenure governance institutions to define and protect tenure rights and effectively engage in co-management arrangements at multiple scales of governance.

I.0 INTRODUCTION

Through its commitment to addressing extreme poverty, USAID is focused on integrating a deeper understanding of the importance of small-scale fisheries and the role marine tenure plays in achieving food security, inclusive economic growth, biodiversity conservation, and other priority development objectives. Small-scale fishing communities are among the poorest and most vulnerable groups in developing countries, highly dependent on wild fish stocks for food and livelihood. These communities are largely landless, residing in coastal areas vulnerable to threats, especially those related to climate change. Small-scale fisheries employ more than 90 percent of the world's capture fisheries workforce and receive few if any subsidies. With fish stocks declining globally due to open access and poor governance of both land and sea, small-scale fishers and their families continue to be marginalized to a life of extreme poverty.

The USAID/E3 Land and Urban Office's Tenure and Global Climate Change (TGCC) program is currently developing focused guidance designed to assist USAID staff and partners in considering the important role of management of small-scale fisheries and responsible governance of marine tenure in reducing extreme poverty. As part of this process, two documents have been developed, a sourcebook that documents the state of knowledge and good practices, and a primer that provides specific guidance and job aids on integration of marine tenure concepts into programming. Field assessments are being conducted in the Philippines and Indonesia to refine this guidance based on lessons from the field.

Marine tenure refers to the range of rights that govern the management of a particular marine area, inclusive of the species that may pass through. It includes the formal and informal institutions that define and uphold these access, use, management and exclusion rights. A thorough consideration of the tenure regime can increase understanding of the incentives that different stakeholder have to manage the system or individual resources within the system. Marine environments are particularly interesting because valuable fishery resources are mobile. When these mobile species interact with less mobile species upriver an interesting management challenge emerges.

USAID/Bangladesh requested technical assistance to determine if responsible governance of tenure should be considered in future fisheries programming and in the existing ECOFISH^{BD} project. ECOFISH^{BD} supports fishing communities and other key stakeholders reliant on the hilsa shad (*Tenualosailisha*) fishery to improve the resilience of the Meghna River ecosystem and communities. This desk study provides a summary of the Bangladesh experience in small-scale fisheries and marine tenure and addresses the following questions:

- Is there a model for tenure/co-management arrangements in the Bangladesh that can be applied to the hilsa shad, a migratory species whose life cycle requires river, estuarine, and marine ecosystems¹?
- What are examples of tenure/co-management arrangements that have been applied/worked for this type of fish species?
- Does Bangladesh have a legal/institutional enabling framework to support these arrangements?

¹ Estuarine refers to transition zone between the salt water ocean (or marine) environment and freshwater river systems, commonly at the mouth of rivers and often extending many miles inland. These waters present a mix of salt and freshwater, commonly referred to as brackish water.

- Is tenure/co-management an appropriate approach for this species, based on experience in Bangladesh and elsewhere?
- What types of interventions should ECOFISH focus on?
- What types of approaches should USAID focus on? What are implications to the broader fishery of the management options if it focuses on one particular migratory species?

2.0 GENERAL CONTEXT FOR MARINE FISHERIES AND TENURE IN BANGLADESH

The coastal and marine fishery of Bangladesh is very diverse and based on over 400 species considered to be “marine” fish. Historically, fish supplied 80 percent of the animal protein consumed in the national diet. Although this has fallen, fish still probably supply 50 – 60 percent of animal protein. However, most domestic fish consumption is of freshwater species. Originally these came from inland capture fisheries, but increasingly since the 1980s pond aquaculture has become a major source of fish in domestic markets. The fishery sector contributes about 5 percent of gross domestic product (GDP), 4.2 percent of exports, as well as full-time employment for 1.2 million people and part-time income for an additional 11 million people. For the poor, fish are a crucial source of nutrition and income. However, in recent decades, the quality and quantity of the country’s inland capture fishery has declined. In the decades since 1985, natural carp spawn catches have declined by 75 percent, and are now negligible, and major carp and large catfish have declined by half in national catches. Fish consumption fell by 11 percent between 1995 and 2000 (but by 38 percent for the poorest households) and it was estimated that inland capture fisheries catches fell by 38 percent between 1995 and 2002 (Muir, 2003). Fish prices increased in real terms at 2.8 percent per year in the 1990s and early 2000s. Catches of the national fish hilsa were in decline, mainly due to over-fishing of juveniles known as jatka. Starting in about 2006 the government introduced seasonal bans on jatka fishing and on catching hilsa during main spawning periods, with some apparent success, and attempted systems of compensating poor fishers during these ban periods through food relief and some livelihood programs.

Although reported marine fish catches have increased over recent decades, their contribution as a proportion of total fish production had fallen to 17 percent in 2012-13 (DoF, 2014) reflecting the continued increase in aquaculture production. Yet hilsa remains an important part of the catch fishery, particularly in marine systems, and constituted 43 percent of the marine catch in 2012-13.

The boundaries between marine and inland fisheries are blurred in Bangladesh, and the areas targeted by the ECOFISH^{BD} project straddles a largely estuarine ecosystem, which combines inland and coastal fisheries. This has important implications for tenure and regulation of fishing. The hilsa fishery is largely estuarine, with the majority of fishers operating in the marine fishery catch fish in coastal and estuarine waters. The estuarine area is strongly tidally influenced with almost fresh to saline water depending on the tidal stage and upstream flow. Saline water from the Bay of Bengal enters more than 100 km interior into the rivers (Mollah, 2008). The estuarine habitat supports a mix of freshwater and marine fishes, along with a few specialized fish. In addition, the important mangrove forest area of the Sundarbans, which contribute three percent of the marine catch, are widely recognized to be a major fishery nursery serving the Bangladesh coastal and Bay of Bengal fisheries, moreover this area is treated as an inland fishery under the Forest Department despite being coastal saline and brackish water.

SMALL-SCALE MARINE FISHERIES

In the national fisheries regime, the small-scale fishery is the most important sub-sector as it lands almost all the marine catch and supports the majority of the fishers. From a management point of view,

however, it is the most difficult sector to manage since fishers are spread out all along the shore, entry into the fishery is free, and fishing tends to be the main source of income and employment in the coastal fishing communities. The small-scale fishery has been passed on from generation to generation in the coastal waters which extend up to 200 m depth from the base line and cover an area of 55,400 km². With the rapid increase in fisher population, fishing in coastal area has become difficult because of low catches and fishing rights conflicts. Many fishermen are now opting to fish away from the coast.

Traditionally coastal fisheries were the domain of low caste Hindus, a culturally distinct and economically disadvantaged group. In recent decades, more and more landless and unemployed Muslim farmers have taken up fishing as an occupation as well. In the absence of any effective institution for sustainable use of resources, these new entrants have tended to adopt fishing practices that test the limits of the fishery's regenerative capacity, and have in many instances occupied the choicest locations, often displacing the traditional fishers.

Despite the importance of small-scale fisheries, management of coastal fisheries in Bangladesh has focused predominantly on industrial trawler fleets, with limited attention being paid to others in the sector. This has led to uncontrolled expansion of fishing effort, which has further moved the crisis forward. Artisanal fishing has already become non-remunerative. Poor fishers are putting more and more nets of fine mesh to survive, resulting in excessive pressure on fish stocks. This has led to increasingly catching less valued and under-sized fish and as a result fish stocks are declining at an alarming rate.

All activities in the Sundarbans Reserved Forest area are under the control of the Forest Department, which has virtually no capacity nor any plan for management of fisheries; on the other hand the Department of Fisheries (DoF) has hardly any access to management of the fisheries resources in the Sundarbans area. This necessary cooperation is an interdepartmental and inter-ministerial issue to seriously consider if the fishery resources of the Bay of Bengal and the livelihoods and food security is to be sustained for food security.

The Marine Fisheries Sector Sub-Strategy emphasizes the priority issue of clarifying whether fisheries resources should be used to maximize sustainable production or to provide employment and a sustainable livelihood to the largest number of resource poor people. The strategy suggests the importance of safeguarding access rights for the artisanal sector in particular through appropriate management mechanisms, as well as the productive gillnet and emerging long line métiers, both of which operate at relatively small scale but operate further offshore than the small-scale fisheries. It then presupposes that large scale, industrial techniques that include trawling and purse seining should only be permitted if there is a sufficient and independent portion of the resource remaining in the sector.

One of the challenges to marine capture fisheries management is the realization of the potential for decentralized co-management, especially for the small-scale fisheries elements of the sector. Community-based management has proved to be successful in the inland fisheries of Bangladesh and both regional and international experience suggests that such models could be adapted for application in the coastal fisheries. The Empowerment of Coastal Fishing Communities for Livelihood Security Project of the Food and Agriculture Organization of the United Nations (FAO) demonstrated some success at applying this model, but further efforts are needed to develop and institutionalize the community-based fisheries management model in marine systems (CBFM 2 Project of DoF/WorldFish).

MARINE TENURE

A review of the literature for marine tenure in Bangladesh found almost no information. This is in contrast to inland fisheries in the country where there is a considerable experience on fisheries tenure. There is no mention of security of marine tenure rights in any areas of Bangladesh. There is also no

mention of traditional/customary marine tenure institutions for marine fishing. While CBFM for inland waters is well established in Bangladesh, CBFM for coastal and marine fisheries is almost non-existent with only a few examples.

According to Roy (2001), there remains a legal barrier to the local and indigenous peoples' right of access to coastal resources because the state generally does not recognize these rights. Areas of fishery and forest resources are considered public property, i.e. state owned and maintained by the government, while the Ministry of Land regulates the management of the land tenure and revenue system. Based on his analysis of marine and coastal resources and relevant tenure arrangements, Roy (2001) identifies the need for the concept of community-based property rights and management to be extended to coastal and marine areas.

Although policy statements supporting CBFM and community-based integrated coastal management exist (for example, the coastal zone policy, national water policy, national fisheries policy, inland capture fisheries sub-strategy and marine and coastal sub-strategy under the national fisheries strategy and action plan, and national adaptation plan of action), these have not been developed into formal instruments or implemented. There has been very limited application of co-management in marine fisheries. The literature makes no mention of local governance institutions that determine rules about how key tenure issues such as access, use, management, and exclusion of a defined fishing area are developed and implemented and which characterize community-based marine tenure institutions. There is no mention of application of fishing rights or community rights in coastal marine fishing areas. Tenure concepts have been applied to public waterbodies through co-management and exclusive use rights based on leases. It is likely that marine tenure institutions and arrangements exist informally and within undocumented arrangements in coastal areas of Bangladesh, but these have not been captured in the literature nor integrated into coastal zone management activities.

3.0 ISSUES SPECIFIC TO THE HILSA FISHERY

Hilsa catches make up one percent of Bangladesh's GDP and contribute considerably to foreign exchange earnings (Rahman et al., 2012). About 450,000 fishers depend directly on the hilsa fishery and about 2 to 2.5 million people are involved in the supply chain from transportation, marketing, processing, and other post-harvest activities (Halder & Ali, 2014). Hilsa was once a cheap fish, affordable even for the poor. After 30 years the fisheries declined, reaching a low point of only 0.19 million tons in 1991–1992 followed by a decade of stagnation. In order to halt the rapid decline of hilsa, the Government of Bangladesh introduced the Hilsa Fisheries Management Action Plan (HFMAP). This prompted the government of Bangladesh to declare five hilsa sanctuaries in the Padma-Meghna River system and their tributaries; impose seasonal bans in jatka and brood hilsa catching; declare some gears detrimental and illegal for use; and, impose strict enforcement, mobilizing the Coast Guard, police, Navy, and other law enforcement agencies, including civil administration. Management of Bangladesh's hilsa fishery is moving from strict regulatory regimes that often ignore the short-term cost imposed on fishers to an approach that combines regulations with incentives or compensation packages to poor fishermen. For example, to compensate for lost earnings and incentivize compliance with the new regulations, the government has started providing affected fishing communities with 40kg of rice per month for four months and some limited alternative income-generating activities (AIGAs) during the ban periods (Haldar & Ali, 2014). While the compensation is highly appreciated, it has only reached just over 50 percent of all fisher households. AIGAs are also extended to only a few communities.

MANAGEMENT IMPLICATIONS OF MIGRATORY FISH SPECIES SUCH AS HILSA

- Migration patterns of fish determine fishery management units.
- Due to fish movement, management units can rarely be managed in isolation.
- Management in one area may not necessarily benefit fishers living in or using that area,
- Multiple interactions between fish and gear mean that no fish species or gear type should be managed on its own.
- Fish lifecycle requirements may mean that some communities only feel costs, while other communities only experience benefits (may need payment for environmental services). As a result, some communities get rights while others get restrictions.
- Due to the impacts of external factors on fish stocks, fishery managers must participate in integrated resource management
- Due to the complexity of the fishery, management must be shared by a variety of stakeholders, both hierarchically, as through co-management, and spatially, between different geographic sub-units of the fishery

ROLE OF MIDDLEMEN

Islam, Mohammed, and Ali (2016a) report that after landing their fish, small-scale fishers normally sell them at auction in local fish landing centers, in the local market, or directly to local fish processors. Fish marketing is controlled by a group of intermediaries known as *aratdars* (commissioning agents) and *mohajans* (moneylenders), both of whom are rich and powerful members of society. Sometimes the same person is both a commissioning agent and a moneylender. The commissioning agents dominate the wholesale markets, each one with a chain of suppliers bringing in regular catches. They provide advance money (*dadon*) to boat owners to make boats and nets, on condition of exclusive right to buy their catch. The agents charge a three to six percent commission and take two to four fish for every 80 fish sold. Fishers tend to sell their fish as soon as possible to these agents after landing to avoid spoilage, as cold storage facilities are inadequate and good quality ice is rarely available. There are around 6,500 fish markets scattered across the country of which approximately two-thirds are small primary village markets.

The role of middleman is particularly important since they regulate fishers' behavior in the exploitation of fisheries resources through credit and patronage. The coastal and marine fisheries are over-capitalized with increasing number of fishers, entering into the fishery each year, resulting in over-exploitation of the resource. Thus, for any policy-making regarding small-scale fisheries governance, the role of middlemen as drivers of resource use should be incorporated (Dewhurst-Richman et al., 2016).

HILSA FISHERIES CONFLICTS

Islam, Shamsuzzaman, Sunny, and Islam (2016b) define the marine hilsa fishery as an artisanal type of fishery. Hilsa stocks are exploited by a variety of gears, including the clap net, seine net, barrier net, and fixed bag net. The largest contribution, however, comes from gillnets and drift nets, and mechanized fishing with gillnets accounts for the bulk of the landings from the sea. Coastal fisher communities typically lack alternative livelihood sources. The sector is further characterized by an open access regime with a crowding of effort in the coastal waters. This crowding is often attributed to the absence of technical skills and capital on the side of fishers to go beyond the inshore water to exploit other resources. However, it is also indicative of the lack of enforcement of existing management measures and lack of adequate policies against over-fishing.

There is intense competition for fishing space which often leads to conflicts that cause loss of property or even physical harm and spills over into communities on land, further increasing social tensions. Most notably, there are conflicting situations among mechanized and non-mechanized fishers. Fishers of non-mechanized boats and mechanized boats blame each other for illegal fishing, though both types of fishers often continue fishing during the ban period. Due to the limited mobility of smaller boats, non-mechanized fishers can only harvest a smaller catch and are more susceptible to being caught during raids by law enforcers, while mechanized fishers can harvest more due to greater mobility and can escape easily due to higher speeds of their boats.

Hilsa fishers are rarely consulted prior to any changes being made in fisheries regulations, which contributes to the high level of non-compliance and ensuing conflicts. Given that conflicts and social tensions negatively affect the wellbeing of hilsa fishers, fishery co-management approaches could be an effective solution for building a synergistic relationship among resources users and government. In designing co-management plans for the hilsa fishery, the simultaneous conflict/cooperation that exists among different fishery stakeholders should be considered to make the hilsa co-management model more effective and compliant.

Badhon (2016) reports that under the HFMAP, fishers have been subjected to increased enforcement and fines, while other stakeholders involved in the value chain, namely *dadondar* (creditors) and

consumers, are not targeted. Enforcement efforts exclusively target fishers, and in the first six months of 2013-2014 the quantity of jatka(hilsa fry) seized, the number of prison sentences made, and the total amount fined from implementing jatka conservation activities were greater than the whole years of 2012-2013 and 2011-2012 (Islam et al., 2016b). Six different law enforcement agencies have been deployed to target hilsa fishers. The disparity of actions on different actors has resulted in supply chain mismanagement, and also an ethical argument against actions taken. Supply chain and consumer responsibility merit substantial attention in terms of combatting illegal fishing.

SOCIOECONOMIC CONDITION OF HILSA FISHERS

Hilsa constitutes the largest single species fishery in Bangladesh. About 40 percent of Bangladesh's fishers depend on hilsa fishing directly or indirectly. In addition to limited income, hilsa fishers suffer from extortion, inadequate credit facilities, ineffective marketing system, and lack of access to appropriate preservation facilities (ice factory or cold storage facility). Most women in hilsa fisher communities have no access to finance nor access to income generating activities.

Hasan Faruque and Ahsan (2014), reporting on the socioeconomic condition of Hilsa fishers in the Padma River area, found that almost all fishers were disadvantaged in social capital such as networks, groups, trust, access to institutions, etc. Results of the study showed poor existence of social organizations among the fishers. The lack of social capital has affected livelihoods of fishing communities, with a lack of mobility and contact to various input and output markets, leading to weak extension services, healthcare services, social and development activities, and education institutions. Fishers are also disadvantaged financially. Most of the women of the fishing communities in the study area had no access to income-generating activities. Additionally, most traditional fishers are Hindu and reported that increasing numbers of Muslim fishers have resulted in frequent conflict with Muslim fishers who are supported by local elites and use non-selective gears such as fine mesh mosquito nets (locally known as *Kapa jal*).

Islam et al. (2016b) further confirm that many of the hilsa fisher households cannot eat regularly, have little education, and have access only to moderate public health facilities. Some receive financial assistance from the government and international donors. Local village leaders tend to make community decisions and resolve most family conflicts, although sometimes elected local government representatives such as the chairmen and members of the union *parishad* (a local government unit) resolve conflicts. Women generally have less freedom, both socially and economically, than men, but most women can vote in national and local government elections.

4.0 LEGAL AND POLICY CONTEXT FOR MARINE TENURE AND FISHERIES CO-MANAGEMENT

Although Bangladesh has many laws that may in some way impact coastal and marine fisheries (for example, Farooque and Hasan [1996] listed 185 laws with a bearing on the environment), there are few that directly regulate inland or coastal fisheries. Generally, implementation of environment-related laws and regulations in Bangladesh is compromised by overlapping responsibilities between different agencies, lack of clear delegated responsibilities, lack of resources, and the ability of those with influence to bypass laws or adapt their application to their own benefit. This section briefly summarizes key provisions in relevant legislation and policies.

The **Protection and Conservation of Fish Act, 1950**, and related Protection and Conservation of Fish Rules, 1985, which cover not only fish but also amphibians and aquatic reptiles, are applicable for all waterbodies except ponds and tanks. They prohibit fishing by harmful methods (such as “fixed engines” barrier systems, poisoning, explosives, and dewatering), pollution and other activities detrimental to fisheries, and enable declaration of closed seasons in specific waters or in general and other rules to regulate, for example size of fish caught or mesh sizes used. However, the DoF has limited powers to enforce fishing restrictions, being dependent more on the will of fishers and leaseholders, with support from magistrates.

The **Territorial Waters and Maritime Zones Act of 1974** and associated **Rules of 1977**, while mainly focused on defining territorial waters, provide for the government to establish conservation zones within territorial waters to protect living resources from indiscriminate exploitation, depletion, or destruction. They also allow unlicensed exploitation by non-mechanized Bangladeshi vessels, banned dynamiting, and made it possible for the government to designate a closed season for fishing for any period and in any area.

After signing the 1982 United Nations Convention on the Law of the Sea, Bangladesh sought new ways to responsibly manage and conserve its marine resources (Chowdhury, 1998). It took the first step towards this goal by introducing the **Marine Fisheries Ordinance (1983)**, which outlined rules that continue to provide the main legal framework for controlling activities, conservation, and development in the marine zone (Chowdhury, 1998). Among other things, the Ordinance empowers the government to declare marine reserves (under this provision, four areas within the Bay of Bengal were declared as reserves in 2000), bans explosive fishing, and covers licensing of vessels. Related rules were passed that prohibit the use of small mesh nets, poisoning, and electric and explosive fishing. The marine reserve provision covers flora and fauna, but is within a fisheries law. However, there is no provision for territorial fishing rights, and licensing is in no way linked with resource management plans or sustainability. According to the ordinance, small-scale coastal fishers can fish in the coastal waters within 40m depth at the highest tide. The ordinance excludes industrial trawlers from this zone.

The Bangladesh **Environment Conservation Act (1995)** and the **Environment Conservation Rules (1997)** serve as the main legislative framework for environmental protection by setting

requirements for environmental impact assessments among other things. The Act allows for the declaration of Ecologically Critical Areas.

Since the early 1990s policy statements have been developed for most sectors including fisheries and others impacting on the environment. These are general statements of intent and are not well harmonized nor coordinated. They have been influenced also by international conventions and requirements, but their implementation has been limited. Bangladesh is party to the five primary conventions with bearing on marine biodiversity conservation: Convention on Biological Diversity (CBD), Convention on International Trade in Endangered Species (CITES), Convention on Migratory Species (CMS), Ramsar Convention, and Wildlife Habitat Council (WHC).

The **Environment Policy and Action Plan** (1992) is wide-ranging, covering agro-chemical control, industrial pollution, wetland maintenance, fuel efficiency, forest and biodiversity conservation, food quality, and other issues. By naming over 80 government agencies and bodies to implement the plan it highlights the problem of how to coordinate across such a major cross-cutting issue. The subsequent National Conservation Strategy and National Environmental Management Action Plan are more detailed but only led to site-specific projects. The **National Conservation Strategy** provides a country-level strategy for the conservation and sustainable use in eighteen different sectors. The **National Environmental Management Action Plan** was developed collaboratively by the Ministry of Environment and Forests (MoEF) and local communities, non-governmental organizations (NGOs), professional groups, and others. It provides the policy framework for environmental development and broad sectoral guidelines to inform such development. The **National Biodiversity Strategy and Action Plan** (NBSAP) outlines the country's commitments and plans to meet goals under the Convention on Biological Diversity.

The **National Fisheries Policy** (1998) focused on fish production and poverty reduction, but included an objective of conserving biodiversity and conserving inland open water bodies. It was superseded by the **National Fisheries Strategy**, developed by DoF (DoF, 2006), which set out a strategy for each fisheries sub-sector and a ten-year action plan up to 2016. In marine fisheries, the Strategy recognizes an unquantified excess fishing effort and capacity and aims to develop “sustainable management of the marine sector by allocating fishing rights to communities and relevant fishing groups and by providing the regulatory framework for its management.” Given the policy focus on small-scale fisheries, it advocates reserving most of the resource for coastal communities, yet also controlling use of destructive gears operated by poorer people as well as those used by industrial vessels. Monitoring is noted to have been misdirected by focusing on industrial vessels when it should prioritize small scale operations. It also observes that investment in mechanization of small-scale vessels resulted in them being controlled by investors/moneylenders, and that ways for fishers to pay off loans and own boats were needed. In particular, the Marine Fisheries Sub-strategy addresses conserving marine fisheries spawning and nursery grounds. Most significantly it proposed zonation and defining nursing grounds as waters up to 5 m deep or 5 km offshore free of all fishing, and for waters 5 to 10 km from shore to be exclusively for artisanal fishers, with co-management committees of government and fishers in each *upazila* to regulate fishing in their part of this zone. Mechanized boats that can undertake one to two week trips would then operate more than 10 km from shore up to 40 m depth of water. Although licensing was mentioned, limits on license numbers were not. It proposed a system of sanctuaries to be established by recommendation of committees comprising fishers, researchers, and DoF.

In inland capture fisheries, the Strategy aims to support sustainable growth in production, and management of open water fisheries through community participation, leading to a more equitable distribution of benefits, based on gradually reserving *jalmohalleases* for supervised community-based organizations (CBOs) against nominal lease payments. It advocates a measured precautionary approach to expanding floodplain aquaculture. It also emphasizes conserving the environment and biodiversity of

fisheries through appropriate ecosystem management regimes, including conservation and restoration of wetlands and fisheries and stronger cooperation with and support from other agencies.

However, implementation of policies set by the Ministry of Fisheries and Livestock (MoFL) with regard to fishing in inland waters is largely dependent on the policies and practice of the land administration, which controls most waterbodies (*jalmohals*). The most recent **Jalmohal Management Policy** (2009) allows on paper for fisher organizations to lease waterbodies without competitive bidding, and makes mention of sanctuaries and swamp forest, but in practice competitive bidding has been retained. Moreover the Ministry of Land has refused to renew or extend reserved use rights for community organizations that were allocated use through previous ten-year inter-ministerial agreements. As a result, in general the policy does not ensure secure tenure for fisher communities, requires continued high levels of lease payments, and leaves considerable space for potential influences and political interference on who gains control of local fisheries.

The **Bangladesh Wildlife (Preservation) Order** (1973) is mainly concerned with regulating hunting to a limited schedule of species for permit holders (although this includes one globally threatened species). It also set out the scope for declaring protected areas as wildlife sanctuaries or national parks, notably these are not limited to forests nor is the act (order) limited to Forest Department implementation. The Act uses a very narrow definition of “wildlife,” which includes only vertebrate species. As such, the Act fails to provide legal protection for a significant number of marine species, such as coral and mollusks. This Act has largely been superseded by the **Wildlife (Conservation and Security) Act** (2012). The key part of this legislation relevant to estuarine-marine systems is section 13 on the declaration of sanctuary. This provides for declaring wetlands and marine areas as sanctuaries (later being defined as free of any human use) and states that:

- (1) The Government may, by notification in the official Gazette, in the light of national forest policy and forest master plan, and considering natural, geomorphological features, biodiversity and environmental significance, declare any Government forests or part of such forests or any Government land or wetland or any specified area as sanctuary, specifying the demarcation, for the conservation of forest and habitat of wildlife.
- (2) The sanctuary declared under sub-section (1) may be called as wildlife sanctuary, bird sanctuary, elephant sanctuary or wetland dependent animal sanctuary or, as the case may be, marine protected area.
- (3) When a wetland is declared as sanctuary, measures shall be taken to protect the occupational, traditional or the right of livelihood of local community of the area such as – fishermen, boatmen, etc.

This provision has already been used to declare a marine protected area in the “Swatch of no ground” (a deep marine canyon outside the ECOFISH^{BD} area).

Lastly there is the **Hilsa Fisheries Management Action Plan** adopted in 2003 in response to declines in the fishery. As noted in ECOFISH^{BD}'s second annual workplan, it defines conservation measures, including scientific fish stock assessments, no-take sanctuaries for juveniles during breeding seasons, and compensation for fishers adversely affected by the closures. Various law enforcement agencies enforce seasonal fishing ban periods, generally from November to January or March to April, as well as enforce restrictions on the catch of juvenile hilsa (measuring less than 25 cm in length) throughout the year in five existing fish sanctuaries, which encompass approximately 7,000 km² in the Meghna River. In addition, under the **Protection and Conservation of Fish Act** (1950) and its associated Rules, the catching, transportation, marketing, and sales of juvenile jatka are prohibited during the months of November to June; and the production, sale, and use of monofilament nets with small mesh size is also illegal. Under the plan there is also a 22-day

countrywide ban on the catch of brood stock during the October full moon (including in the Bay of Bengal). The Jatka Conservation Task Force, formed by union, *upazila*, district, and national levels committees, enforces the ban on juvenile hilsa (up to 23.0 cm size) catch, transportation, marketing, selling, and possession.

What is notable in these policies and laws is the lack of a clear definition of where they apply considering the continual river-estuary-coastal transition zone, which is the focus of hilsa management and ECOFISH^{BD}. For example, none of the fisheries laws specify using maps or similar definitions where inland waters end and marine waters start, or define any intermediary coastal zone. However, since large parts of this zone were leased out as *jalmohals* up to 1995 (when competitive leasing of flowing waters ended and they became de facto open access), it follows that the land administration, which actually determines actual fishery access and management, considers estuarine rivers to be inland waters.

5.0 INLAND FISHERIES APPROACHES AND LESSONS

This section provides a summary of approaches, strategies, and lessons based on project reports focused on “inland fisheries management,” including some estuarine rivers, in Bangladesh. In addition, direct experiences in four of the projects are described, as well as subsequent interactions with community organizations originally formed for fisheries management that have engaged in an adaptive learning network process (Sultana & Thompson, 2012; Thompson, 2013). This summary is organized in roughly chronological order documenting the response to changing legal and policy framework for managing small-scale fisheries.

Unfortunately, there is little documented evidence or lessons on management of coastal or estuarine fisheries in Bangladesh. Some past projects in these areas worked closely with coastal fishers on their livelihoods, but these did not consider fishery management or tenure.

Although there have been a number of research and development projects since the late 1980s, and particularly in the late 1990s to mid-2000s, that worked to improve management of inland capture fisheries, none focused exclusively on management of riverine or coastal fisheries. Experiences in riverine-estuarine fisheries and in large wetland systems are more relevant to ECOFISH^{BD} than achievements in more isolated waterbodies, since the latter are partially open but less dependent on migratory fishes and use rights are not only more easily defined but also fishing rights holders are more likely to benefit from adopting sustainable practices. By comparison river-estuarine ecosystems are more open to migratory fish and fishers. As a result, activities that took place in more or less enclosed beels² or lakes where communities introduced stock enhancement measures are not considered further in this report. Nevertheless, several project sites included riverine components within or close to the ECOFISH^{BD} zones, and this is highlighted below, following an overview of leasing approaches around fisheries.

LEASING OF FISHING RIGHTS FOR INLAND WATERS

Leasing of fishing rights has been the most commonly applied tool to strengthen fishing rights in Bangladesh. The significant experience of Bangladesh in community based and co-management of inland fisheries has been based on the administrative system for inland fishing rights. Although MoFL and under it DoF have the responsibility to conserve and enhance fisheries and fish production, and have set policies, strategies, and rules (see section 1), these agencies do not directly control the use rights to waterbodies. Instead, public waterbodies (*jalmohals*) are under the control of the Ministry of Land, which leases out fishing rights for the purpose of collecting revenue. This revenue makes a minuscule contribution to the national budget (Huda, 2003). This system creates a significant number of management-related barriers affecting fisheries.

There are about 12,000 public *jalmohals*, which are controlled by the civil administration at district and *upazila* levels working under the directives of the Ministry of Land, which sets rules under a remit dating

² A beel is a term for billabong or a lake-like wetland with static water in the Ganges - Brahmaputra flood plains.

back to the 1950 State Acquisition and Tenancy Act. Essentially, fishing rights are leased out for three years in “closed waters”; in rivers and “open waters” there has been no leasing since 1995 and they are now open access. No sustainable fishing plans are required by the competitive leasing process, although they are supposed to be prepared for leases longer than three years under a “development project” provision. The land administration system also has no structures to determine if fishing effort and practices are sustainable in the waterbodies.

The majority of *jalmohals* leased under the traditional competitive system have experienced over-exploitation, declining catches, and a lack of conservation measures, since fishers are usually poor and leases have to be paid at the start of the year. Access for fishers has been compromised, as middlemen pay the lease and take effective control using lists of their “fishers.”

Recognition of the failings of this system, and awareness of international initiatives towards community-based natural resource management, led to a number of donor-supported projects involving NGOs and DoF that established community-based fisheries management in individual waterbodies, including ox-bow lakes, beels, and parts of rivers, in the early-mid 1990s. The Center for Natural Resources Studies demonstrated that natural fishery productivity could recover when silted up channels between floodplain wetlands and main rivers are re-excavated (Rahman, Capistrano, Minkin, Islam, & Halder, 1999). Elsewhere NGOs had helped minority fishers to organize to manage fisheries with support from DoF, but access had only been assured for the fishers for three years (Thompson, Sultana, & Islam, 2003). The short-term tenure rights were insufficient to incentivize long-term sustainable management practices. These initial efforts, supported by the Ford Foundation, were built on: longstanding debate and rhetoric over poverty among traditional fishers and their lack of direct access rights to waterbodies in Bangladesh; growing international experience in community based approaches; failure of an experiment in individual licensing of fishers; NGO pressure awakened by the Flood Action Plan process; and, a burgeoning civil society with the establishment of democracy. Increased donor interest was complemented by mutual benefits between DoF and fishing communities. Since neither DoF nor fishers had secure access or decision making roles in waterbodies administered by the Ministry of Land, DoF’s cooperation with donors, fishers, and NGOs on co-management helped it to achieve a more substantive role in fisheries management.

In 2000, MoFL negotiated a framework with the Ministry of Land for *jalmohals* to be reserved for sustainable community based management for ten-year periods. This resulted in a series of Memoranda of Understanding (MOUs) over a total of around 300 waterbodies covered by projects supported by Danida, the UK Department for International Development (DFID), the International Fund for Agricultural Development, and USAID, as well as projects supported entirely by the Government of Bangladesh. Most of these initiatives worked in individual waterbodies, while larger open systems were more challenging to manage both because of the ecology of the system and because of the socioeconomic conditions of the fishers. The open water fishers traditionally were principally from the minority Hindu community, and were also among the poorest members of rural society. Without some sort of formalized recognition and alliance with DoF, these communities would have little possibility of continuing their open water fisheries practices. Project reports and evaluations indicate that, in most cases, community based management has established sanctuaries and closed seasons, and restored habitat with these communities though limited empirical data is available on the impacts of these efforts. Where surveys have been done, such measures have been shown to have restored fishery productivity (up to doubling) and biodiversity; improved the livelihoods and fish consumption of local communities (most fishers are poor); and, continued to realize functioning CBOs that operate their management plans after project support ended.

LICENSING UNDER NEW FISHERIES MANAGEMENT POLICY

In the late 1980s, an experimental New Fisheries Management Policy (NFMP) tested a licensing system in 12 locations, including four in riverine-estuarine locations, of which two were in the ECOFISH^{BD} target area. Attempts to coordinate access through a CBO failed as the district administration leased out rights to a single individual, who then sub-leased out this large area (Nabi, 1989). Sub-lessees were able to control access by enforcing fees to fish in the sub-lessee's section of river. The sub-lessees enforcement team in the river ensured compliance, whereas in other river sections where DoF issued licenses under the experimental policy, it conferred a right to fish anywhere in the river and there was no authority on site in the river to arbitrate on disputes over fishing grounds. More significantly, DoF was uncoordinated, allowing different districts to set different license fees, but maintaining an open access fishery on the river. Enforcement was limited and no field team was able to stop unlicensed fishing by migrant fishers, unlike the sub-lease system.

RETURN TO OPEN ACCESS IN RIVERS

Huda (2003) summarizes the underlying factors behind the abrupt decision in 1995 to abolish leasing of open *jalmahals* (effectively flowing rivers) leading to a return to open access. Despite the failings of leasing and licensing systems, neither fishers nor government had advocated for open access. The Prime Minister, while inaugurating the Fisheries Fortnight in 1995, made this sudden announcement to the surprise of almost everybody present. Huda (2003) suggested that this policy change resulted from pressure from engine boat and trawler owners/operators who were unhappy with the rate of toll being demanded by the leaseholders on the lower Meghna river. This fishery sub-group pressured their Members of Parliament and used the rhetoric of linking up access to open water bodies for poor fishers. The potential political benefits apparently convinced the Prime Minister, who did not have the proposal reviewed by the bureaucracy, but instead took an impromptu decision and made the announcement. When the government operationalized and formalized this declaration it made two qualifying provisions: that mechanized boats obtain annual licenses, and that open *jalmohals* reserved as fish sanctuaries or for MoFL projects would not become open access.

This decision has not been reversed or changed in the subsequent 20 years, presumably for fear that a change would be seen as going against poor fishers. The distributional and ecosystem impacts are not easily studied, but as will be seen in the projects reviewed below, the policy action limited the scope for improving management or fisher rights in rivers. Since 1995, under open access local landowners and elites have been able to capture part of the resource by investing in more brushpiles (fish aggregating devices) where they attract fish and exclude others from fishing, while in the estuarine rivers more investors were able to finance engine boats for fishing which in practice go unregulated. The government's district administration, unlike leaseholders, does not have the capacity to enforce limits on the numbers of boats or to set high license fees to limit access. Benefits to the poorer fishers, including operators of non-mechanized boats and crew members have certainly not benefited from the policy change.

COMMUNITY-BASED FISHERIES MANAGEMENT (1ST PHASE)

The Ford Foundation funded the Community-Based Fisheries Management (CBFM) program from 1996 to 1999 across 19 waterbodies, ten of which were in rivers, although only two of these were larger main rivers or estuarine. In the river sites tenure was diverse. Two sites had licensing systems initiated under NFMP, one was leased to an elite fisher group as a "fish sanctuary," but had no formal sanctuary status, and seven became open access with no lease history when the policy changed immediately before the project began. Management committees were introduced in all these sites, but were largely ineffective and communities were unable to establish any active fishery management rules or practices in six of these river sites. Only one briefly established a sanctuary, but this was achieved with little local

buy-in. Overall, the management attempts were abandoned in two of the river sites and rated poor in five others. Thompson (2004) concluded that “the policy and history of leasing inland fisheries in Bangladesh has left the most important legacy for undertaking CBFM. Despite many negative impacts, this system is preferable to open access and has established mechanisms for obtaining exclusive use rights to defined fishing areas (waterbodies or *jalmohals*). Payment of government revenue (the lease) gives the lessee the right to set local rules on exploitation of the fishery. Because leasing (revenue collection) ended in most flowing rivers in September 1995, when CBFM-I tried to work in rivers there was no legitimacy for local management committees to set rules limiting fishing, even when they included local officials.”

COMMUNITY-BASED FISHERIES MANAGEMENT (2ND PHASE)

DFID supported an expansion of this approach to about 130 waterbodies or sections of river during 2001-2006. Lessons drawn in 2004 based on CBFM-I and the first half of the CBFM-2 project were summarized (Thompson, 2004) as:

- CBFM is based on co-management empowering fishing communities.
- Development of local fisher-based organizations (CBOs) is essential.
- New institutions can be built as easily as modifying existing ones (or with as much difficulty).
- Local government support for CBOs is important for longer-term sustainability.
- Establishing CBFM is a slow process.
- Strong facilitation is necessary.
- External threats, such as existing powerful interests, are a limiting factor to success.
- Effective well-defined partnerships of NGOs and government are not easy to establish but are needed to support new community institutions for fisheries management.
- The extent of appropriate NGO and DoF support after projects end is uncertain, and it is unclear whether the structures will allow CBOs to flourish.
- It is essential that communities obtain clear use rights over government fisheries.
- In *jalmohals* (including rivers), leases should be preferentially reserved for CBOs through a supportive government agency, and the CBO needs to manage lease payments.
- Land administration authorities at the district level need to be convinced of the merits of CBFM.
- Diverse stakeholder interests in floodplain beels can be brought together, as they have shared interests and concerns over declining fisheries.
- Coordination of CBOs and management plans in connected waterbodies is promising, but has been limited in practice due to a lack of shared trust and compliance issues.
- Non-fish aquatic resources need to be included in more integrated floodplain management plans.
- Establishment of visible resource management actions, such as fish sanctuaries, helps strengthen institutional development and adoption.
- CBFM is slightly easier in small fisheries with clear boundaries.

- Success was more likely/easier in homogeneous communities.
- Scaling up should first expand CBFM to neighboring waterbodies, and should screen proposed sites to avoid ones dominated by strong influential interests.

Many of these findings correlate closely with principles outlined in Eleanor Ostrom's work on governing the commons (Ostrom, 1990).

Analysis of fishery impacts in rivers under CBFM-2 indicated no change in effort over time and compared with control sites, but did find a non-significant decline in fish diversity in non-CBFM sites. Despite increasing catches per hectare, declining catches per unit effort for major gear (Mustafa and Halls, n.d.) suggests community management in open river environments was less effective than other project sites. Though it did find that community management in rivers performed better than open access river sites. They also concluded that fishery closures during the spawning season in the early monsoon were beneficial, but that sanctuaries had no clear impact. The lack of impact of sanctuaries may have been due to the small area of these sites. CBFM-2 concluded that the lack of leasing in river sites meant that although costs for fishers were low, communities could not ensure exclusive rights and exclude others. Since the communities already had access rights, they continued to allow all local fishers to access, leading to a slow decline in the resource. Collective action within each community area as well as collective action among community areas would have been required across all of the connected waterbodies and river sections (WorldFish Center, n.d.).

FOURTH FISHERIES PROJECT

Lessons from the World Bank and DFID-supported Fourth Fisheries Project during 2000-2005 focused on selection of sites for community involvement in fishery management (FFP, 2005), on the basis that community-based management could only be established in a limited number of Bangladesh's water bodies. Hence it focused efforts on identifying and selecting areas where rights could promptly be reserved for fishers and their organizations; boundaries could be clearly defined; there were limited disputes over boundaries or leasing; and, there was limited elite entrenched control. It also highlighted a flexible approach without pre-defined interventions or management prescriptions. Other lessons stressed the importance of involving NGOs in organizing fishers, but noted that "few NGOs or staff have skills in establishing sustainable fisheries community based organizations. Medium-size and large size NGOs perform better than small NGOs but still need training" (FFP 2005). This was confirmed as 74 percent of the sites where smaller NGOs started work were ultimately unsuccessful in establishing community-based fisheries management, whereas pm;u 30 percent of sites where medium and large NGOs worked were reported to be unsuccessful. The most successful measure was considered to be local fish sanctuaries, at least in terms of widespread adoption across sites.

Although no lessons were drawn specific to riverine systems from this evaluation, it did recommend changing tenure in rivers from open access back to a leasing system where there were suitable fisher community organizations that would obtain rights against nominal payments. Issues of coordination or management of mobile fish stocks across community areas in the river system were not addressed. Unpublished information (Thompson) on the coverage of sites and assessments to review progress and sustainability of community management indicates that by mid-2005 (when the project was closing down) five river sites (two in the ECOFISH^{BD} zone) and four non-river sites had been dropped for lack of progress and insurmountable problems. Twenty-eight river sites (some involving breaking down a river into more than one section) and 18 non-river sites were continued and were expected to result in sustainable management. Of these, four were within the ECOFISH^{BD} zone; three were parts of the Andarmanik River. Here the fishers faced issues over boundaries between their fishing grounds and encroachment by larger mechanized boats. They attempted to establish fish sanctuaries, but community

management was ultimately undermined by the imposition of a hilsa sanctuary/closed fishing area in this river and subsequent conflicts with coastguards.

MACH PROJECT

The Management of Aquatic Ecosystems through Community Husbandry (MACH) project, supported by USAID and the Government of Bangladesh from September 1998 to June 2008 (MACH 2007) aimed to ensure the sustainable productivity of all wetland resources, water, fish, plants, and wildlife, over three large wetland ecosystems and thereby to help ensure food security and restore biodiversity. MACH established what is best described as “community based co-management” in three large wetland systems, each comprising of multiple connected waterbodies. The key components were establishing community organizations, embedding within them institutions for sustainable wise use of wetland resources, and formally linking them with the existing local government system. It split functions between types of CBOs. The main CBOs focused on wetland resources (not just fish) management, and were not exclusively fisher organizations. Within the Resource Management Organizations (RMOs), about 60 percent of members represented resource user groups which were federated into livelihood organizations operating revolving loan funds. MACH initially had “local government committees” in each working *upazila* for coordination, and these were transformed into formal co-management bodies, *Upazila Fisheries Committees (UFC)*, chaired by the *Upazila Nirbahi Officer* (the administrative chief of the *upazila*). The group would meet on a quarterly basis and with *upazila* officials, relevant Union *parishad* (local council) chairmen, and the leaders of each RMO and resource user group in that *upazila*. Once formed, the RMOs acted, with project support, to restore wetland habitats and their productivity (re-excavating silted up waterbodies, creating fish sanctuaries, setting limits on fishing, and planting swamp forest). NGOs provided training and also revolving loan funds to improve the livelihoods of poor people dependent on these wetlands.

For longer-term sustainability, MACH facilitated local government to propose and obtain decisions directly from Ministry of Land to take a small number of waterbodies permanently out of leasing to be kept as sanctuaries, one of these continues to present and is a model of a permanent sanctuary (BaikkaBeel). This sanctuary covers about 170 ha and has been the main conservation measure serving the 13,000 ha Hail Haor wetland in northeast Bangladesh (a site that has continued to receive USAID support in subsequent projects).

MACH generated a wide range of lessons summarized in several policy briefs. Four of the key messages (adapted from Sultana, 2007) were:

1. Communities have complex structures. Community wide organizations can benefit from the influence of local elites as champions of conservation and the poor, but their motivation needs to be understood. They may take control of resources to the detriment of the poor unless time is taken to establish practices for good governance that limit elite dominance.
2. Wetland resource management depends on CBO performance and accountability. Meetings should be conducted among stakeholders of different social status so each group can express their problems and possible solutions. Participatory action plan development can ensure poor people's opinions are reflected in resource management. It is a continual process to review progress, identify failures and their reasons, find solutions, and make improved plans.
3. Establishing sanctuaries for conservation of fish brood stock during the dry season ensures long-term success of fisheries management by ensuring reproduction of a wide range of fish in the monsoon and by protecting other aquatic life. However, the decision to develop sanctuaries needs to be made by the CBOs.

4. Well-functioning linkages between community organizations and the local administration are essential. Union *parishad* chairmen and *upazila* administration may act as arbitrators when conflicts occur.

Before the MACH project ended, to sustain this system, endowment funds were created by order of MoFL under district administration oversight for each of the five concerned *upazilas*. The interest from the endowment funds is available each year for the UFC to spend with about 20 percent for UFC functions and the majority forming a competitive grant fund that RMOs can bid for by proposing schemes for wetland conservation. This system sustained after the project, but was compromised by three changes. MoFL brought in a general system of *upazila* committees, which did not give space for all of the CBOs within an *upazila* to be members of that committee. Secondly, after ten-year agreements covering *jalmohals* ended, the CBOs lost use rights (except for permanent sanctuaries). Thirdly USAID did not continue limited support to co-management in two of these large wetlands.

CHANGES TO WATERBODY LEASING AND ACCESS SINCE 2009

The leasing process for non-handed over *jalmohals*(the majority) changed in 2009 when the Ministry of Land introduced its latest *Jalmohal* Management Policy. This policy (1) expands recent successful experiences in community management of wetlands and fisheries; (2) encourages sanctuaries and swamp forest restoration; and, (3) ends competitive leasing of *jalmohals*. In theory under the policy a registered CBO would receive a three-year, renewable lease. In practice it has not provided any advantages for fisher CBOs or for traditional fisher cooperatives; instead it has brought in significant implementation challenges due to weak institutional motivation to be pro-fisher. It also formally introduces political involvement from Members of Parliament, who have been given a role in advising on which CBO/cooperative will get a lease, and from powerful individuals who constantly try to take control of wetlands that CBOs are trying to assert management rights over.

Another challenge has been that when the ten-year periods of the MOUs between the Ministry of Land and MoFL ended (generally during 2011-13), they were not renewed. Instead the CBOs that had been formed under the projects discussed above and held reserved access lost their access rights. Despite lobbying and forums where the Ministry of Land expressed support for fisher concerns, and DoF proposed to extend reserved tenure under its supervision for these waterbodies and their CBOs, the Ministry of Land did not ultimately support this. In a small number of cases, CBOs obtained access through competitive bidding, or by convincing the relevant district administration to allocate access. Over 20 CBOs used writs in the High Court to obtain injunctions preventing competitive leasing, but a solution to these writs and injunctions has never been found, and in practice the CBOs lost the recognition to exclude others or set fishing rules. In many cases, the small sanctuaries that CBOs created within *jalmohals* were abandoned, or even broken up by local influential persons who persuaded sub-district administrations to grant them short-term fishing rights.

Overall, this experience stresses influence of the local land and civil administration (districts) over the practice of resource tenure in fisheries. While leasing is a way of specifying use rights within defined areas, the approach has been undermined over recent years. In the future, it seems unlikely that the government would risk perceptions of being anti-fisher and reintroduce leasing in rivers as a tool for fishery management. Unfortunately, the leasing approaches have seemed to evolve to favor powerful elites, involve rent seeking and promote political patronage, despite in theory offering a means for securing rights of local groups or associations of fishers to adopt sustainable practices.

6.0 COASTAL AND MARINE APPROACHES AND LESSONS

RELEVANT COASTAL AND MARINE MANAGEMENT PROJECTS

Attempts in Bangladesh to improve coastal and marine fisheries and environmental management over the past 15 years with some addressing increased community participation have included:

- The United Nations Environment Program (UNEP)/Global Environment Facility (GEF) funded Community Mobilization for Biodiversity Conservation at Cox's Bazar Project ended in 2006 and was conducted in conjunction with the Department of Environment (DoE), under MoEF. This project entailed gathering feedback from community members on perceived problems, issue prioritization and consensus building in Cox's Bazar (Bangladesh Poush, 2006).
- The Coastal and Wetland Biodiversity Management Project of the DoE supported by UNEP/GEF aimed to improve management of three coastal Ecologically Critical Areas (ECAs) (Sonadia, St. Martin's Island and Cox's Bazar, and Teknaf Peninsula), as well as one major freshwater wetland - HakalukiHaor. The goal of the project was to design and implement an innovative system for managing ECAs, and in doing so, serve as a demonstration site for other ECAs elsewhere in the country. This was based on a participatory approach focusing on formation of a series of Village Conservation Groups (VCGs). It emphasized livelihood development, and included a range of capacity building, but did not establish effective co-management institutions between VCGs and government (personal observation; IPAC, 2012).
- A series of initiatives by NGOs supported by a range of small grant facilities have established systems of patrolling beaches, collecting marine turtle eggs (mostly Olive Ridley and a few green turtles) and hatching them in nurseries in Sonadia, Cox's Bazar, and St. Martin's Island. They work to reduce predation of eggs and head-start baby turtles that are then released to sea with help of local coastal VCGs.
- Mainstreaming community participation and empowering coastal communities through the Integrated Coastal Zone Management Policy (2005) addressed issues including: (1) instituting co-management procedures which "bring decision-making power to the grassroots level;" (2) addressing the vulnerabilities of coastal communities; and (3) adopting initiatives that maintain the cultural heritage of coastal communities (MoWR, 2005).
- Activities led by the Bay of Bengal Large Marine Ecosystem Project promoted the involvement of fishing communities in marine management through awareness-raising programs (Chowdhury, 1998).
- The FAO and Department of Fisheries sponsored Empowerment of Coastal Fishing Communities for Livelihood Security Project, which sought to improve coastal fisher community welfare in seven sub-districts of Cox's Bazar District (IUCN, 2010; personal communication). The community organizations developed through this project and their endowment funds are still partially functioning.

- Strengthening Marine Fisheries Capacity of Bangladesh is an ongoing project of the Department of Fisheries, with funding through the Organization of Islamic Countries (IUCN, 2010; personal communication).
- The Integrated Coastal Zone Management Programme (Phase I) of the Water Resources Planning Organization (IUCN, 2010; personal communication).
- The Organization of Islamic Cooperation has been supporting DoF to strengthen marine fisheries in Bangladesh. It has helped to procure a research vessel, MV MeenShandhani, for stock assessment and biological monitoring in the Bay of Bengal (personal communication).

INTEGRATED COASTAL MANAGEMENT

A 2010 Bay of Bengal Large Marine Ecosystem project report on a meeting on integrated coastal management (ICM) reported that the success of CBFM is highly recognized in the national fisheries strategy and action plan of Bangladesh, as noted above. The marine fisheries sub-strategy has also endorsed the need to institutionalize CBFM in coastal areas. However, this strategy has not been fully implemented as it depends significantly on the will of other agencies and ministries on one hand and on project funding on the other hand.

The policy framework supporting ICM exists (coastal zone policy, national water policy, national fisheries policy, inland capture fisheries sub-strategy and marine and coastal sub-strategy under national fisheries strategy and action plan). In theory, co-management experience and pressure for integration of all sectors is there, but in practice integration is limited. Five sanctuaries have been established for hilsa (Andarmanik, Bhola, Meghna Estuary, Tetulia; see Figure 5) and one is proposed (Shariatpur). More generally the fisheries sector has targeted establishing at least two sanctuaries in each *upazila* (though this has not happened to date), and fisher identification cards have been introduced.

Several government policy documents have highlighted the importance of optimizing land use and land zoning for integrated planning of resource management (Islam, 2006). These are the National Fish Policy (1998), National Water Policy (1999), National Agricultural Policy (1999), Draft Shrimp Strategy (2004) and Coastal Zone Policy (2005). The Coastal Zone Policy (2005) states that “actions shall be initiated to develop land-use planning as an instrument of control of unplanned and indiscriminate use of land resources” and “zoning regulations would be formulated and enforced in due course.”

Bangladesh worked on an integrated coastal zone management policy supported by the World Bank and the Government of Netherlands. These efforts stemmed from recognition that the lack of a clear-cut government policy was a bottleneck. The resulting passing of the 2005 Coastal Zone Policy helped implement nationwide integrated coastal zone management (Iftekhar, 2006). In regards to protected areas, this policy outlines several goals, including:

- Attaining “meaningful” conservation in ECAs, heritage sites, and marine reserves;
- Supporting institutional strengthening/capacity building programs;
- Fortifying the regulatory framework for environmental protection;
- Expanding the role of the Coast Guard such that “it can be used on behalf of all relevant institutions as a common resource for enforcement of different regulations applicable to the coastal zone”; and,
- Harmonizing existing environmental laws (MoWR, 2005).

The **National Land Use Policy** (2001) describes zoning based on land use, ensuring the best use of land through zoning, and enactment of a zoning law to allow local government institutions to prepare zoning maps. The National Land Use Policy places special emphasis on coastal areas. Recognizing the complexities of coastal land use, the policy makes provisions for an inter-agency task force to prepare an outline of coastal zoning. Many agencies in Bangladesh already recognize this need for integrated zoning in support of planning for “best possible” economic land use, while preventing land degradation and protecting the environment. DoF (2002) stated that “coastal zoning would improve land-use planning, minimize conflicts over land tenure and identify appropriate areas for shrimp farming and areas that need to be protected (for grazing of livestock, common access, etc.)” The emerging concept is to formulate land zoning, with administrative boundaries as the unit, in accordance with the (dominant) land use and economic activities, as well as their potentials and vulnerabilities. Hence, this zoning has to be more than just a description of the current situation and must account for major underlying ecological and socio-economic factors and processes that have led to the current situation and that may be important for future trends and hazards.

MARINE AND COASTAL PROTECTED AREAS

This section is based on Bay of Bengal Large Marine Ecosystem (2013) Marine Protected Areas in Bangladesh - a framework for establishment and management.

History and Status of Marine Protected Areas (MPAs) in Bangladesh

There are no explicit marine protected areas as defined through legislation. The Bangladesh Wildlife Preservation Act of 1974 defines national parks and wildlife sanctuaries and there are examples of both of these protected area categories in the marine environment (Figure 1).

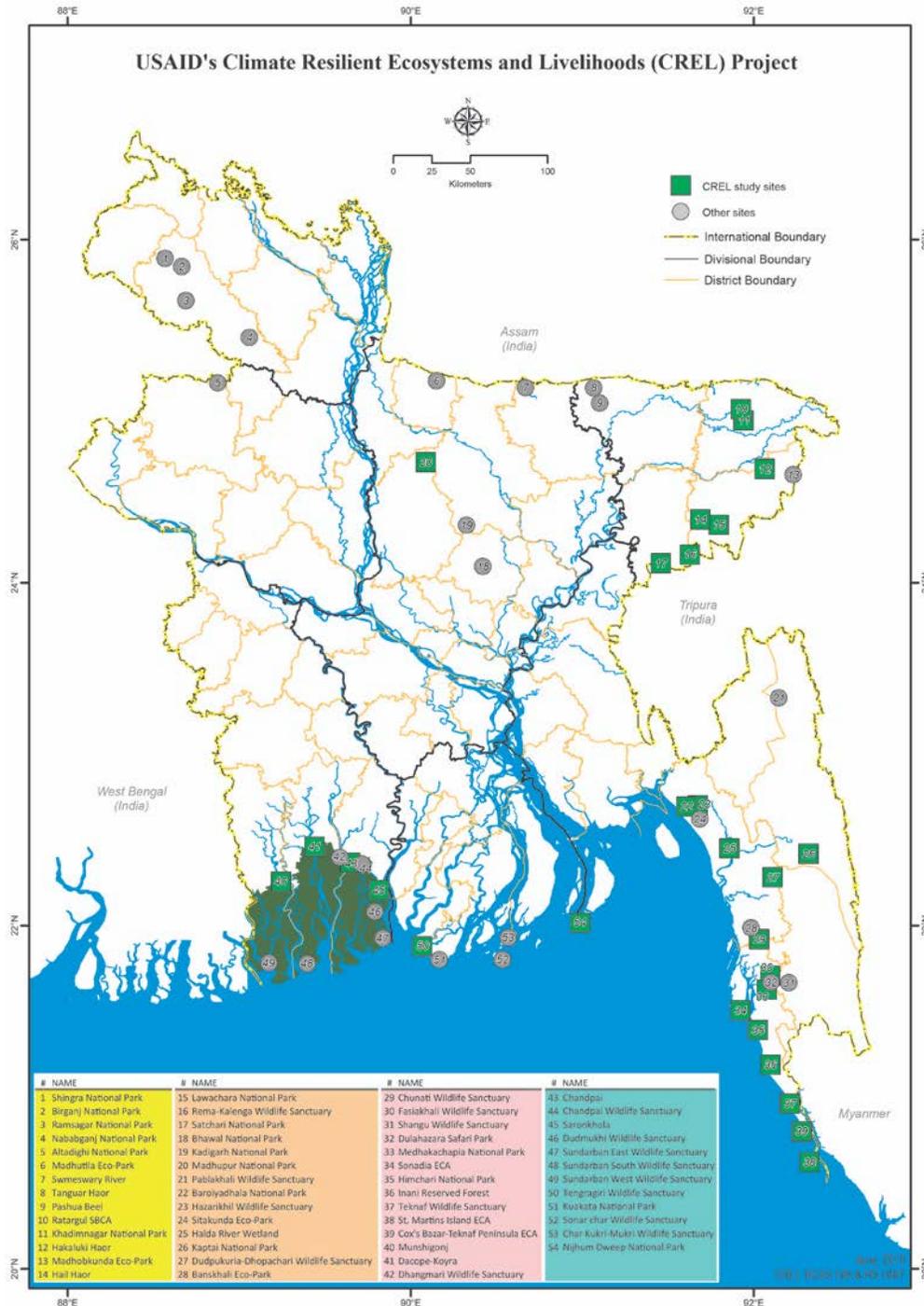


Figure 1. National parks, wildlife sanctuaries, and other protected areas designated in Bangladesh
 Source: CREL

The Sundarbans Reserve Forest (Figure 2) comprises mangrove forests and brackish waterways (with waterways covering an estimated 180,000 ha against total area of 601,700 ha of the reserve) enjoys a level of protection under the Forest Department, which has responsibility for all natural resources in this area including fisheries. The entire area has been a World Heritage Site since 1997, and is also one of only two Ramsar Sites in Bangladesh. Fish are managed as a non-timber forest product in the Sundarbans, with the Forest Department licensing and collecting entry fees from boats entering for

fishing, for crab collection and also for collecting other products such as nipa palm or golpata. In recent years it has set limits on entry in an attempt to address over exploitation. A level of co-management exists already with four co-management committees (and respective councils) established and supported by a series of USAID projects. The USAID Bagh project also supports tiger protection through co-management approaches. The management of fisheries resources in the Sundarbans began in 1989 with the closure of 18 canals to accelerate fish breeding (IUCN, 2012). Within the Sundarbans Reserved Forest are three large wildlife sanctuaries established in 1996 that cover areas of mangrove with associated channels in the outer west, south and east parts of the forest, as well as three additional smaller wildlife sanctuaries declared in 2012 to protect channels preferred by threatened species of dolphin (Ganges River dolphin and Irrawaddy dolphin). These channel-based sanctuaries are potentially also important as fish sanctuaries.

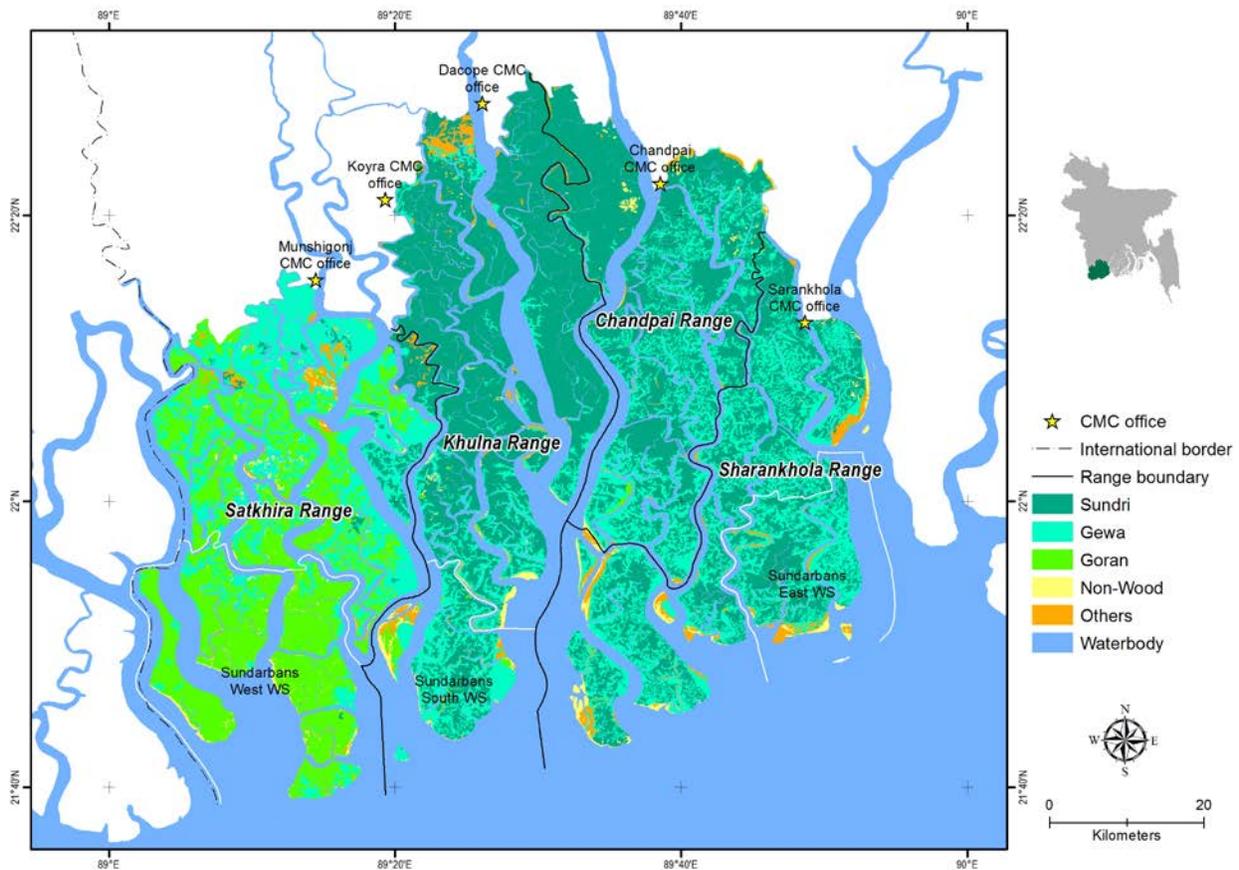


Figure 2. Sundarbans Reserve Forests

Source: CREL

There are a further five protected areas in the coastal zone, out of a total of 33 national parks and wildlife sanctuaries throughout the country (Figure 3). Three of these Char Kukri Mukri Wildlife Sanctuary, Sonar Char Wildlife Sanctuary, and Kuakata National Park, do not have a history of co-management. However, USAID's Climate Resilient Ecosystem and Livelihoods (CREL) project (CREL 2015, 2016) has introduced co-management in two of these coastal protected areas over the last three years. In Tengragiri Wildlife Sanctuary, not far from the eastern edge of the Sundarbans and adjacent to Andermanik River (an ECOFISH^{BD} target site), communities have established a fish sanctuary within a creek in the mangroves. A similar fish sanctuary has been established in NijhumDweep National Park, which is a large area of islands with mangroves, open wet tidal grass, intertidal mudflats, and shallow sea covering 16,352 ha south of Hatiya Island. The offshore areas immediately to its south are important for hilsa, and the site is one of the most important locations for wintering waterbirds in Bangladesh, hosting

in winter a large part of the global population of Indian Skimmer, for example. One area of tidal creek here has recently been protected by the local stakeholders as a fish sanctuary.

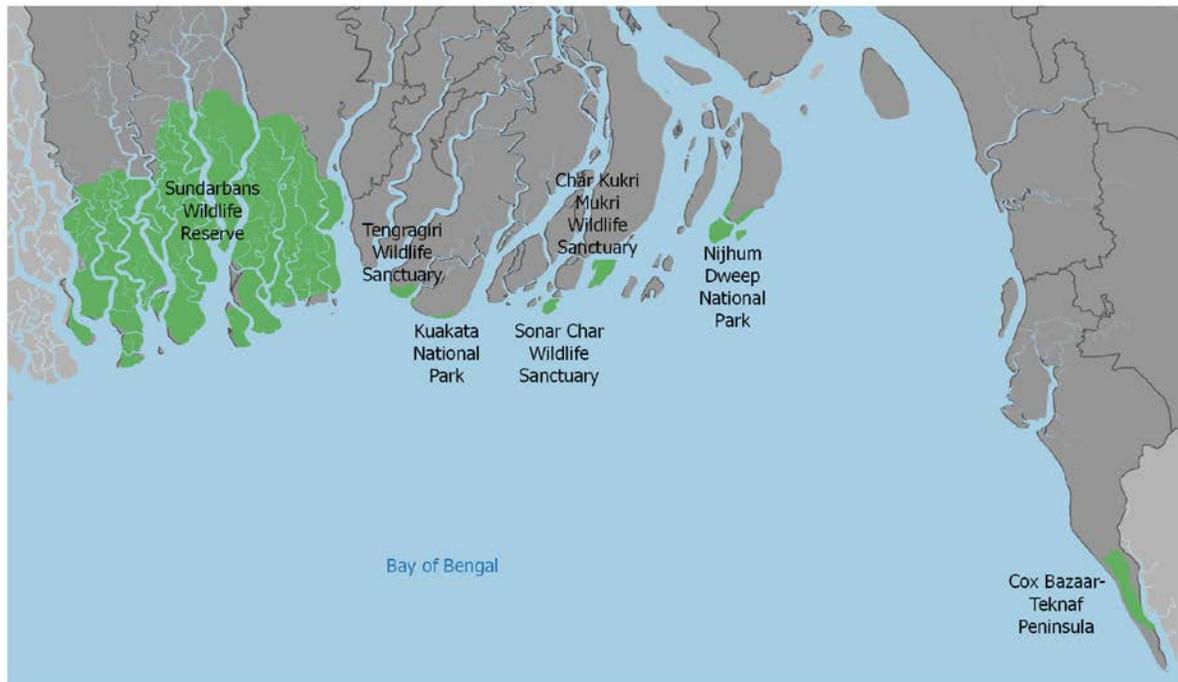


Figure 3. Protected areas in the coastal zone in Bangladesh

Another type of protected area in Bangladesh applicable to marine environments are ECAs, which are established under the Environmental Conservation Act of 1995. ECAs are geographically delineated areas, which by themselves or in a network have distinguishing ecological characteristics, and are important for maintaining habitat heterogeneity or the viability of a species, or contribute disproportionately to an ecosystem’s health, including its productivity, biodiversity, function, structure, or resilience. ECAs are typically declared in areas that have suffered from intense ecological degradation, and comprise a mixture of public and private lands and waters. Four ECAs are located in the marine/coastal zone. St. Martin’s Island covers 590 ha, is home to Bangladesh’s only coral block communities, and is under heavy pressure from domestic tourism. The Cox’s Bazar-Teknaf peninsula covering the sea beach and Naf estuary (bordering Burma) includes a beach under heavy pressure from tourism development. Sonadia Island immediately north of Cox’s Bazar is recognized by BirdLife International as an important bird and biodiversity area, and is particularly important for wintering populations of globally threatened shorebirds, but has been threatened by proposals for a major port. The Sundarbans ECA differs fundamentally from other ECAs as it covers a “buffer” area of largely private lands as well as waterways in a 10 km wide strip on the landward border of the Sundarbans Reserved Forest covering about 51,000 ha. The Environmental Conservation Act of 1995, which was amended 2010, states that the legal boundary and map for each land-based ECA should be prepared. However, the boundaries of ECAs tend to be poorly defined, since they do not coincide with any administrative or land ownership boundaries, and reliable maps have not been prepared. Of the coastal ECAs, Sonadia and Cox’s Bazar-Teknaf peninsula have management plans. Prevention of changes in land use such as construction, industrial development, and pollution have proven difficult to enforce within some ECAs.

In a move that clearly links protected area development with fisheries management, Bangladesh began declaring hilsa closed seasons in recent years. It began by declaring four of these areas, located in two of

the country's most productive fishing grounds – the “Middle Ground” and “South Patch” areas (Hussain, 2009; Hossain, 2004). These sanctuaries were established to “achieve the desired development of the hilsa fishery” (Mome, 2007; Hussain, 2009). Hilsa fishing is banned in these sanctuaries during certain months of the year (March to April in three sanctuaries, and November to January in the fourth). The country also regulates the hilsa fishery by imposing zone restrictions for artisanal and commercial and trawling operators, as well as banning hilsa catch outright during the peak spawning season in October in all major fishing grounds (Mome, 2007). Bangladesh also declares closed seasons at key shrimp spawning sites (shrimp trawling is banned at certain points during the year).

MPA Governance in Bangladesh

Three government agencies can declare and manage protected areas in the coastal marine zone: DoE under MoEF, which has the authority to declare ECAs if it deems an area under threat; MoEF, which is responsible for declaring national parks and wildlife sanctuaries; and, DoF under MoFL, which can identify and propose areas as hilsa closed season locations and fisheries sanctuaries (although for these public lands and waters it is the Ministry of Land which formally recognizes them as conservation locations). The Bangladesh Coast Guard is charged with enforcing regulations governing these hilsa conservation areas. Other agencies with a peripheral role in the management of marine protected areas (especially the hilsa closed seasons) include:

- The Bangladesh Fisheries Research Institute, which runs the Marine Fisheries and Technology Station in Cox's Bazar;
- Academic institutions, such as the Institute of Marine and Fisheries Science at Chittagong University, and Fisheries and Marine Resource Technology School of Khulna Science and Technology University, which are involved in teaching and academic research; and ,
- The Bangladesh Fishery Development Corporation, which plays a role in overseeing industrial trawlers (Hussain, 2009; Hossain, 2004; IUCN, 2010; personal communication).

Furthermore, per DoF regulations and the Marine Fisheries Ordinance, all industrial trawlers in the Bay of Bengal must use turtle excluding devices.

Historically, the Government of Bangladesh has tended to follow a single sector-single agency approach in protected area management (Iftekhar, 2006). This had led to challenges in protected area management. Notable consequences include the implementation of unilateral actions based on departmental priorities; overlapping, redundant activities; and, a failure to coordinate efforts. Cognizant of these limitations, multi-agency cooperation is becoming increasingly common (Iftekhar, 2006).

Similarly, a lack of clear legislation and definitions creates challenges in protected area management. ECAs are a relatively new category in Bangladesh, and there has been uncertainty as to which legislation is applicable for management: “Until ECA regulations are formally acknowledged in Bangladeshi law, all ECA management enforcement could become ineffective in reality, with no real benefit for biodiversity conservation” (Molony, 2006). After a number of years of stagnation, the ECA Rules were formally approved by the Government of Bangladesh in October 2016, offering the prospect in coming years of a clearer and stronger approach to regulating harmful land and water uses within ECAs.

A 2016 visit of senior level leadership of MoFL to visit MPAs in the Philippines brought about a growing interest to work for setting up MPAs in Bangladesh. Under the ECOFISH^{BD} project, the International Union for Conservation of Nature (IUCN) has been contracted to explore the possibility of setting up an MPA in the strategic site of NijhumDweep in collaboration with the Forest Department and National Park. The establishment of a sanctuary under CREL and the formation of CBOs of the fishers will provide resources to jointly work on the feasibility study. A recently held stakeholder's workshop by

IUCN in NijhumDweep on January 13, 2017 showed a commitment and support from the local leaders and fishers representatives. This could be done in three phases, with first phase at the Channel between NijhumDweep and emerging KabirDweep below the Shahbazpur Channel that connects Meghna Estuary with the Bay of Bengal at the western side of the Dawyer Char. The Wildlife Conservation Society has shown interest to voluntarily join IUCN/ECOFISH^{BD} efforts for exploration for declaration of an MPA in and around NijhumDweep.

SUMMARY OF KEY FINDINGS

The following key findings and observations relevant to hilsa fishery management and ECOFISH^{BD} are drawn from these Bangladesh experiences:

- To empower and mobilize fisher support, co-management will require a significant enabling investment in helping fishers at local level organize into community based organizations on a more equitable and democratic basis without domination by middlemen, investors and large traders.
- Current laws and policies enable areas to be defined and designated as sanctuaries/refuge/no-take zones, but compliance is limited and these are difficult to enforce, with top down enforcement efforts tending to alienate fishing communities. Community-supported compliance and enforcement efforts should be examined.
- The legal/policy framework does not provide proven mechanisms for small-scale fisher communities and clusters of communities to establish exclusive tenure rights over specific estuarine/coastal areas and their fishing grounds. A policy analysis needs to be undertaken on establishing tenure rights for true fishers over the hilsa fishery/sanctuary.
- Licensing has been tried in inland fisheries and in coastal fisheries but has never in practice been used to regulate fishing effort, and has not provided incentives or security for fishers to invest in conserving fish stocks, except in a few cases.
- Experience in inland fisheries demonstrates that communities adopt sustainable fishery practices when they have well defined use rights. Testing this in coastal-estuarine-river fisheries will require government adoption of a pilot arrangement, which will need a carefully worded and promoted arrangement that makes it clear this is designed to empower fishers and sustain fisheries and not to take away access to fisheries. Otherwise those better off and well connected beneficiaries of open access will likely mobilize support against “grabbing of fishing grounds from poor fishers.”
- Fish sanctuaries are successful in inland fisheries, although their effectiveness in coastal-estuarine systems is uncertain. They are most easily developed when planned by/with fisher communities and are implemented at a scale that serves local ecosystem units and where benefits can be seen by the neighboring fishing communities.
- Several sanctuary/conservation areas have been declared in the coastal zone, and co-management has been established in some protected areas, but this has not yet resulted in significant impact on local fisheries.
- A tenure-based approach will be best located in part of the ECOFISH^{BD} zone where there is the potential for better management practices to benefit fishers operating there; for example, around an existing sanctuary area.

- The co-management bodies established as a pilot will be most accessible to fisher community organizations, administration and government agencies if they are established at the *upazila* level, but this is unlikely to be able to resolve coordination in any significant part of the hilsa fishery. This may be possible in Andharmanik *Upazila* since it belongs to only one *upazila*, Kalapara.
- In a multi-tier co-management system a district-based tier should be avoided as this will be compromise ecological integrity, since district boundaries lie along many of the rivers. While DoF could establish a forum that includes officials and CBOs from several *upazilas*, it will lack administrative teeth. Establishing on a pilot basis one or more co-management forums for this zone will either require finding an ecologically and biologically sound management area that falls within one district, or obtaining divisional level administrative support for a special hilsa and estuary ecosystem management forum.
- In all cases, the local co-management forums need to include sufficient representatives of fisher CBOs and others from civil society so that they are not dominated by government officers.

Barriers that continue to hinder the development of successful integrated coastal zone management in Bangladesh include:

- There is a lack of adequate legislative arrangements and inadequate budgetary provisions.
- Despite a pro-poor general policy, policy formulation is non-participatory.
- Equally, there is a lack of access to information/dissemination for the local public.
- The government adopts a highly sectoral and department-based approach, which limits opportunities to manage mobile species across multiple ecosystems and jurisdictions. Within government there is generally an institutional capacity gap (resource, knowledge, skill).
- There is a lack of governance/ownership at the local level, and a lack of continuous institutional support for organizations that have been supported, illustrated by a general lack of effective exit strategies for projects and limited knowledge transfer from project to project.
- As a result, implementers often lack the background research based information to adapt program management.

7.0 SOUTHEAST ASIA EXPERIENCE

The following section places the Bangladesh experience within the context of regional best practices and approaches to integrate tenure rights into a sustainable management framework. It presents a range of management models employed in the region.

AN ECOSYSTEM APPROACH TO FISHERIES MANAGEMENT IN SOUTHEAST ASIA

The increased understanding of the interactions among different components of marine ecosystems such as fish, people, habitats, and climate has led to a growing recognition of the need to manage fisheries in the context of their supporting ecosystems (Pomeroy et al., 2013). Applying an EAFM is considered the preferred option and best practice for the long-term sustainability of fisheries and the services that fisheries ecosystems provide to society (e.g., food security, livelihoods, economic security, coastal protection, human health and wellbeing) by many Southeast Asian countries (Pomeroy et al., 2015). An EAFM looks beyond seeing a fishery as simply “fish in the sea and people in boats.” An EAFM covers the broader marine environment including natural components, such as habitats, and the environment, and human activities, such as fishers, fishing communities, coastal development and tourism. An EAFM focuses on sustainable management of fisheries and their provisioning of food and livelihoods for humans, as a sectoral component of the more holistic and ecosystem-based management, which includes management of all of the other non-fisheries sectors as well, such as coastal development and land use, shipping and transportation, etc.

Transitioning towards an ecosystem approach will involve broadening the scale of what is being managed both spatially and temporally, and likely will also involve more attention to governing across scales. One of the greatest shortfalls of conventional fisheries management, indeed, conventional environmental management, is the mismatch of scales of governance to the scales of the system being managed. Identifying appropriate spatial, temporal, and governance scales is perhaps one of the most important aspects of transitioning to EAFM, and is particularly important when considering a migratory fish species, such as hilsa. Fish, fisheries, and fishers rarely exist fully within a single management jurisdiction: upstream agricultural and urban runoff can affect fish nursery habitat; fish often swim across jurisdictional boundaries; illegal fishers extract resources from a management jurisdiction; global climate change causes warming in nearshore waters, shifting fish abundance and distribution; the list goes on. Fisheries management quickly becomes ineffective without attending to the relevant spatial scales of the ecosystem (e.g. including habitat, fish nursery grounds in management actions, and fishing communities and households particularly dependent upon the ecosystem); without attending to the temporal scale of ecosystem interactions (e.g. seasonal fish spawning aggregations; long timescales of climate change impacts); and, without ensuring an appropriate match of governance to the scales of the system (e.g. cooperating across local jurisdictions, sub-national, and national scales).

Establishing and implementing an effective EAFM, thus, should be based on the spatial, temporal, and governance scales appropriate to achieve the prioritized goals and objectives of management. Likely, the goals and objectives of an EAFM represent those of the fisheries institutions and the stakeholders in the communities involved, and address issues across sectors. Scale factors into a plethora of management decisions: for example, in determining boundaries (e.g. defining the relevant fish stocks and habitats to manage); in determining the multiple spatial and temporal scales reflecting the natural hierarchy of the ecosystem (e.g. from large marine ecosystems to small estuaries); and in establishing climate change

adaptation measures (e.g. counting on uncertainties). In almost all situations, regardless of the degree of management centralization, EAFM-implementing institutions will need to consider mechanisms to scale up and scale down management decision-making within and across the community, municipality, district, province, national, and regional levels.

There will always be questions about the efficiency of the management arrangement, particularly with respect to the level of centralization in a particular place. With thoughtful consideration, the development of efficient, flexible, and responsive management structures can be achieved and can allow for integration of science, management, and stakeholder involvement across different scales. In other words, the spatial and governance scales need to be adaptive to changes in the human system, such as rapid coastal development, and ecological systems, such as shifts in species distributions associated with climate change or ocean acidification.

Among the most important issues to be addressed for effective implementation of EAFM are the appropriate governance arrangements and scale for management. “In the end, governance systems that work, may matter most. Governance is the most independent of the four components of ecosystem area management because one can improve governance at scales from local to international, and can address (a range of challenges alone or in) combinations. It is simultaneously the most co-dependent of the four components. None of the other factors can be addressed without effective management tools.” (Pomeroy et al., 2013).

The spatial extent of the ecosystem determines which species, other ecosystem attributes, and human activities are the focus of EAFM. The EAFM faces the challenge of defining the relevant “fish stock” to manage, i.e., setting the right boundaries, as well as deciding on the appropriate scale and scope within which to manage. Ecosystem based management must be implemented at the multiple spatial and temporal scales that reflect the natural hierarchical organization of ecosystems (e.g., from large marine ecosystems to small estuaries). EAFM is by its very nature about interactions: those between land and sea, people and the environment; among stakeholders, managers, and scientists; and among different spatial and temporal scales. There is a need to develop flexible, responsive management structures. These structures integrate the organizational structure of science, management, and stakeholder involvement across different scales.

EAFM often involves “scaling up” management: for example, from single-species fisheries management to management of multi-species assemblages; from looking at isolated drivers of change to considering all environmental and human impacts; from design of individual protected areas to planning protected area networks; and, from conservation of a fragment of habitat to comprehensive spatial management. Issues of scale include what is the appropriate scale of the marine ecosystem for fisheries management purposes and scaling up from other management arrangements such as community-based management to an ecosystem scale. There is a need to assure harmony between scales of management and linkages between and among the various scales. One of the challenges of EAFM is to fashion ways to ensure that the actions of the coastal and fisheries institutions at each level of government are harmonized with one another and are consistent with agreed EAFM goals and policies. Management decisions that are matched to the spatial scale of the ecosystem, to the programs for monitoring all desired ecosystem attributes, and to the relevant management authorities are likely to be more successful in achieving ecosystem objectives.

Scaling up in ICM, for example, refers to three different contexts: (1) geographical expansion; (2) functional expansion; and, (3) temporal considerations. The same contexts may hold true for small-scale fisheries management. Geographically, the expansion could be from a small coastal community operating in a nearshore area up to the entire Bay of Bengal. Functional expansion involves adding new program interventions, for example, if the current intervention relates largely to enforcement, functional expansion may involve adding new interventions such as livelihoods and education. Temporal

considerations involve integrating fisheries management within the broader administrative programs of the local government units.

Issues in establishing governance arrangements for EAFM include not only the appropriate scale, but also boundaries and type of management for a marine ecosystem. Marine resources are usually managed at a political jurisdiction level rather than an ecosystem level. The question is how to develop governance arrangements at the appropriate scale that addresses political, social/customary, and ecosystem needs for management. In addition, it is important to establish the appropriate type of governance arrangement, central, co-management, community-based, to manage the ecosystem.

The Philippines has been addressing these issues of governance and scale as related to EAFM by managing fisheries on a multi-jurisdictional, ecosystem level. The management of fisheries and coastal resources in a number of bays and gulfs in the country, which represent marine ecosystems, have been developed over the last decade or more. The legal and institutional structure in the Philippines provides for governance of fisheries and coastal resources at an ecosystem scale in nearshore areas. The Local Government Code of 1991 devolved much authority to local government units, specifically municipalities. A general operative principle is a provision that the local government units may group themselves, consolidate or coordinate their efforts, services and resources for purposes commonly beneficial to them.

The 10 bays and gulfs analyzed in a recent study revealed seven different governance arrangements:

1. Clusters and alliances of municipalities to integrate coastal resource management (Lingayen Gulf, Sogod Bay, Lagonoy Gulf, Iligan Bay);
2. City-Wide Fisheries and Aquatic Resource Management Councils and Clustered Barangay Fisheries and Aquatic Resource Management Councils (Puerto Princessa City, Palawan);
3. Integrated Fisheries and Aquatic Resources Management Councils (San Miguel Bay, Carigara Bay, Ragay Gulf);
4. Gulf Management Council (Davao Gulf); and,
5. Regional Integrated Fisheries and Aquatic Resources Management Council (San Pedro Bay and Leyte Gulf; Western Leyte Coast).

In addition to the ecosystem governance arrangements identified through the study, the literature revealed two other examples in the Philippines:

6. The integrated municipal council (Banate Bay, Iloilo); and,
7. The LIPASECU Bay Management Council, Inc. (Pandan Bay, Antique)

For the hilsa fishery, the above discussion highlights that management will involve broadening the scale of what is being managed both spatially and temporally, and likely will also involve more attention to governing across scales. One of the greatest shortfalls of conventional fisheries management, indeed, conventional environmental management, is the mismatch of scales of governance to the scales of the system being managed. Identifying appropriate spatial, temporal, and governance scales is perhaps one of the most important aspects of transitioning to EAFM, and is particularly important when considering a migratory fish species, such as hilsa.

MARINE SPATIAL PLANNING

Marine spatial planning (MSP) is 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 usually have been specified through a political process (Pomeroy, Baldwin, &McConney, 2014). Characteristics of marine spatial planning include ecosystem-based, area-based, integrated, adaptive, strategic and participatory. In fisheries management, MSP – or at least its fisheries use zoning component – is an effective tool for consolidating the range of management interventions, particularly in relation to the various marine spatial uses. Because of the range of existing management paradigms and approaches that have been introduced, it has to be understood from the very beginning that zoning as a tool does not replace any of the coastal and marine management tools already in place. In fact, it has to be highlighted that MSP, or its fisheries use zoning component, will only attempt to consolidate the various management initiatives by providing the spatial scale. It organizes where human activities can occur in a given coastal and marine space with the objective of encouraging compatibility of uses, reducing conflicts between human activities, and preventing conflicts between human uses and the environment.

As mentioned above, there is intense competition for fishing space which often leads to conflicts that cause loss of property or even physical harm and often spills over into communities on land, further increasing social tensions. In the coastal and fisheries use context of Bangladesh, MSP or zoning is meant to reduce conflicts among various capture fisheries activities, between capture fisheries and other sea uses (maritime, tourism and mariculture), and between human activities and marine environment, particularly in key habitats, such as the hilsa sanctuaries.

FISHERIES REFUGIA

The fisheries refugia concept is based on the use of area-based or zoning approaches to fisheries management aimed at maintaining the habitats upon which fish stocks depend, as well as minimizing the effects of fishing on stocks of important species in areas and at times critical to their life cycle (Paterson et al., 2013). The fisheries refugia concept promotes sustainable use of fish stocks and their habitats. It focuses on fish life cycle and critical habitat linkages as the criteria for site selection. The common understanding is that fisheries refugia relate to specific areas of significance to the life cycle of particular species, and that they should be defined in space and time, and serve to protect spawning aggregations, nursery grounds, and migration routes. This is already well recognized in Bangladesh, previous sections have noted the use of sanctuaries in inland fisheries and the four hilsa seasonal closures and sanctuaries.

RIGHT-SIZING OF FISHERIES

One approach to managing fisheries is to control access rights. In the Philippines, as in Bangladesh, there is a need to reduce the numbers of fishing vessels targeting hilsa to increase stock numbers (Armada 2014). There is an on-going attempt by the Ecosystems Improved for Sustainable Fisheries (ECOFISH) Program in the Philippines to address this issue. This requires substantial effort to determine the right-size of fishing effort that can be sustainably supported by a fisheries or an ecosystem. First, the process involves the development of an ecosystem model using Ecopath software with Ecosim for a given spatial and governance scale. This is followed by simulating the various scenarios with stakeholders to arrive at the appropriate number and allocation of the fishing gears among the various local government units and developing and implementing a process of allocating the appropriate fishing gear mix among the various local governments. To sustain the intervention, the allocations are incorporated into the fisheries management plans and legitimized through legislation or other policy instruments.

The initiative has to be tied to other directly relevant initiative like registration and licensing and enforcement to ensure the success of their implementation. As with other management interventions, a participatory approach and learning by doing, all the way from conceptualization of the idea of right-sizing of fishing effort, to planning, and ultimately to implementation, is the best approach to ensure success of the initiative.

ENFORCEMENT AND COMPLIANCE

As mentioned above, there is limited enforcement of laws and regulations related to hilsa management and high levels of non-compliance in Bangladesh. Compliance and enforcement involves the application of a broad range of approaches, using both incentives and disincentives, by different agencies to alter the stakeholder's behavior with respect to the fishery (Pomeroy et al., 2015). Those approaches can consist of "soft" preventive measures such as education or "hard" sanctions such as apprehension, prosecution and conviction. Soft enforcement approaches promote voluntary compliance with the requirements of the law without going to the courts. Soft enforcement focuses on building on the social and cultural dynamics of compliance that can be used to: (a) sustain widespread compliance; (b) encourage voluntary compliance; and, (c) achieve general deterrence. Soft or positive approaches include:

- Social marketing;
- Social mobilization;
- Coastal resource management best practices;
- Legislation and regulation;
- Information management and dissemination;
- Education and outreach; and,
- Monitoring and evaluation.

Negative or "hard" enforcement uses legal sanctions imposed by a court or regulatory authority for deterrence. Hard enforcement approaches have one objective, which is to identify, locate and suppress the violator using all possible instruments of law. Negative or hard approaches include:

- Continuous presence of law enforcement;
- Consistent activities to detect, apprehend, and prosecute violators and impose appropriate sanctions;
- Development of sophisticated strategies to apprehend repeat violators; and,
- Negation of all economic benefits from illegal activities.

In the Philippines, local-level compliance and community-supported enforcement efforts, for example, focus largely at the community and municipal levels, with the recognition and close collaboration of local government agencies and law enforcement officials. There is wide recognition of the need to continue strengthening these community-supported enforcement efforts; in particular, strengthened local compliance and community support for local governance units and community-based enforcement efforts. Similar types of community-supported enforcement mechanisms could be established in Bangladesh based on the Philippine model.

8.0 PROJECT-LEVEL RECOMMENDATIONS

Given the long and often roller-coaster legal, policy, and institutional changes in small-scale fisheries, what types of interventions should ECOFISH^{BD} focus on? Recommendations to enhance the current ECOFISH^{BD} approach are focused on the following key questions:

- Is there a model for tenure/co-management arrangements in the Bangladesh that can be applied to the hilsa fishery throughout its migratory range and habitat requirements?
- Is there a legal/institutional enabling framework to support these arrangements?
- Is tenure/co-management an appropriate approach for this species (based on experience in Bangladesh and elsewhere)? What would a draft co-management framework for the Meghna estuary look like?
- If there are other approaches, how is the national legal/policy framework conducive to whatever approach is recommended?

CURRENT ECOFISH^{BD} APPROACH

ECOFISH^{BD} is a five-year initiative funded by USAID/Bangladesh and implemented jointly by WorldFish and DoF. The project supports coastal fishing communities and other key stakeholders to improve the resilience of the Meghna River ecosystem and communities reliant on coastal fisheries (Figure 4). The project aims to enhance ecosystem resilience through the establishment of effective co-management in hilsa shad (*Tenualosailisha*) fish sanctuaries. ECOFISH^{BD} will enhance community resilience by improving the savings, livelihoods and coping strategies of marginalized and extremely poor fisher folk, particularly women, and thereby reducing their risk to climate-affected shocks and stresses in villages throughout the project area (Figure 5).

ECOFISH^{BD} is aligned with the Consultative Group on International Agricultural ReseaRch (CGIAR) Program on Aquatic Agricultural Systems (AAS), and operates in concert with the existing AAS “research in development” program in southern Bangladesh. To achieve its objective of “improved resilience of Meghna River ecosystem and communities reliant on coastal fisheries,” ECOFISH^{BD} supports four Intermediate Results (IRs):

- IR1: Improved fisheries science for decision making;
- IR2: Strengthened fisheries adaptive co-management;
- IR3: Enhanced resilience of hilsa fisher communities; and,
- IR4: Improved policy, power and incentives.

Consistent with the Fish Act, fisheries regulations, and HFMAP, ECOFISH^{BD} project implementation strategy focuses on sustainably managed exploitation of hilsa resources combined with strategies to diversify livelihoods and improve social capital in fishing communities. Fisheries measures include closed fishing seasons, protected fish sanctuary areas, and controlling and removing fishing gear that

capture juvenile fish. All these efforts seek to steer the fishery in the direction of sustainable yields.

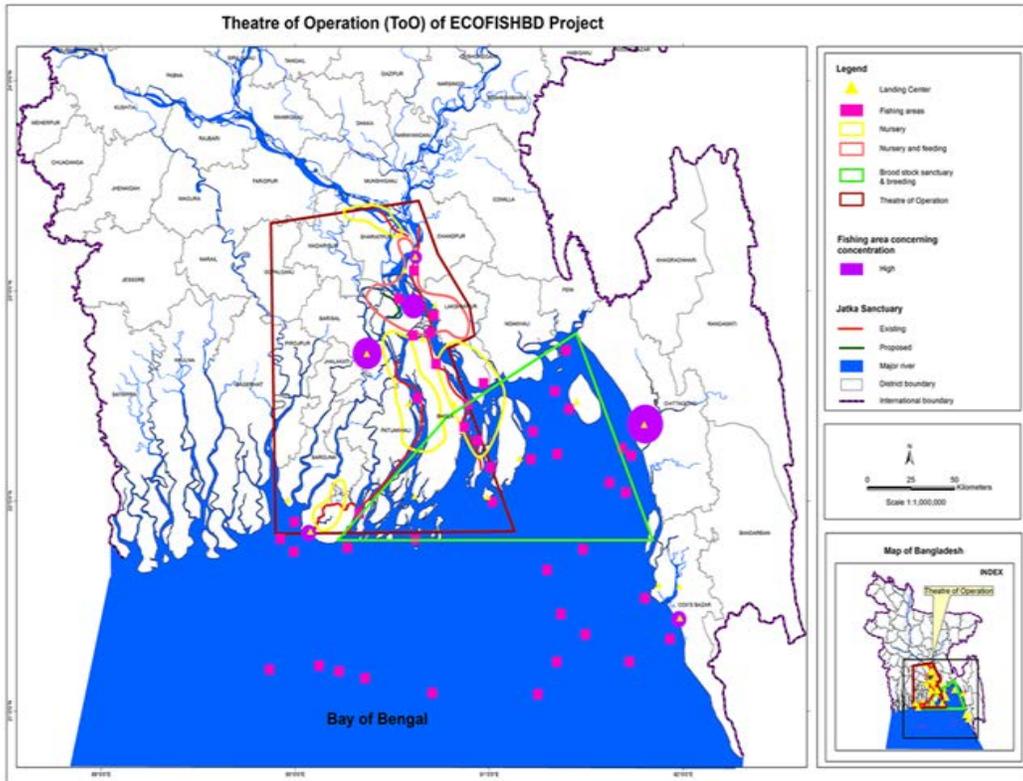


Figure 4. ECOFISH^{BD} theater of operations
Source: ECOFISH^{BD}

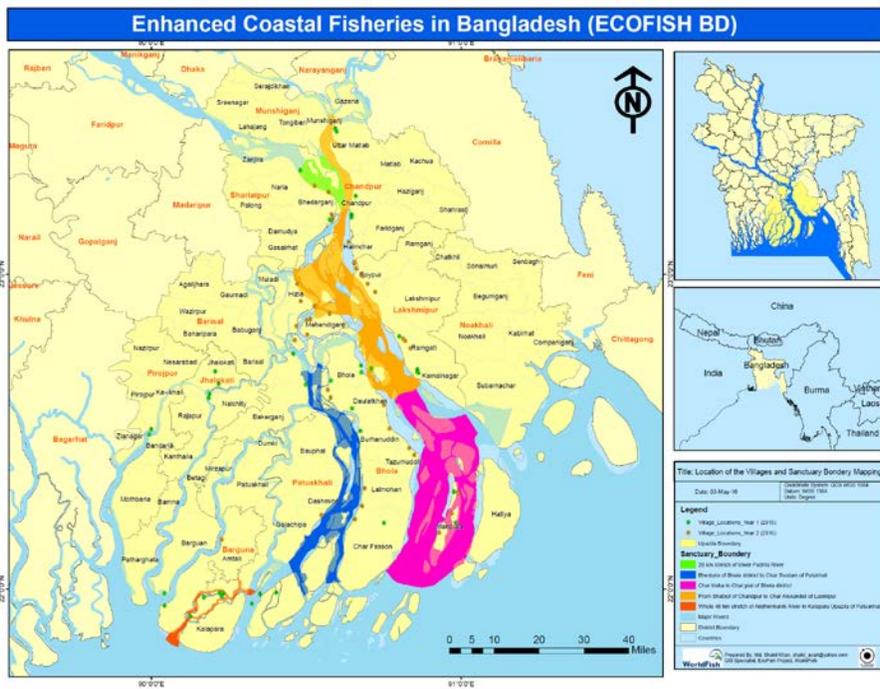


Figure 5. ECOFISH^{BD} villages
Source: ECOFISH^{BD}

The ECOFISH^{BD} Theory of Change (Figure 6) supports interventions to address fishery systems at multiple levels, including:

1. **Sub-national (district/upazila/union/and community) level activities:** Develop stakeholder and co-management institutional capacity, and provide efficient and functional co-management structures for inclusive consultation so that the needs at the local-level are better addressed in planning and decision-making on fisheries.
2. **National policy level activities:** Provide policy and decision-makers with vital scientific and technical knowledge to enable informed and coherent policy integration, planning, and decision-making. Harnessing local knowledge and scientific research will inform both local and national level consultation platforms and policy and planning outcomes.
3. **Regional level activities:** Support scaling up of best management practices and innovations includes efforts to align resource management actions in national policy and among neighboring countries that share the hilsa stock, as well as to share lessons and best practices that emerge from the program.

ECOFISH^{BD} supports DoF and local communities to establish collaborative management (co-management) of open-water hilsa fisheries. Previous USAID investments in co-management in Bangladesh have resulted in improved natural resources management system in more than 25 small protected forests and wetlands (about 600 hectares), and a national policy framework that allows for revenue sharing in democratically elected co-management units. Although the conditions of large-scale open water hilsa fishery are much more complex and challenging, by expanding this co-management approach into designated hilsa fish sanctuaries, covering tens of thousands of hectares, which are currently managed by DoF, ECOFISH^{BD} is positioned to provide a unique and historic demonstration of decentralized resource management decision making. It has the potential to improve the efficiency and effectiveness of existing and future government fisheries enforcement and social compensation schemes.

ECOFISH^{BD} activities are based on the use of existing knowledge and the generation of new local and scientific knowledge. These will be used to diagnose the current status of the socio-ecological system and define needs and opportunities to enhance fisheries and marine ecosystem management through: (a) reduced overfishing, and (b) improved community empowerment in fisheries management and livelihood diversification. ECOFISH^{BD} will also explore opportunities to strengthen existing government policies and strategies, improve inter-agency coordination to effectively enforce these regulations, and develop local capacity for fisheries co-management. ECOFISH^{BD} activities will aim to benefit marginalized and vulnerable poor fishing communities, and deliberately target women in fishing households.

ECOFISH^{BD} combines several key biodiversity conservation and climate resilience approaches to achieve the development objective of “improved resilience of Meghna River ecosystem and communities reliant on coastal fisheries.” These include:

- **Research in development:** WorldFish’s approach ensures that strategies to sustainably manage aquatic living resources are developed in partnership with communities, documented, and shared with the public, practitioners, and the scientific community.
- **Local systems:** The primary partner and clients are national and sub-national DoF officers and fishing communities. This ensures highest levels of relevance and sustainability. ECOFISH^{BD} project staffs are co-located with DoF staff in field offices and activities are

implemented in partnership. In addition, ECOFISH^{BD} seeks to build local capacity of DoF field staff, local research institutions, and local groups whenever feasible.

- **Community resilience and women’s empowerment:** ECOFISH^{BD}’s approach to enhancing resilience of hilsa fisher communities is predicated on targeting marginalized and vulnerable groups, particularly women, and delivering sustainable interventions that mitigate, adapt and transform household and community capacity to adapt to and “bounce back” from shocks and stresses. Increasing social capital and cohesion, and livelihood options, of poor fishing communities are important approaches and tools to achieve this result.
- **Citizen Science and community led fisheries monitoring in fisheries and biodiversity assessment:** Volunteer monitoring and data collection and a Citizen Science approach are project innovations. Citizen Science is supported by digital devices to collect information for catch assessment and stock and biodiversity assessments. In this approach, the skipper of a boat is the “Citizen Scientist” and is equipped with a smartphone that is able to take photos with GPS coordinates. Volunteer monitoring and Citizen Science approaches are intended to strengthen cooperation of fishers with ECOFISH^{BD} and improve these citizens’ engagement in fisheries management.
- **Learning and adaptive management:** The project-level theory of change is periodically revisited and modified using a participatory, adaptive and learning-based approach through periodic self-assessments and internal workshops.

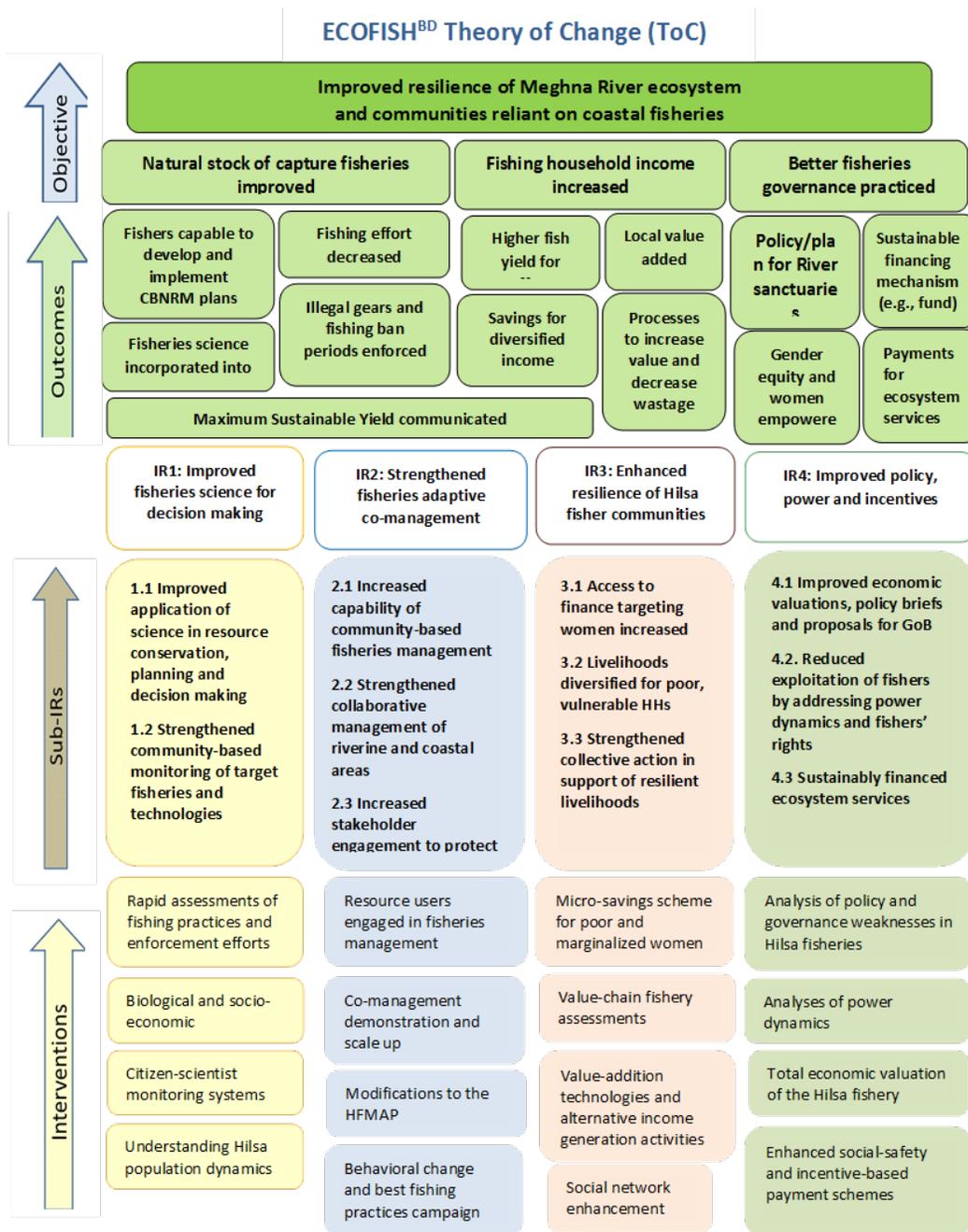


Figure 6. ECOFISH^{BD} Theory of Change

Source: ECOFISH^{BD}

Marine resource tenure is the system of rights and responsibilities regulating resource use and access that has been devolved or allocated by a tenure governance body to individuals, groups, or communities in a geographic area. Governance of tenure comprises the means by which diverse interested parties in society negotiate and decide upon the tenure allocation of natural resources among a group of people. In terms of the ECOFISH^{BD} theory of change above, IR2: Strengthened fisheries adaptive co-management and IR4: Improved policy, power and incentives, could benefit from an analysis of marine tenure considerations. This is especially true for the interventions of resource users engaged in fisheries

management, co-management demonstration and scale-up, analysis of power dynamics, governance weaknesses in hilsa fisheries, and incentive based payment schemes.

POTENTIAL ENHANCEMENTS

Is there a model for tenure/co-management arrangements in the Bangladesh that can be applied to the hilsa fishery throughout its migratory range and habitat requirements?

Estuarine fisheries are only part of the wider marine environment. Interactions of the fishery with other sectors, such as agriculture, will usually need to be managed at an ecosystem level. Hilsa fish, which migrate around the full estuarine/marine system, must also be managed at this level. It is recommended that an EAFM be utilized.

Maintaining the joint productivity of fisheries and other sectors thus requires their coordination at an ecosystem level. Such management activities would be best handled by creating a management body with a regional perspective and authority, and access to the departments responsible for other sectors, such as a Hilsa Fishery Management Authority. Local communities, as stakeholders in the migratory fishery, can participate in co-management, especially where there are important habitats or breeding areas, at this level. However, local communities may play stronger roles in the co-management of their own local blackfish species. For these species, management tools applied at a local level may result in improved local fish stocks and give direct benefits to the local community. Communities thus have the incentive to manage fish stocks, particularly where they have some form of “use rights” to local spatial sub-units of the fishery. Such a sub-division of the fishery into management units would also provide the flexibility needed for effective local management. These special characteristics of estuarine fisheries suggest that some management activities will need to be undertaken at an ecosystem level while others occur at a local, community level. In between these two levels, there may also be certain situations where intermediate management units may be required; for example, for the Tetulia management area (blue area in Figure 5) which comprises parts of two districts, multiple sub-districts and many fishing villages, for example. Such groupings of several villages for fishery governance exist for EAFM in the Philippines as described above, and in inland/freshwater fishery/wetland management in Bangladesh. In some parts of the estuarine system, the geographical distribution of villages and waterbodies may mean that the catches in each village are heavily dependent on the activities in neighboring villages. In such situations, co-operation between the different villages may be required to achieve management goals. This is especially true in Bangladesh where in almost all cases, inland and marine, more than one village will be involved in the management. This requires particular skills in communication and co-ordination, therefore intermediate management units may be expected to be more difficult than fishing community management. Basic understanding of the distribution of species and their lifecycles, must therefore be stressed to local communities through perhaps the citizen science approach to ensure that learning is two-way.

The fishery will need to be managed at various nested scales through fishery management units with co-management arrangements in those units. A fishery management unit is the area to be managed. The establishment of fishery management units should be based on spatial interactions in the estuarine/marine environment, the fishing communities and the fish stocks. At a minimum, three categories or levels of fishery management units may be trialed:

1. CBO level – smallest management unit composed of clusters of several adjacent fishing villages who have been allocated use rights and authority to manage local fish stocks and regulate access to a specific water area
2. *Upazila* level (intermediate area) – fishery coordination committees composed of two or more CBOs represented by an *upazila* committee composed of CBO leaders and government officials

3. Fishery ecosystem management area level – based on hilsa fishery ecosystems with a management body with responsibility to coordinate the community management areas in one of the existing hilsa management units/areas (this may include parts of more than one district)

In addition, there might be a Hilsa Fishery Management Authority composed of government officials, management unit representatives and experts at a national level to provide broader policy and management guidance.

Applying an EAFM is considered the preferred option and best practice by many countries in Asia for the long-term sustainability of fisheries and the ecosystem services provided to society (e.g., food security, livelihoods, economic security, coastal protection, human health and well-being). The increased understanding of the interactions among different components of marine ecosystems such as fish, people, habitats, and climate has led to a growing recognition of the need to manage fisheries in the context of their supporting ecosystems. An EAFM looks beyond seeing a fishery as simply “fish in the sea and people in boats.” An EAFM covers the broader marine environment including natural components, such as habitats, and the environment, and human activities, such as fishers, fishing communities, coastal development and tourism. An EAFM focuses on sustainable management of fisheries and their provisioning of food and livelihoods for humans, as a sectoral component of the more holistic and ecosystem-based management, which includes management of all of the other non-fisheries sectors as well, such as coastal development and land-use, shipping and transportation, etc. Policy to address non-fishing-related threats (such as from transportation, maritime uses, tourism, mariculture) will require coordination and cooperation across all sectors impacting hilsa management and habitat. This should identify any divergences or potential for conflicting policies.

Is there a legal/institutional enabling framework to support these arrangements?

While there is yet no EAFM-specific legislation in Bangladesh, there are laws and policies that provide support for the guiding principles of an EAFM and, as in countries in Southeast Asia, they provide a sufficient legal foundation to be able to implement EAFM, although a government (MoFL) order would be needed to establish the committees and bodies discussed above. The Government of Bangladesh is also a signatory of the FAO Code of Conduct for Responsible Fisheries, which endorses the use of an EAFM.

Is tenure-based co-management an appropriate approach for this species (based on experience in Bangladesh and elsewhere)? What would a draft co-management framework for the Meghna estuary look like?

Bangladesh has a long history and experience with co-management in inland waterbodies. Many of these lessons are transferable to the estuarine/marine environment. There is much less experience of co-management in estuarine/marine ecosystems. The fishery and resource system in the estuarine/marine environment is different from the environment of inland fisheries, and co-management will present a major challenge both to government and other stakeholders. The usual response to this challenge would be for managers to test a change in governance in a few local areas and build gradually on the experience, which is what happened in inland fisheries over a period of over ten years. This is strategy is only partly applicable in the estuarine hilsa fishery. Because the hilsa and fishers are mobile through a large estuarine system, piloting will need to work in relatively well defined parts of the large system and with a set of adjacent sub-units (not isolated local areas) to test how management and expected benefits can be coordinated among and between these sub-units. The National Social Protection Strategy has been suggested as one of the major tools to bring the hilsa fishers under an effective co-management umbrella.

While co-management approaches are recommended here for the estuarine fisheries, it must also be recognized that this approach will not always be possible. The movement of fish around the estuary

means that management will always be more complicated for fisheries than for other non-mobile resources such as mollusks. In addition, conflicts of interests between different social groups, or the self-interests of even a small number of locally powerful community members may prevent any partnerships from working effectively. Certain environmental and social situations will thus be more appropriate for co-management than others. While some parts of each estuarine ecosystem should be expected to present major management challenges, other parts may often provide good opportunities; for example, where there are fewer administrative units involved (e.g., only one district) and the river/estuarine area is relatively well defined and other fish (besides hilsa) spend all or most of their lifecycle within that area. These latter parts are where co-management activities should begin. In general, conditions that improve the chance for successful co-management for a migratory fishery such as hilsa include clear boundaries of the management unit, a common approach by the community to shared problems (group homogeneity), existing fishing organization, clear objectives, strong leadership, and support from government (Pomeroy, Katon, & Harkes, 2001).

If there are other approaches, how is the national legal/policy framework conducive to whatever approach we recommend?

According to the Territorial Waters and Maritime Zones Act of 1974, no foreign ship and no person without a license can enter the maritime zone of Bangladesh. But it is known that fishers from India, Thailand, Sri Lanka, and Burma regularly enter the maritime zone of Bangladesh. For the hilsa fishery, trans-boundary initiatives with neighboring countries may serve as a vital aspect of conserving fisheries resource of Bangladesh. Transboundary cooperation will require forums in which to facilitate dialogue between the various stakeholders. These initiatives must be linked to adequate monitoring, surveillance and enforcement of the fisheries regulations.

ADDITIONAL ENHANCEMENT CONSIDERATIONS

In Bangladesh fish marketing is controlled by a group of intermediaries known as *aratdars* (commissioning agents) and *mohajans* (moneylenders), both of whom are rich and powerful members of society; sometimes the same person can be both a commissioning agent and a moneylender. The commissioning agents dominate the wholesale markets, each one with a chain of suppliers bringing in regular catches. They provide advance money (*dadon*) to boat owners to make boats and nets, on condition of getting the exclusive right to buy their catch. The agent's charge a three to six percent commission and take two to four fish for every 80 fish sold. Fishers tend to sell their fish as soon as possible to these agents after landing to avoid spoilage; cold storage facilities are inadequate and good quality ice is unavailable.

There is a need to better examine this market-credit relationship in the hilsa fishery to understand the relationship and linkages between the agents and moneylenders and the fishers. The relationships may differ between mechanized boat operators and owners, non-mechanized boat operators and owners, and fisher laborers (not owning boat or gear). The strong influence of these agents and moneylenders on fishers could be having an impact on fishing practices and the ability to manage the fishery. There have been few studies of this relationship in Bangladesh. There is also a need to examine post-harvest facilities and infrastructure in the fishery as better quality fish and improved prices for fishers could be obtained and used as a means for more sustainable fishing.

The existing fisheries laws and policies have not been properly implemented and non-compliance is widespread (Islam et al., 2016b; Murshed-e-Jahan et al., 2014). The lack of adequate MCS affects the sustainability of the coastal and marine ecosystem of Bangladesh. The low probability of detection and conviction only encourages illegal fishing activities. MCS capacity is constrained due to lack of knowledge, skills, and abilities related to compliance and enforcement among practitioners at the local level. This indicates that training and mentoring activities should be carefully tailored to specific gaps and

address the specific needs within Bangladesh and sub-national units. Strengthening resource rights is a particularly important approach to creating incentives for local fishers to be part of an effective MCS. Fishers who have enforceable rights are more likely than others to be engaged in management of the resource. Barriers to be addressed include the existence of cultural and social constraints on enforcement activities that might strain social, familial, political, or professional relationships; lack of effective partnerships with external agencies and local leaders; and, insufficient financial support for compliance and enforcement activities. Specific activities may include strengthening the strategic focus and effectiveness of public education and outreach efforts, as well as assessing the effectiveness of current information and outreach campaigns; increasing law enforcement capabilities and effectiveness, particularly with respect to legal and tactical procedures, through supplemental and advanced training techniques; developing community-supported enforcement efforts; and, creating local enforcement alliances.

The Marine Fisheries Ordinance of 1983 mandated the Government of Bangladesh to declare marine reserves. There is a need to establish more marine protected areas or fisheries refugia or sanctuaries to enhance the sustainability and resilience of marine fisheries. Experience with hilsa sanctuaries indicated that before the sanctuaries were established, there was limited consultation with fisheries stakeholders, which partially contributed to widespread non-compliance in the sanctuaries (Islam et al., 2016b). Fisheries stakeholders need to be consulted and involved in all stages of the conception, formulation and implementation, preferably through co-management, of any new MPAs or sanctuaries. This balance of establishing refugia alongside building an understanding of the benefits to the fishery is an important component of establishing an effective governance regime

A learning exchange needs to be established to share experiences and lessons learned between inland and marine fisheries. For example, how can the years of experience and lessons from co-management in inland fisheries be translated to marine fisheries?

SUMMARY

In summary, there is no obvious model of co-management institutional arrangement for the entire coastal-marine ecosystem and stock of hilsa. Globally migratory stocks are managed through multi-level institutional arrangements. The wider challenges of coastal zone co-management are best addressed at the programmatic level, given that the project is half way through its life. To help enable this, ECOFISH^{BD} should focus on completing its spatial analysis and mapping of the hilsa lifecycle and fishery activities covering key social-ecological-governance attributes of the hilsa fishery: spawning, nursery, feeding grounds, areas of extreme poverty, institutional jurisdictions, sanctuaries, etc. This will inform planning, form the basis for strengthening tenure rights and river-estuarine-marine spatial planning at an ecosystem/national level.

For ECOFISH^{BD} the current focus on piloting co-management in Andermanik River is a good choice as potential rights for co-management are recognized through its status as a hilsa sanctuary and the area lies within one sub-district. Moreover there are past arrangements for co-management and fisher community organizations established under the Fourth Fisheries Project (although the ECOFISH^{BD} team appear to be building new fisher groups rather than working with and re-activating existing fisher CBOs). Additionally, it is adjacent to a mangrove forest protected area (Tengragiri Wildlife Sanctuary) that has co-management established under USAID's CREL project. There is scope to apply experience from the citizen science component of the project, which has focused on threatened fishes and cetaceans outside of the main intervention areas, to this area to track fishing activities combining GPS data and fisher observations on a pilot basis to provide near instant information to a co-management body.

The additional focus area of the lower Meghna River poses challenges for designing co-management approaches. Not only is the area much larger, and has substantial movements of fish and fishers through the river reaches, but the reaches defined for hilsa conservation do not coincide with district boundaries. While a tier of *upazila* level co-management bodies can feasibly be established to improve coordination and planning between fisher community organization representatives and government agency officers, any improvement in compliance with rules or fish conservation within an *upazila* is likely to have much more dispersed benefits. ECOFISH^{BD} could initiate policy dialogue that includes the land and civil administration as well as DoF and MoFL, with the aim of aligning hilsa conservation areas with district boundaries so far as possible. This should also focus on reaching agreement on the format of a higher tier of district/conservation area level co-management bodies where there would be proper representation of fisher CBOs from the riverine parts of *upazilas* within that area.

Research under ECOFISH^{BD} should also investigate the history and experience, such as it is, of local tenure and use rights in the intervention's rivers and estuarine areas, to fill a knowledge gap and determine if there is any past basis that could guide future arrangements.

Lastly it will be important to demonstrate an effective model for seasonal compensation and livelihood diversification that is sustainable and non-exploitative, at least in the pilot area, which may be based on using a tenure analysis to define who should and should not benefit; and to document how this impacts compliance and also the traditional trader-moneylender relations with fishers.

9.0 PROGRAM-LEVEL RECOMMENDATIONS

The update of a CDCS as part of USAID programming provides an opportunity to suggest enhancements in program strategy and focus. USAID/Bangladesh is in the process of updating their CDCS.

BANGLADESH COUNTRY DEVELOPMENT COOPERATION STRATEGY

The USAID/Bangladesh CDCS for fiscal years 2011 – 2016 supports the Government of Bangladesh’s Vision 2021 through the goal statement, “Bangladesh, a knowledge-based, healthy, food secure and climate resilient middle income democracy,” and will contribute to the GOB’s long term development goals while focusing on improving the lives of the poor. The results framework for 2011-2016 presents the following Development Objectives (DOs) that contribute to USAID/Bangladesh’s overall goals:

- DO1: Citizen confidence in governance institutions increased;
- DO2: Food security improved;
- DO3: Health status improved; and
- DO4: Responsiveness to climate change improved.

Given the significant challenges in food security, health and climate change, Bangladesh has been selected as a priority country for the U.S. government’s Global Health Initiative, Feed the Future, and the Global Climate Change Initiative.

POTENTIAL ENHANCEMENTS

The Meghna River estuarine ecosystem and the communities reliant on coastal fisheries and the hilsa shad (*Tenulosailisha*) fishery are part of a complex and diverse fishery that is vulnerable to overfishing and resource degradation. Although hilsa is the main species, a large part of the catch within this area comprises many other species, and fishers do not specialize all year just on hilsa. There is a need for good governance of the fisheries in order to maintain productivity.

Weak governance is one of the main causes of the present poor condition of fisheries in the Meghna River estuarine systems. Secure tenure for fishers to fisheries resources is proposed as an important component in improving fisheries governance. Having good governance in place is essential to achieving most fisheries’ management goals, and goes hand-in-hand with well-defined tenure arrangements.

Based on the legal and policy review for marine tenure and co-management in the ECOFISH^{BD} zone, and on marine tenure frameworks and concepts, the following approach is recommended to managing the Meghna River estuarine ecosystem and fishery.

It is recommended that management (decision-making) be shared between a range of different stakeholders to the fishery. This sharing can happen (a) through a co-management arrangement between government and fishers and other stakeholders; (b) through an ecosystem

approach to fisheries management; and, (c) between different geographic sub-units of the fishery or fishery management units. Discussions over tenure arrangements and rights of different groups to different areas and enforcement may facilitate the development of these decision-making processes.

Consider an ecosystem based approach to management. At program level, the initial project entry point with hilsa management has made sense given the importance to the overall Bangladesh fish catch, economy and culture, and vulnerability of these fishing communities to climate stresses and exploitation. However, a more ecosystem-based approach to management that takes onboard the extensive lessons and experience in co-management under past and present USAID-supported projects, as well as the challenge of integrated coastal management would need to combine several elements possibly through several projects. The following ministries, departments, and partners will need to be further engaged:

- The Forest Department and DoE to influence protected area management in terms of fisheries and aquatic resources, while adding through them a stronger component for coastal biodiversity conservation;
- The Ministry of Land to address land use zoning and tenure rights for areas of estuarine-coastal fishing grounds, as well as to clarify and coordinate sanctuaries, and to change understanding and gain support for co-management;
- DoF to promote and guide technically fisheries co-management, and for its field presence; and,
- Finance/business enterprise support institutions to develop closed season compensation and operational finance packages.

The options are either to have distinct projects with each main government agency, working in several key coastal areas as ecological units within the wider coastal-estuarine-marine zone, or to develop more than one activity each for a specific substantial ecological unit or set of adjacent units, but including all the relevant agencies/ partners and ensuring policy coherence.

Determine the need to invest in the “blue development space.” Since 1998 USAID has made a long-term commitment in Bangladesh to participatory restoration and governance of wetlands and small-scale fisheries. Existing global agendas on poverty reduction and food security such as the *Global Food Security Act of 2016* and *Voluntary Guidelines on Securing Sustainable Small-scale Fisheries in the Context of Food Security and Poverty Eradication* (SSF Guidelines) provide a platform to justify investment. The SSF Guidelines are intended to support the visibility, recognition, and enhancement of the already important role of small-scale fisheries and to contribute to global and national efforts towards the eradication of hunger and poverty. The SSF Guidelines support responsible fisheries and sustainable social and economic development for the benefit of current and future generations, with an emphasis on small-scale fishers and fish workers and related activities and including vulnerable and marginalized people, promoting a human rights-based approach.

The next update of the Bangladesh CDCS provides an opportunity to support more inclusive economic growth that includes small-scale fishers and to improve the health and welfare of fishing families. A country-level assessment of the status of implementation of the SSF Guidelines, developed collaboratively with partners, could guide the development of multi-sectoral investment strategy to reduce extreme poverty in fishing communities. An SSF Guidelines country-level assessment methodology was tested as part of the Philippines field assessment and will be refined to help USAID missions spearhead this activity with its partner. This could be applied to the Bangladesh context.

Diversify investment portfolios to address multiple development objectives within small-scale fishing communities. Historically, USAID’s investment in marine and coastal issues has been

limited to meeting biodiversity conservation objectives. Despite the great progress made in Bangladesh toward reducing threats to fisheries, other social, economic, and governance issues need to be addressed as part of a holistic approach to reduce extreme poverty and build resilience in the small-scale fisheries sector. There is a need to address issues such as poverty, food security, and education. Fishing families are seeking alternatives to fishing, especially for their children but also for themselves. Declining fishing stocks, disaster events such as cyclones, and annual seasonal limitations on fishing due to rough sea conditions impact small-scale fishers that depend primarily on fishing for food and livelihood. USAID/Bangladesh should seek innovative ways to diversify and align investments to support multiple development objectives. A country-level policy review on small-scale fisheries could identify priority reforms and strategies that could be supported by different programs within the mission such as eliminating harmful subsidies that promote overfishing or supporting a more inclusive coastal economy. Further, USAID could identify priority geographies for investment in fishing communities by overlaying multiple indicators of extreme poverty such as poverty level, health, nutrition, biodiversity, conflict, and vulnerability to climate change.

Consider responsible governance of tenure in small-scale fisheries explicitly in project design. Good practices and emerging themes on small-scale fisheries highlight the need for secure and capable marine tenure systems, multiple scales of social-ecological knowledge, and effective co-management. There is a growing recognition of the importance of secure tenure in small-scale fisheries to achieve benefits related to food security, inclusive and sustainable economies, and climate resilience. Small-scale fishers and coastal communities with secure rights over a given fishery, fishing ground, or territory have a strong interest in organizing and acting collectively to manage their resources sustainably. Marine tenure institutions and property rights form the overarching governance structure that enables a fishing group or community to establish rights to both use resources from a defined territory as well as exclude outsiders. Marine tenure, therefore, establishes a set of rights and responsibilities as to who is allowed to use which resources, in what way, for how long, and under what conditions, as well as who is entitled to transfer rights to others and how. Secure tenure and governance promotes stewardship of natural assets such as fish and creates incentives to maintain ecosystem goods and services. As in terrestrial settings, secure tenure for small-scale fishers can help prevent coastal land and fish grabs. A community's secure right to make management decisions on resources within the coastal zone is crucial to building their resilience to the increasing impacts of climate change. Secure tenure and mediation mechanisms can also reduce conflicts, which will become more important with climate change impacts such as rising sea levels, population mobility, and changing spatial distributions of livelihood options.

Acquire knowledge on marine tenure and social-ecological system. As has been made clear in this study, there is almost nothing known about marine tenure in Bangladesh. This is either because no one has studied marine tenure or looked at marine fisheries through a holistic tenure lens in Bangladesh. Either way, this is a critical area for USAID investment in Bangladesh to support healthy marine and fisheries ecosystems, food security, and livelihoods. There should be a review of the past and exiting jurisdiction and user rights of the major rivers like the Padma and Meghna ecosystems. This would lead to an assessment of alternative tenure arrangements in the Meghna River that may provide rights to the fishers for access to hilsa fish and support co-management. Fishers in the Meghna River estuarine ecosystem, as in other marine areas of Bangladesh, do not have secure rights to fishery resources. Secure tenure arrangements, along with effective management and stewardship regimes, can support sustainable small-scale fisheries in the Meghna River estuarine ecosystem. Rights and responsibilities should be bestowed on small-scale fishing communities to restore, protect and manage local marine resources and ecosystems on which they depend for food and livelihoods. These rights need to include both use rights and management rights. Small-scale fisheries exist in a complex social-ecological system. Traditional, local, and modern scientific knowledge are all needed to understand the connectivity and interactions among the ecosystem, resource users, governance systems, and an array of social,

economic, and political drivers. For new projects, there is a need to conduct baseline assessments that include not only ecological and socioeconomic conditions, but also on characterization of existing marine tenure rights and institutions. Informal or weak marine tenure systems often go unrecognized during project design and implementation. As many fishing households are landless, tenure assessments should also provide an understanding of their land tenure security.

Strengthen marine tenure governance institutions to protect tenure rights and effectively engage in co-management arrangements at multiple scales of governance. While marine tenure considerations often focus on the tenure rules governing rights and responsibilities, it is critical to strengthen marine tenure governance institutions (people's organizations, co-management groups, as various national and local government offices) that design the tenure arrangements and therefore create these rules. By providing consistent support to strengthening governance bodies (at the district level), an effective institutional modality can be created through which multiple objectives can be pursued over time such as biodiversity conservation, food security, eradication of extreme poverty, and climate change resilience. This can be achieved through tiered tenure arrangements since communities have the greatest commitment to support their ongoing welfare and well-being. Land-water tenure for small-scale fishers should be considered in project design. There is an opportunity to develop effective co-management arrangements, and consider the vision for sustainable management of local waters. An assessment of how well co-management arrangements are working could provide insight into the key gaps and challenges at work in different parts of Bangladesh.

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