FAO/GLOBAL ENVIRONMENT FACILITY
PROJECT DOCUMENT

Cover page

PROJECT TITLE: Community-based Climate Resilient Fisheries and Aquaculture Development in Bangladesh **PROJECT SYMBOL: GCP/BGD/055/LDF**	
Recipient Country: Bangladesh	**Resource Partner: Least Developed Countries Fund (LDCF)**
FAO project ID: 626403	**GEF Project ID: 5636**
Government /other Counterpart(s): Department of Fisheries	
Expected OED (starting date): 1 February 2016	
Expected NTE (End date): 31 January 2020	
Contribution to FAO's Strategic Framework[1]	**a. Strategic objective/Organizational Result:** 1. Contribute to the eradication of hunger, food insecurity and malnutrition. 2. Increase and improve provision of goods and services from agriculture, forestry and fisheries in a sustainable manner. -MAW Climate Smart Agriculture 3. Reduce rural poverty. 5. Increase livelihoods resiliency to climate change and other disasters. **b. Regional Result/Priority Area, Asia-Pacific:** 1. Enhancing equitable, productive and sustainable natural resources management and utilization. 2. Coping with the impact of climate change on agriculture and food and nutritional security. 3. Asia Pacific Blue Growth Initiative. **c. Country Programming Framework Outcome, Bangladesh:** 1. Reduce poverty and enhance food security and nutrition (access and utilization). 2. Enhance agricultural productivity through diversification/intensification, sustainable management of natural resources, use of quality inputs and mechanization.
LDCF: Agriculture and fisheries sector	**LDCF Objectives:** **CCA-1:** Reduce vulnerability to the adverse impacts of climate change **CCA-2:** Increase adaptive capacity to respond to the impacts of climate change **CCA-3:** Promote transfer and adoption of adaptation technology
Environmental and Social Risk Classification: Low	

Financing Plan: LDCF allocation (USD):		**5 425 114**
Co-financing (USD):		
DoF	6 100 000	
DoE	250 000	
MoEF/IUCN	1 300 000	
FAO	4 200 000	
World Fish	2 000 000	
IFAD	2 500 000	
Total Co-financing:		**16 350 000**
Total Budget:		**21 775 114**

EXECUTIVE SUMMARY

Bangladesh, due to its geographical location and spatial ecosystems/ landscape diversities, is exposed to climate-induced and differentiated impacts. The fisheries sector in Bangladesh is extremely important for its contribution to poverty reduction, food/livelihood security and export earnings. To address the threats of climate change affecting the rapidly growing fisheries and aquaculture sector and the livelihoods of the millions of people that depend on the sector, the project has selected two vulnerable areas for intervention identified in the *National Adaptation Programme of Action (NAPA)* on Climate Change that was adopted in *2005* and updated in *2009*, and the Bangladesh Climate Change Strategy and Action Plan (BCCSAP) that was adopted in 2009. The two Project areas include the the **south-west coastal** area, which is increasingly affected by rising sea levels, salt water intrusion and storm surges, and the **north-east *haor* wetland** area that is increasingly affected by flash floods, erratic rainfall and drought.

The Project will remove key barriers to effective adaptation to climate change in the fishery and aquaculture sector and build the resilience of the fishery sector through capacity development and policy reform. It will strengthen the awareness and knowledge of local communities, and enhance local adaptive capacity through transfer and adoption of appropriate site-specific climate resilient fisheries and aquaculture intervention technologies and approaches, which will be underpinned by effective knowledge management (e.g. use of ICT-based climate and disaster information services) ensuring wider dissemination of best practices and lessons learned. The Project results will be delivered through four Components:

Component 1: **Climate resilient fisheries sector through relevant national capacity development**

Capacities urgently need to be developed for the Department of Fisheries (DoF) and other relevant government agencies and the private sector to integrate climate resilience into policies, programmes and projects. On the basis of the *National Fisheries Policy*, 1998, the *National Fisheries Strategy* with its sub-strategies was formulated in 2006. At that time climate change implications in fisheries were not adequately addressed in the National Fisheries policy and the National Fisheries Strategy. Through this component, policy gaps will be addressed by assessing climate induced risks and vulnerability of fisheries and aquaculture sub-sectors at national level, with special focus on climate sensitive areas,

review and revision of relevant national policies and strategies, and development of a capacity building strategy for DoF, other relevant government agencies, private sector and community-based organizations. Activities and produts will facilitate climate resilient fisheries sector development.

Component 2: **Strengthening knowledge and awareness of fisheries/aquaculture dependent communities facing the adverse impacts of climate change**

Fisheries and aquaculture dependent communities at the local level are continuously affected (loss of income, livelihoods and nutrition) by climate change induced shocks (increasing temperature, droughts, erratic rainfall, floods, cyclones, sea level rise, salinity intrusion, etc.) and are unable to overcome the impacts due to high poverty levels and limited access to knowledge and information about adaptation options. Improved climate information and prediction is one of the most important elements of adaptation. Adaptation requires working in multiple time scales, from short-term to the long-term, addressing climate variability and changes through a range of forecasting systems to provide additional value to the entire adaptation process. This component will therefore focus on improving local-level climate change awareness and governance.

Component 3: **Enhancing local adaptive capacity to support climate resilient fisheries and aquaculture management and alternative livelihoods in the face of climate change**

Climate change threats are becoming evident for vulnerable communities, yet coastal shrimp farmers have been repeating the same old traditional and extensive technologies of brackish water shrimp culture in the dry season and mixed culture of white fish and freshwater prawn in the monsoon, year after year. Similarly in the *haor* area, capture fisheries-based livelihoods are predominant, yet the water sector and wetland planning in the region is heavily biased to increased revenue earning, flood control and infrastructure development targeting cereal crop production ignoring fisheries and other natural resources management-based livelihoods. Existing planning strategies and processes are less community focused. This Component will therefore support more climate resilient and sustainable policy and strategy for site specific climate resilient and gender sensitive fisheries, and aquaculture technologies. These will include: popularizing fisheries information platform, piloting depth flexible cage and pen fish culture, fish culture in climate change adapted ponds, improvement of brood fish banking, drought resilient kua fish culture, establishment of fish sanctuary and habitat restoration with relinking of canals and plantation of wetland macrophytes, and openwater stocking through beel nursery management of indigenous fish species. Non-fishery alternative livelihood options will also be considered, for ezample, duck rearing . Other adaptation options include community-led and gender sensitive dissemination systems, innovative environmental monitoring and information tools, and manuals on climate resilient and gender differentiated fisheries and aquaculture.

Component 4**: Dissemination of best practices and lessons learned, monitoring and evaluation**

The current situation is characterized by insufficient dissemination processes by the DoF, and also in other relevant agencies, of lessons learned from various recently completed and on-going fisheries and aquaculture projects. This project will address these issues through this Component and ensure systematic data collection from the project sites to effectively

monitor and evaluate project progress indicators, monitor risk mitigation measures and design new measures to face unexpected risks, and to extract lessons learned (including successes and failures) that will be useful for future adaptation and LDCF/GEF initiatives.

Overall impact:

The expected impact of this project will be that, the poor and smallholders in the project areas will benefit from project interventions both socially and financially, including capacity development to adapt to the adverse impacts of climate change and variability. The coastal and inland aquatic ecosystems of this project (covering an area of about 4,790 km^2) will be under climate resilient plans and management practices. About 400 000 people will have reduced vulnerability to climate change, of which at least 40% are women.

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List of Acronyms

AAS	Aquaculture and Aquatic Agricuture System
ADB	Asian Development Bank
AIGAs	Alternate Income Generating Activities
AWPB	Annual Work Plan and Budget
BADC	Bangladesh Agriculture Development Corporation
BAU	Bangladesh Agriculture University, Mymensingh
BCCRF	Bangladesh Climate Resilience Fund
BCCSAP	Bangladesh Climate Change Strategy and Action Plan
BCCTF	Bangladesh Climate Change Trust Fund
BFD	Bangladesh Forest Department
BFRI	Bangladesh Fisheries Research Institute
BH	Budget Holder
BINA	Bangladesh Institute of Nuclear Agriculture
BSFF	Bangladesh Shrimp and Fish Foundation
BRRI	Bangladesh Rice Research Institute
BW	Brackish Water
BWDB	Bangladesh Water Development Board
CALIP	Climate Adaptation and Livelihood Protection project
CARRP	Cyclone Aquaculture Rehabilitation Project
CB	Community-based
CBFM	Community-based Fisheries Management
CBOs	Community-based Organizations
CC	Climate Change
CCA	Climate Change Adaptation
CCA-TT	Climate Change Adaptation Tracking Tool
CCC	Climate Change Cell, DoE
CCRF	Code of Conduct for Responsible Fisheries
CDMP	Comprehensive Disaster Management Programme
CEGIS	Centre for Geographic and Environment Information Services
CIGs	Common Interest Groups
CMPAs	Coastal and Marine Protected Areas
COP	Conference of Parties
CPR	Common Pool Resources
CRA	Climate Risk Assessment
CREL	Climate Resilient Environment and Livelihood
CTA	Chief Technical Advisor
DAE	Department of Agriculture Extension
DANIDA	Danish International Development Agency
DFID	Department for International Development, UK
DLS	Department of Livestock Services
DMD	Disaster Management Department
DoF	Department of Fisheries
DRR	Disaster Risks Reduction
EAA	Ecosystem Approach to Aquaculture
EAF	Ecosystem Approach to Fisheries
ECAs	Ecologically Critical Areas
ECNEC	Executive Committee of National Economic Council
ERD	Economic Relations Division, MoF
ESAs	Ecologically Sensitive Areas
EWS	Early Warning System

FAO	Food and Agriculture Organization of the United Nations
FCD/ FCDI	Flood Control Drainage and Irrigation
FFEWS	Flash Flood Early Warning System
FFP	Fourth Fisheries Project
FGD	Focus Group Discussion
FPMIS	Field Programme Management Information System
FSMFs	Fish Seed Multiplication Farms
FTF	Feed the Future
FY	Fiscal Year
GAqP	Good Aquaculture Practices
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GoB	Government of Bangladesh
HILIP	Haor Infrastructure and Livelihood Improvement Projec
HYV	High Yielding Variety
ICZM	Integrated Coastal Zone Management
IFAD	International Fund for Agricultural Development
IMS&F	Institute of Marine Science and Fisheries, Chittagong University
IPAC	Integrated Protected Area Co-management
IUCN	International Union for Conservation of Nature
IUU fishing	Illegal, unregulated and unreported fishing
IW	Inception Workshop
IWM	Institute of Water Modelling
LoA	Letter of Agreement
LTO	Lead Technical Officer
LTU	Lead Technical Unit
MACH	Management of Aquatic Ecosystems through Community Husbandry
MCS	Monitoring, Control and Surveillance
MEAs	Multilateral Environmental Agreements
M&E	Monitoring and evaluation
MIDPCR	Market Infrastructure Development Project in the Charland Regions, Bangladesh
MoA	Ministry of Agriculture
MoDMR	Ministry of Disaster Management and Relief
MoEF	Ministry of Environment and Forests
MoF	Ministry of Finance
MoFL	Ministry of Fisheries and Livestock
MoU	Memorandum of Understanding
MoWR	Ministry of Water Resources
MRs	Marine Reserves
MT	Metric Tones
MTE	Mid-Term Evaluation
NAPCD	National Action Plan for Combating Desertification
NAPA	National Adaptation Programme of Action
NPC	National Project Coordinator
NPD	National Project Director
NREG	Natural Resources and Environment Group (of FAO)
OGs	Occupational groups
PIF	Project Identification Form
PIR	Project Implementation Review
PKSF	Palli Karma-Sahayak Foundation
PMU	Project Management Unit
PPR	Project Progress Reports
PRAs	Participatory Rural Appraisals
PRF	Project's results framework
PSC	Project Steering Committee

PTC	Project Technical Committee
RAP	FAO Regional Office for Asia and the Pacific
RRA	Rapid Rural Appraisal
SCBRMP	Sunamganj Community Based Resource Management Project
SEALS	Sunderbans Environmental and Livelihoods Security Project
SISs	Small Indigenous (Fish) Species
SPARRSO	Space Research and Remote Sensing Organization
SUFOs	Senior Upazila Fishery Officers
TCI	FAO Investment Centre Division
ToR	Terms of Reference
UFOs	Upazila Fishery Officers
UNFCCC	United Nation's Framework Convention on Climate Change
USD	United States Dollar
VTMS	Vessel Tracking and Monitoring System
VW	Validation Workshop
WARPO	Water Resources Planning Organization
WB	World Bank
WBRP	Wetland Biodiversity Rehabilitation Project

1. Relevance (strategic fit and results orientation)

1.1 GENERAL CONTEXT

1.1.1 General Development Context Related to the Project

Bangladesh is extremely vulnerable to the current and future effects of climate induced threats as a result of: i. its geographical location; ii. Ecosystems/ landscape diversities, iii. High population density; iv. high levels of poverty; and v. the reliance of many livelihoods on climate-sensitive sectors – particularly rural agriculture and fisheries[2]. In addition, two-thirds of the country is less than 5.0 m above sea level, making it one of the most flood prone countries in the world.

The majority of the natural ecosystems of Bangladesh are wetlands. The floodplains of Bangladesh represent one of the world‘s most important wetlands – home to hundreds of species of fish, plants, and wildlife and are critical habitat for thousands of migrating birds. Almost 4.0 million ha of inland waters – including floodplain, *beels*, rivers, estuaries and the sundarbans (tidal halophytic mangrove forest), and the Kaptai Lake – support a great diversity of freshwater species. There are an estimated 260 species of fin-fish, as well as shrimps, turtles, snails, and other wetland resources. The *Haor* basin is the only region in Bangladesh where remnant patches of freshwater swamp and reed lands still exist.

Unemployment and poverty are ubiquitous across Bangladesh, with ~32% of the population living below the poverty line[3]. Poverty is prevalent among rural and landless communities that depend on natural resource. Around 53% of the populations in rural communities are classified as poor. The disparity between men and women in Bangladesh is reflected by the country‘s gender index scores. The Gender Inequality Index (GII) score for Bangladesh is 0.52, ranking the country 111thin the world. The lower the GII ratio, the greater the inequality between the sexes. This is in contrast to the Gender Gap Index (GGI) where a high score indicates a larger gap between the sexes. Bangladesh’s GGI is 0.69, placing it 68th out of 135 countries. These indices indicate that women in Bangladesh currently do not have equal access to resources such as health care, education, economic participation, family decision making issues and political engagement.

Fisheries and aquaculture sector in Bangladesh: The fisheries sector in Bangladesh is extremely important for its contribution to poverty reduction, food/livelihood security and export earnings. This sector has experienced consistent growth– from ~7% in 2009-10 to ~5% in 2012-13. In addition, this sector provides about 60% of the national animal protein, with more than 17.5 million people being engaged in this sector on a full-time and part-time basis[4]. With over 400 species of fish and shrimps, total annual fisheries production of 3.41 million tonne in the Fiscal Year 2012-13[5], the sector contributed 4.37% of the national GDP, 23.37% of net income from the agricultural sector, and 2.01% of the export earnings of which 86% comes from farmed shrimp and prawns in 2012. Over the last two decades there has been remarkable growth in aquaculture production due to the continuous strides of the government, private sector, NGOs and donors in the areas of fish seed and feed production, and grow-out technologies, capacity building, and extension services. Fisheries production in Bangladesh is

[2] Climate Change Cell key facts. Available at: http://kmp.dmic.org.bd/bitst ream/handle/123456789/50/230.%20Climate%20Variability%20and%20change%20factsheet .pdf?sequence=1. Accessed 27 February 2015.

[3] CIA World Factbook 2013. Available at : https://www.cia.gov/library/publicat ions/the-world-factbook/geos/bg.html. Accessed 24 February 2015.

[4] DoF (Department of Fisheries). 2014. Fish Week Compendium. Department of Fisheries, Ministry of Fisheries and Livestock, Bangladesh.

[5] DoF (Department of Fisheries). 2013. Fish Week Compendium. Department of Fisheries, Ministry of Fisheries and Livestock. 144 p.

usually reported under the categories of: **i.** *inland fisheries* which comprises capture fisheries and culture fisheries, and **ii.** marine fisheries which consists of industrial fisheries and artisanal fisheries. **Capture fishery** refers to catches from inland open waters which include fishing in rivers and estuaries, in the Sundarbans, beels[6], flood plains and in the Kaptai Lake. **Culture fishery** refers to aquaculture in inland closed water, including ponds, semi-closed water bodies, *beels*, *haors*[7] and shrimp and prawn farms.

Aquaculture (or culture fishery) enjoyed a tremendous growth with a production of 1,859,808 tonnes in FY 2012-13 up from 657,120 tonne in 1999-2000 (Figure 1). This increase is mainly attributable to a rapid growth in pond culture and shrimp and prawn farming as compared to the FY 1999-2000. In FY 2012-13 the culture fish sub-sector already provided 55% of the total fish production and 28% were provided by the capture fish sub-sector (Figure 2).

Marine fisheries contributed 17%, whereby the majority of fish harvest came from the artisanal fisheries sub-sector, namely 15%, and 2% from the industrial fisheries sub-sectors[8]. *Capture fisheries* showed an increase of about 43% in FY 2012-13 as compared to FY 1999-2000. (Figure 1).

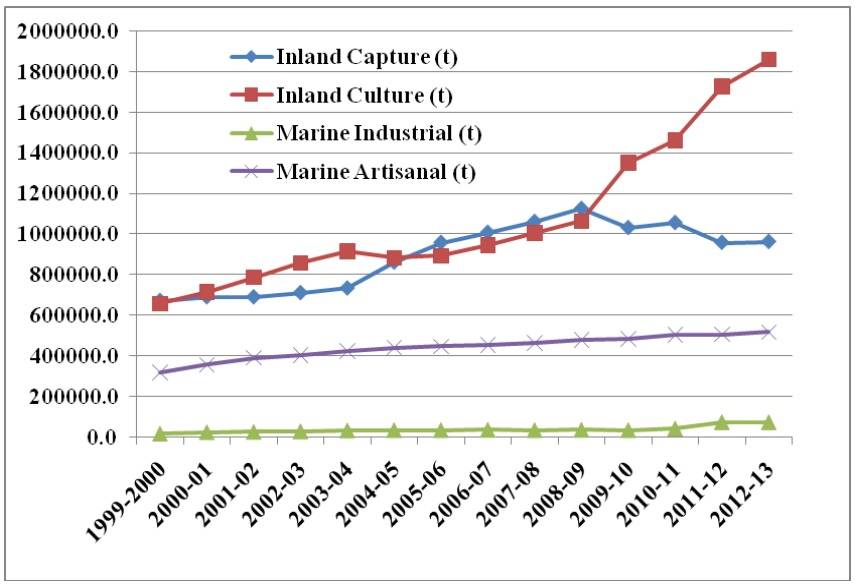


Figure 1: Total fish production in metric tons (t) during the period 1999/2000 – 2012/13 (*Statistical Year Book, DoF*).

[6] A *beel* is a term for a lake-like depressed wetland with static water (as opposed to moving water in rivers and canals)

[7] A *haor* or a bunch of beels together forming a lake when a river bank forms across the neck of a well-developed meander; it is found on the floodplain of a river. Usually, haors become plugged with sediment where they adjoin the channel and then progressively fill in. Some of the haors are considered to be very important freshwater fishing grounds, and are locally called jalmahal. During the monsoon season haors act as local water reservoirs, and help to control the local flood level. In some areas, these haors serve as valuable sources of irrigation during the dry season. Source: Bangladesh Water Development Board http://www.bwdb.gov.bd/ (accessed on 25.04.2014)

[8] DoF (Department of Fisheries). 2014. Fish Week Compendium. Department of Fisheries, Ministry of Fisheries and Livestock, Bangladesh.

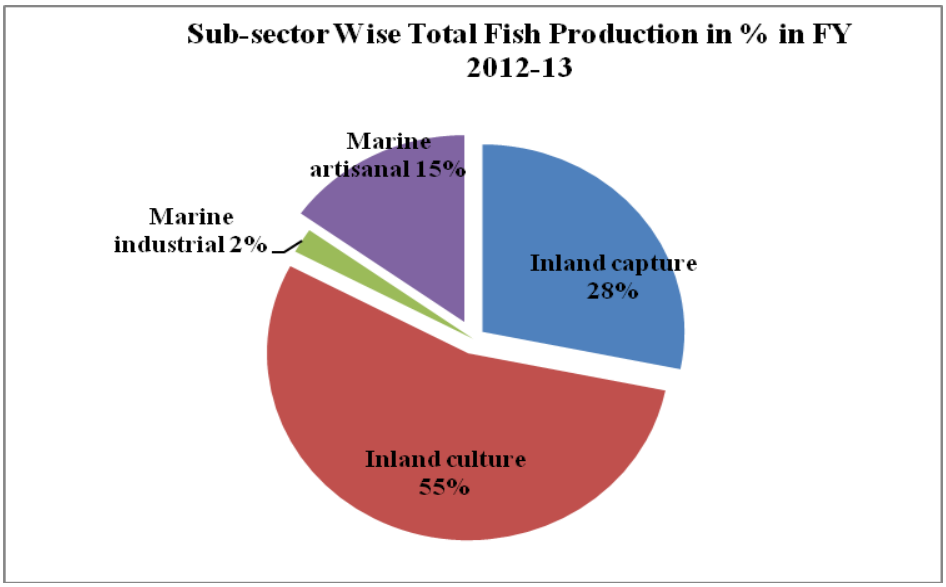


Figure 2: Total fish production in percentages in the FY 2012/13 [*Statistical Year Books, DoF*].

1.1.2 Expected Climate Change Impacts

Climate change impacts in Bangladesh especially relate to surface warming, sea level rise, extreme events (e.g. more frequent hot extremes and heat waves), precipitation events, cyclones, and similar other events. General Circulation Model (GCM) analysis indicates that the average temperature of Bangladesh will increase by 1.4°C by 2050. Based on the above projections, Bangladesh is likely to experience more hot days and heat waves annually, longer dry spells and higher drought risk[9]. In addition, there will be a change in average monthly rainfall. Monsoon rainfall is expected to increase by 11% by 2030 and 27% by 2070. In addition, surface average temperature is expected to increase by 1.3°C by 2030 and 2.6°C by 2070. The number of rainy days will increase by ~20 days. These climate change scenarios suggest that ~18% of current flooded areas will be susceptible to higher levels of flooding. In addition, Bangladesh is expected to experience the following climate-related changes: i. more extreme hot and cold spells; ii. melting of the glaciers in the source areas of Bangladesh's rivers, thereby altering the hydrological cycle; and iii. more powerful tornados and cyclones.

The predicted increase in air temperature and decrease in precipitation will result in an increase in severity and frequency of droughts in the southern, central and northwestern part, and an increase in precipitation with heavier and more erratic rainfall in the northeastern *haor* basin. This projected increase in rainfall will result in: i. higher river flows and widespread flooding, resulting in damage to land and infrastructure; ii. increased erosion; and iii. increased sedimentation, leading to poor drainage and the loss of important habitats for aquatic species.

Moreover, Bangladesh is identified as the most vulnerable country in the world to tropical cyclones and the sixth most vulnerable country to floods (of major flood-affected countries reporting an average of over 200 deaths/year). The UNESCAP database for the period of 2000-2004 to 2005-2009 suggests that the risk of hydrological disasters has increased for countries including Bangladesh, coupled with a rise in losses caused by multi-hazard,

[9] Ramamasy, S. and Baas, S. 2007. Climate variability and change: adaptation to drought in Bangladesh. Food and Agriculture Organization of the United Nations. Rome, Italy.

geophysical, and meteorological events[10]. Between 2007 and 2009, five tropical cyclones formed in the Bay of Bengal (Sidr-2007, Nargis-2008, Rashmi-2008, Bijli-2009, and Ayla-2009) that affected the country's coast to varying degrees.

In recent years, natural fish stocks have declined due to natural and manmade catastrophes, degradation of aquatic environments and reduction of many wetlands and water areas (Table 1). The flood plain fisheries are the main source of fish resources of Bangladesh. But due to erratic behavior of seasonal flood and drought spells, these fish resources are the worst hit. There is a considerable threat of losing around 4.0 million tonnes of fishes by the year 2030 due to loss of habitats and changes in spawning and recruitment. For example, the habitat of the Hilsa fish is being altered leading to decreased productivity. This would be a serious concern in the future. Migratory freshwater fish hatchlings would face severe difficulties in South-West Bangladesh as the saline intrusion deepens. Such fish cannot survive in water that is even moderately saline, and with the reduction in brood stock, freshwater fisheries production can be expected to drop. Sea level rise is predicted to reduce freshwater fisheries production through decline in available fisheries habitat. The whole coastal zone is extremely vulnerable to saltwater intrusion, even under a low climate change scenario. Both coastal and freshwater fisheries are likely to be adversely affected by changing temperature, siltation, inundation and salinity regimes.

Table 1: Climate related stressors affecting aquaculture in the south-western coast[11].

Climate Change induced threats	**Impacts on aquaculture**
2007, November: Super cyclone Sidr	Damaged over 80% fish and shrimp *ghers* and disrupted fishing operations
2008, September: Abnormally high tide and coastal flooding	Breached and overtopped coastal dykes and damaged many fish./shrimp ponds/*ghers*
2009, May: Cyclone Ayla with high surge	Damaged 80-100% fish/shrimp ponds/ *ghers* and affected fishing operations
2009, August: Intense rain-based flooding	Flooded many fish/shrimp ponds/*ghers*
2009, October: Post monsoon drought	Heat stress affected shrimps
2010, April-June: Pre monsoon drought	High temperature affected pond/ *gher* ecology, heat stress affected shrimp growth
2011, August: Intense heavy rain-based flooding for about two weeks	Over 80% ponds/ *ghers* flooded and all fish and shrimps died due to sudden fluctuations of pond/*gher* ecology
2012, January: Severe cold spell with dense fogs (around 10 days)	Affected *gher* ecology, increase diseases of fish/ shrimps, inhibit fish/shrimp growths, high mortality, loss of dyke crops

The rapid onset of climate extremes (cyclones and storm surges) not only affect instantly the lives and livelihood assets of poor coastal households, but also have residual effects which keep affecting the communities over longer period. For example, cyclone Sidr (November 2007) instantly damaged the fish and shrimp ponds, agriculture, and fishing, while the cyclone-induced prolonged inundation by salt water damaged the ecology of ponds/*ghers*, requiring more than two years to recover to normal productive levels. When the farmers were

[10] UNESCAP 2010, *The Asia-Pacific Disaster Report 2010,* United Nations Economic and Social Commission for Asia and the Pacific, Bangkok.

[11] CNRS (Centre for Natural Resources Studies) 2012. Communities' observation and disaster preparedness in an age of climate change: A case study from two coastal villages, Shyamnagar, Satkhira, Bangladesh. Paper presented by Rahman, M. M. in *Transboundary Meeting on Sundarbans*, October 3-6, 2012, Kolkata, India

about to recover from the impacts of cyclone Sidr, cyclone Ayla (May 2009) again damaged their aquaculture and agriculture production potentials for several years.

In terms of vulnerability and its three dimensions – exposure, sensitivity and adaptive capacity – water resources are ranked as the most vulnerable in Bangladesh's *National Adaptation Programme of Action (NAPA)* due to increased risk of flooding. Bangladesh's coastal resources are ranked as the next most vulnerable because the country is a delta with most of its population and resources at low elevations. In most cases, fisheries and aquaculture activities are affected seasonally by climate change impacts. For example, delays in arrival of the rainy season and lesser precipitation leave shorter breeding and growing period for fishes which could adversely affect total fish production. Thus, climate change and climate variability are posing new challenges to the small-scale inland fishery in both capture and culture fishery sectors. The local fishers and fish farmers communities that depend largely on capture or culture fisheries for their livelihood are finding it difficult to adapt to climate change impacts that are putting their livelihoods at risk. For sustainable production and resilience in the fisheries and aquaculture sectors, urgent interventions are required.

The LDCF fund is sought to support the government's efforts to address these additional and increasingly severe threats from climate change impacts to the fisheries and aquaculture sub-sectors. The project will implement climate resilient policy and strategies at national level, build capacity of the personnel of the Government of Bangladesh, private sector and community in climate resilient adaptations. The project will also pilot and upscale climate resilient fisheries and aquaculture adaptation options in the project areas. By implementing the proposed project activities, it is expected to enhance the ecosystem functioning, resulting in the icrease in the supply of goods and service from these ecosystems. The project aims at achiving climate change adapatation and diversifying the local community's livelihoods and economic sectors including fisheries.

The long-term sustainability of the project will be promoted by adoption of a strategy that promotes the upscaling and replication of climate resilient adaptations across Bangladesh, and capcity strengthening of the personal of the Department of Fisheries, partner organizations and local communities on climate change implications and resilient adaptation options. By implementing the activities described in the ProDoc, the project will contribute to realizing the objectives of national plans for climate change adaptation including the *NAPA, 2009* and the *Bangladesh Climate Change Strategy and Action Plan (BCCSAP), 2009*.

1.1.3 Project Areas

To address the threats of climate change affecting fisheries and the rapidly growing aquaculture sector and the livelihoods of the millions of people that depend on the sector, the project has selected two vulnerable intervention areas identified in the *National Adaptation Programme of Action (NAPA)* on Climate Change adopted in *2005* and updated in *2009.* These areas are also included in the Bangladesh Climate Change Strategy and Action Plan (BCCSAP) adopted in 2009. The areas are: **i.** the **south-west coastal** area, which is increasingly affected by rising sea levels, salt water intrusion and storm surges and; **ii.** the **north-east *haor* wetland** area that is increasingly affected by flash floods, erratic rainfall and drought. Both areas hold some of the largests fisheries and aquaculture production and sector-dependent communities.

The Project builds on experiences and lessons learned from other development projects on fisheries and aquaculture in these two priority areas on how to enhance resilience and reduce the vulnerability of fisheries and aquaculture. Best practices that will be generated by the Project have great potential for upscaling in other vulnerable areas suffering similar, albeit

less intense impacts of climate change, such as the south-east coastal region as well as other upstream wetland areas adjacent to *haor* wetlands (Figure 3).

1.1.3.1 South-west coastal zone

Ecosystems in the southwest coastal zone are highly diverse and include aquatic and terrestrial ecosystems encompassing saline water, brackish water and fresh water areas. The land area of the coastal zone includes mud flats, sandy beaches and sand dunes, flatlands and undulating terrain that harbor different ecosystems with a diverse and wide range of habitats. Changes in tide and freshwater flow, twice daily, result in the advance and retreat of the salinity limit. Under this process, during the wet season, local rainfall associated with flood flows from upland regions keeps the salinity limit near the coastline. Again, salinity starts increasing and intrudes inland from the beginning of November with the cessation of the rains and consequent reduction of river flows. While water salinity starts gradually decreasing with the onset of rainfall during late June or early July, almost freshwater condition prevails during September-October.

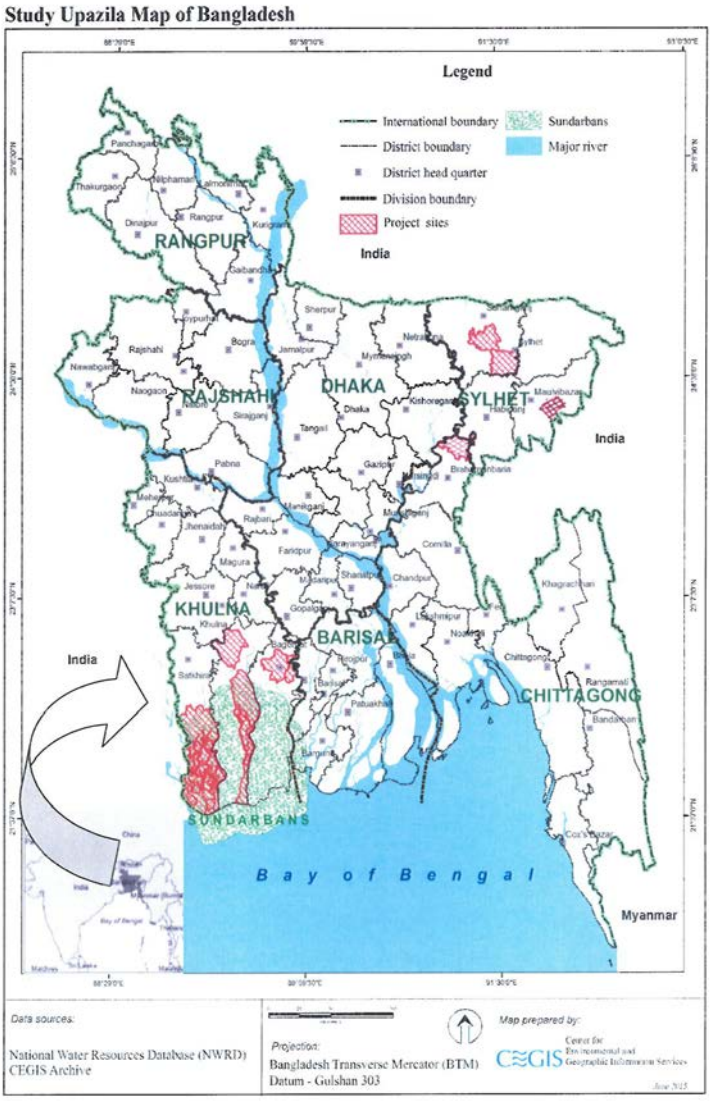


Figure 3: Map of Bangladesh showing the project areas (upazilas – sub-districts) in the Southwest and Northeast.

Fisheries/aquaculture: The land use of the south-western coastal zone is predominantly under aquaculture shrimp, prawns and fish). Along the coastal salininty prone area, alternate cultures of brackish water (BW) shrimp - *Bagda* (primarily *Penaeus monodon,* the tiger prawn - *bagda*) with BW seabass, mullets, datina, payra, nona tengra, etc. during winter dry months and freshwater (FW) prawn (primarily *Macrobrachium rosenbergii*, the giant freshwater prawn - *golda*) are farmed mixed with FW fish (mainly major carps, tilapia and/or pangas) during wet rainy season. These species area farmed in areas that have been predominantly (for around 30 years) under rice farming in wet season and fallow in winter. Over 80% rice paddies (in some places 100% crop lands) in the south-western coastal zone have been converted to shallow *gher*s[12] to farm brackish water shrimps.

Total fish production from this area is around 0.27 million tons per year of which only 22% comes from capture fisheries (5,422 t comes from rivers and khals, 15,945 t from the Sundarbans, 142 t from beels, 17,334 t from floodplains, 14,805 t from seasonal waterbodies, 241 t from oxbows). About 78% (212,156 t) comes from aquaculture including 156,050 t of BW shrimps and giant FW prawns[13].

High tides threaten these *ghers* both from inside and outside embankments[14]. On the other hand, salinity ingress in new areas to the north of current shrimp growing zones would facilitate shrimp farming[15] in those areas, and conflict would arise between shrimp farming and rice farming communities. A general rise in surface water temperature would also put shrimps into heat related stress, if the temperature crosses a threshold level of 32°C, the small shrimp fries would show very high rates of mortality. In April the temperature becomes quite high. Simultaneously, warmer water might appear conducive for algal bloom – the latter having detrimental effects on growth of shrimps. Climate change can, therefore, put this profitable shrimp farming and its community into jeopardy.

Many important, popular and common fish and shrimp species once abundant in the rivers throughout the year now either has disappeared altogether or are found only occasionally. Catch per unit of effort (CPUE) of all types of riverine fishers have gone down. Fishers are having hard times in supporting their families and many are switching to other livelihood strategies.

Sea level rise (SLR) will engulf a significant part of the low and flat coastal areas, along with inundation by cyclonic storm surges functionality of BW shrimp farms, crab farms and other fish culture farms will be hampered. Due to greater salt water intrusion, coastal culture fishery and even inland water (both open capture and culture) fishery will suffer. More and more cautionary signals per year due to predicted increased cyclonic frequency would prevent coastal and marine fishers from going to the sea for fishing.

Increased resource loss such as sunken boat/trawler/net and death of sea-going fishers is expected to result in a drastic reduction in marine fish catch. This would also **i.** significantly decrease dry fish production, **ii.** boat owners, private money lenders (*Bahaddars, Aratdars*) and fishers group would respectively face problems in providing fresh cash and be reluctant to

[12] *Gher* is a Bangla term for a unit of shrimp farms.

[13] DoF (Department of Fisheries). 2014. Fish Week Compendium. Department of Fisheries, Ministry of Fisheries and Livestock, Bangladesh.

[14] WB (World Bank) 2000. "Bangladesh: Climate Change and Sustainable Development. Report No. 21104-BD", Rural Development Unit, South Asia Region, The World Bank (WB), Dhaka. 95 p.

[15] CEGIS (Centre for Environmental Geographic Information Services) 2006. Impacts of Sea Level Rise on Land Use Suitability and Adaptation Options, Draft Final Report. Submitted to the Ministry of Environment and Forest, Government of Bangladesh and United Nations Development Programme (UNDP) by Centre for Environmental Geographic Information Services (CEGIS), Dhaka.

invest further on quick boat/net repair or replacement and repaying outstanding loans, and **iii.** poor fishers, shrimp/crab farmers and fish dryers will lose employment and income. Millions of coastal marginal farmers, fishers, shrimp farmers would be forced to migrate to the urban areas for their livelihood, unless climate resilient sustainable and judicious alternative livelihood options and strategies are adopted.

Agriculture activities coexisting with fisheries/aquaculture: In the areas with moderately saline water zone (up to Kaliganj Upazila), where there is no ghers (due to absence of saline water canal/khal), farmers practice rice farming. During the period of December-March, winter boro rice is farmed and during the *kharif* (monsoon) season in June-October, Transplanted Aman (T. Aman) rice is farmed, both yielding around 4-6 t/ha/crop. In high saline zones such as Munshiganj and Syamnagar upzilas, rice is farmed alone or mixed with golda and white fish (rohu, katla, pangas, tilapia, etc.) during the wet season, and in the dry winter months the following production takes place: BW shrimp alone, or BW shrimp mixed with BW fin-fishes and crab fattening, or simply leaving it as fallow. This is a century old traditional cropping pattern of this area during the dry winter and monsoon seasons. Short-stemmed High Yielding Varities (HYVs) have now replaced the local rice varieties (such as Patnai). To maintain golda and white fish, in integrated and concurrent concurrent fish/prawn+rice production system, farmers dig deeper trenches (rufuge), about $1/10^{th}$ of the total area along the periphery or on one side in the rice field. Rice yields are around 2-6 t/ha, golda yields are 150-300 kg/ha and fish yields are around 100-200 kg/ha. In some areas rice lands are excellent for both kharif (wet-monsoon) boro (dry-winter). In some cases, farmers easily cultivate 2-3 crops of rice in the same land.

Most farmers also grow seasonal vegetables (both winter and kharif) throughout the year alongside the golda gher (FW prawn farm) and fish pond dikes and near homesteads but not along the bagda ghers (BW shrimp farm), and creepers (bottle gourd) over the ponds on nets/bamboo splits. However, agricultural development and communities' livelihoods in the coastal area are challenged by physical and socio-economic problems, some caused by climate change. In terms of profession and income, the fishers and fish farmers are greatly affected as they lose their boats, also have to refrain from going to the sea to save life and lose their cultured shrimp, prawn and white fish.

In general the constraints to agricultural activities include:

- High risk in investment because of frequent cyclones and storm surges.
- Transplanted Aman (T. Aman) rice, being the primary field crop, suffers most from cyclones and storm surges.
- Cyclones and storm surge inundation sometimes cause total loss to cultures fisheries (especially BW shrimps, FW prawns, fin-fishes and crabs).
- Induction of saline water impedes other crop production for a certain time; causes drainage congestion; contaminates surface and shallow ground water causing severe scarcity of drinking water for human and livestock; hinders rice and vegetable cropping and irrigation, ploughing and tillage operation.
- Access rights to the Government-owned water bodies (rivers, canals and wetland, floodplains) of the fishers and the community residing along the vicinity of the resources is not ensured. Providence of easy collateral-free loan for aquaculture farmers and facilitating institutional capacity building for production and management by genuine full-time fishers/fish farmers are totally absent.

Livelihoods: Poor[16] males' daily activity includes day laborer (mostly land work in *gher*s, roads and ponds or pulling rickshaw/van, or any sort of physical work on a daily basis). Poor women's daily activities are diverse and include household chores and taking care of domestic animals (chicken, duck, sheep), family members, in some cases helping in feed making, feed administration and sorting of fish/shrimps/prawns after harvest, earth work in *gher*s, roads and ponds, and collecting drinking water and fuels for cooking. Earth cutting for making rural roads, strengthening haor/beel dikes also provides some livelihood support to the female part of the population. Women get paid only 50-60% as compared to their male counterpart during land/field work. Women counterpart help the farmers in day-time guarding and watching, feed making and feeding in the gher, vegetable sowing, harvesting and packaging, rearing family poultry and household chores. While laborious gher preparation, dike repairing, PL/juvenile transportation, soil liming, irrigation (water pumping and draining), marketing of prawn, fish and vegetables are shouldered by the male counterpart. Although women may inherit land on paper, they do not have decision-making power on how to use or sell that land, and have no direct access to other productive resources, such as fish ponds/shrimp gher.

The increasing horizontal extension of BW shrimp farming on the coastal lands, even in good rice lands, has put negative effect on the ecosystem. The coastal ecosystems is affected by the multiplicity of threats relevant to both climate and non-climate stressors. Habitat destruction and biodiversity loss are degrading the ecosystem and its productivity. Concurrently to environmental degradation, climate change and climate variability exacerbate its vulnerability and further compromise ecosystem integrity.

1.1.3.2 North-east wetland haor basin

*Haor*s and *beel*s are local terms for low-lying natural depressions on a floodplain. The north-eastern *haor* basin is close to the Indian border of Meghalaya Hills and encompasses the districts of Sunamganj, Habiganj, Moulvibazar, Kishoreganj and Netrokona and constitutes the main drainage outlet for the neighbouring Meghalaya Hills and Barak water basins in India. The natural pattern of flooding in this unique landscape traditionally results in deep monsoon flooding supporting productive rich mother fisheries with excellent species richness and rich biodiversity (supplies around 0.67% of catch to open water fisheries). On the other hand, drier winter yields includes a mono-cropping bumper rice yield (makes up 16% of national paddy production) - the only crop (boro crop) in this vast basin covering 97% of the total cropped area. During the wet season (June-October), the entire *haor* gets between 3,000-4,000 mm of rainfall and together with the monsoon river flow from the Meghalaya and Barak basins, the haor gets completely inundated with 4-8 m of water for around 6-7 months of the year.

The productivity of the wetlands (*haors*) contributes to a food surplus of this region since times immemorial. *Haor*s are also considered as one of the richest common pool resources (CPR) in the water sector that provide livelihoods of thousands of poor households under different formal and non-formal access arrangements. *Haor*s are the source of almost all fresh water plants and animals, and may be called wild brood bank and breeding ground of all wetland small indigenous fish species (SISs) and aquatic flora and fauna. These wetlands have a rich wildlife community and include 257 species of birds, 40 species of reptiles, 29

[16] Household is *poor* if its per capita calorie intake is less than the standard per capita nutritional requirement - 2,122 kcal per day (estimated as per cost of basic needs, CBN). *Source:* Bangladesh Bureau of Statistics (2008). *Household Income and Expenditure Survey (HIES) report*. Government of Bangladesh.

species of mammals and 9 species of amphibians. Most of the important haor basins are also enriched by wetland plants and lowland plantation. The second Ramsar wetland site (Tanguar *haor*) of Bangladesh is located in the northeast *haor* basin. Some other wetlands in the *haor* basin are declared by the government of Bangladesh as ecologically critical areas (ECAs), that need immediate interventions to rejuvenate the ecosystem functions and integrity.

The *haor* ecosystems is affected by the multiplicity of threats relevant to both climate and non-climate anthropogenic stressors. An already precarious existence in the NE basin is being further exacerbated by climate change impacts in the haor area and upper catchment of the Meghalya, India, resulting in extreme events of unpredictable drought, rainfall and flash floods, erosion and siltation. Such local and transboundary impacts are resulting in habitat destruction and biodiversity loss, which ultimately are degrading the ecosystem and its productivity. Concurrently to environmental degradation, climate change and climate variability exacerbate its vulnerability and further compromise ecosystem integrity.

Protection of villages against flood action, proper management of the fishery resources and securing existing livelihoods such as, crops, animal and fish production are critical needs for the poor rural households of the haor region. Present wetland leasing and management measures are mostly biased to only fish neglecting other wetland flora and fauna which are the part and parcel of the ecosystem there. Over the last two decades various initiatives e.g. MACH (Management of Aquatic Ecosystems through Community Husbandry - MACH project of Winrock International), CBFM (Community-based Fisheries Management), FFP (Fourth Fisheries Project of DFID), IPAC (Integrated Protected Area Comanagement Project of USAID, WBRP (Wetland Biodiversity Rehabilitation Project of GIZ), and Tanguar Haor Management Project (of DoE) tried various methods and approaches towards community-based co-management of wetland resources. Such initiatives have produced encouraging results in the haor basin in terms of protection, restoration and enhancement of wetland ecosystems.

Fishery/aquaculture: The *haor*s significantly contribute to the national economy directly and indirectly, the mother fishery supplies 0.67% at national level catch to open water fisheries. Aquaculture potential has never been effectively explored in these flooded haors by key actors while it is reported that 29% of national total yearly fish production derives from the wetlands capture fishery. The existing revenue oriented leasing system of the *haors* favour massive overexploitation of the fisheries resources by the leaseholders with limited or no protection at all of other resources (due to poor policies with a faulty leasing systems of short duration, and lack of guarantee by the lease holder for improvement of the habitat) leading to deterioration of the ecosystem. Besides, the fisheries-resources dependent communities are excluded from the century old traditional access rights to common pool fisheries resources during the wet season. Such deprivation pushed the community people to extract non-fishery resources indiscriminately. The *Jalmohal* (wetland) *Management Policy, 2009* – is revenue and exploitation oriented, while biodiversity conservation and sustenance of the ecosystem is of less concern.

Total fish production from this area is around 0.61 million tons per year of which 41% comes from capture fisheries (4,514 t from rivers and khals, 208,860 t from floodplains, 27,466 t from seasonal waterbodies) and about 59% (372,431 t) comes from aquaculture including 2-3

t of giant FW prawns[17]. About 30 years back total annual fish production from the haor basin was mostly (90%) from the capture fisheries.

The Haor Master Plan (HMP), 2012 describes the haor area as having notable potential to contribute to the fisheries sector. Most of these beels are leased out by the GoB to local community members for fishing activities. These leases can last for up to a period of three years, with the chance of renewal. There are claims that under the current practice of land leasing, the Hakaluki haor is in danger of losing nearly 32 fish species because of over fishing[18]. This is a serious threat to fish stocks in the haor area.

Agriculture activities coexisting with fisheries/aquaculture: The most popular rice variety among the farmers of the *haor* area is BRRI *dhan* 29[19] and winter boro rice is the principal crop. Flash floods are a common occurrence in the haor and extreme events are being experienced frequently where often 60-80% of crops are lost. The winter boro rice crop mainly depends on surface irrigation. Above 95% of the *haor*'s winter boro rice lands are irrigated with surface water and are directly or indirectly dependent on the Surma river system. If the water level exceeds the risk level, flood occurs in the *haor* region and crops are damaged, while if the water level of the Surma River declines, irrigation is reduced. Besides, cultivation of vegetable is not popular in the *haor* areas. Previous studies[20] revealed that only women members of a few households used to cultivate vegetables in the homesteads and courtyards. To protect the only rice crop from flashflood damages, the Government erected submergible dykes, long ago, as part of flood control drainage and irrigation (FCD/ FCDI) projects. Delaying and diverting entry of flashflood water (at least for 20-25 days) into the crop fields to allow for timely harvest has been the only adaptation means established so far. However, dyke failures occur almost every year resulting in consequent losses of rice crop. While flooding enhances floodplain capture fisheries, early flashfloods pause high risk of damage to the standing rice crop just 2-3 weeks before harvesting. Coexisting with agriculture, haor capture fishery is the major fishery activity, which is followed by pond, pen and cage fish culture in the haor areas.

Livelihoods: The majority of the population of the basin are poor and a significant percentage is categorized as ultra-poor[21]. The primary livelihood activities are predominantly farming and fisheries in the dry and wet seasons, respectively. On an average 65% of the inhabitants earn their daily means through fishing and related ancillary trades from this ecosystem. Women sometimes participate in sorting of harvests, net repairing and watching farm/ fish sanctuaries. Some women are also involved in fish drying activities. Women get only 50-60% as compared to their male counterpart during earth work. Though women may inherit land on paper, they have little or no influence on the decision-making process. At times of high flooding, they often leave houses for about 10- 15 days. They have to take shelter on high

[17] DoF (Department of Fisheries). 2014. Fish Week Compendium. Department of Fisheries, Ministry of Fisheries and Livestock, Bangladesh.

[18] Natural Resource Economic Evaluation of Hakaluki Haor, 2006. Prepared by IUCN-Bangladesh.

[19] *dhan* Bangla term for rice/paddy

[20] CCC (Climate Change Cell, DoE) 2009. *Adaptive Crop Agriculture Including Innovative Farming Practices in Haor Basin.* Climate Change Cell, DoE, MoEF; Component 4b, CDMP, MoFDM. June 2009, Dhaka.

[21] The extreme (Ultra) poor households are those, whose total expenditures on food and non-food combined are equal to or less than the food poverty line. As per cost of basic needs (CBN) *poverty lines* represent the level of per capita expenditure at which a household can be expected to meet their basic needs consisting of 11 key items, providing minimal nutritional requirements corresponding to 2,122 kcal/day/person (food and non-food). *Source*: Bangladesh Bureau of Statistics (1991-92). Household Income and Expenditure Survey (HIES) Report. Govt. of Bangladesh.

roads or bridges. Children's, particularly girls' schooling becomes very difficult during monsoon season.

Large-scale deforestation of wetland trees, due to anthropogenic activities, has taken place in the haor region over the last 30-40 years and has stripped away the natural barriers that have historically mitigated wave action. Forests in the Indian Meghalaya hilly areas and *haor* basin used to slow down the downhill flow of water, and more water infiltrated into local soils for storage as green and blue water. In recent years, due to deforestation in the Indian hills and the *haor* basin, flashfloods hit 10-15 days earlier than they did 30-40 years back. Siltations in rivers, canals, and haors themselves have also raised the *haor* and river beds. As a result, the rivers and canals cannot hold much water and are unable to drain excess water to the Meghna river system – the only drainage gateway to the Bay. Flash floods generally occur during March-April, which corresponds to the winter peak rice-harvesting time, the only crop, in the *haor*s. To protect vast winter rice crop from flashflood damages, the Government erected submergible dykes, long ago, as part of flood control drainage and irrigation (FCD/FCDI) projects. Delaying and diverting entry of flashflood water (at least for 20-25 days) into the crop fields until complete harvesting has been the only adaptation. However, there are incidents of failure of dykes almost every year and consequent losses of winter rice. While flooding enhances floodplain fisheries, early flashfloods caus high risk of damage to the standing winter rice crop just 2/3 weeks before harvesting. Flashfloods have remained the major climate risks to thousands of rice farmers in the region over the years.

1.1.4 Project sites

Bangladesh consists of 64 administrative districts divided into rural, urban and hill districts under seven divisions. Urban authorities are single-tier and include nine City Corporations and 315 Pourashavas (municipalities). Rural local government has three tiers: 61 zila (district) parishads and 3 hill district councils, 488 upazila (sub-district) parishads, and 4,550 union parishads. Union Parishad is the smallest rural administrative and local government unitsin Bangladesh.

In line with the Bangladesh's *NAPA* priorities, the approved PIF prioritized the SW coastal and NE haor area for the LDCF project implementation. The *NAPA 2005* prioritized these two areas as the SW is famous for the production of fresh, brackishwater fish and shrimps, particularly foreign exchange earning BW shrimps, in coastal ghers,. The NE haors are famous as mother fishery of indigenous species. Both areas are vulnerable to climate risks and disasters. During the Project Preparation phase, the project sites were further elaborated through Rapid Rural Appraisal (RRA) and Participatory Rural Appraisal (PRA) and included rapid assessment of CC risks and vulnerability (Appendix-7), field visits, Focus Group Discussions (FGDs), and consultation meetings and workshops with the community people. DoF officials both at the field and HQ, field personnel of BFRI, WorldFish, academicians, community leaders, private entrepreneurs. NGOs and baseline co-funding institutions, were also consulted. The RRA and PRA were conducted by the national team and international experts during the PPG phase.

The following five sites (upazilas) of the SW coastal region and six haors of four sites (upazilas) in the NE haor basin (Table 2 and Figure 3) were identified for implementation of the Project activities. Besides, criteria of representativity and upscaling potential were also considered in selecting the 9 upazilas (general area).

Table 2: Project sites identified for project implementation in the south-west and north-east regions through rapid assessment during the PPG phase.

SW Coastal Area	NE Haor Area
Dumuria Upazila,Khuna (Moderately vulnerable)	Dekhar haor of South Sunamganj Upazila (Highly vulnerable), Sunamganj district.
Dacope Upazila, Khulna (Highly Vulnerable)	Shanghai haor of South Sunamganj (Highly vulnerable), Sunamganj district.
Bagerhat Sadar Upazila, Bagerhat (Vulnerable)	Medir haor (tail end of Dekhar haor of South Sunamganj) of Nasirnagar Upazila (Vulnerable), Barahman Baria district.
Kachua Upazila, Bagerhat (Vulnerable)	Noluar haor of Jagannathpur Upazila (Vulnerable), Sunamganj district.
Munshiganj area of Syamnagar Upazila, Satkhira (Extremely vulnerable)	Pinglar haor of Jagannathpur Upazila (Vulnerable), Sunamganj district.
	Agdar beel of Hakaluki haor, Juri Upazila (Highly vulnerable) of Moulvibazar district.

The 9 sites are classified as being *Moderately vulnerable* (1 site), *Vulnerable* (5 sites), *Highly Vulnerable* (2 sites), and *Extremely Vulnerable* (1 site) based on Exposure (E), Sensitivity (S) and Adaptive Capacity (AC), with defined as: ***Vulnerability = (E + S) – AC.*** See Figure 4 below for vulnerability scores of the sites. Also see Appendix-7 for detailed assessment criteria and scoring.

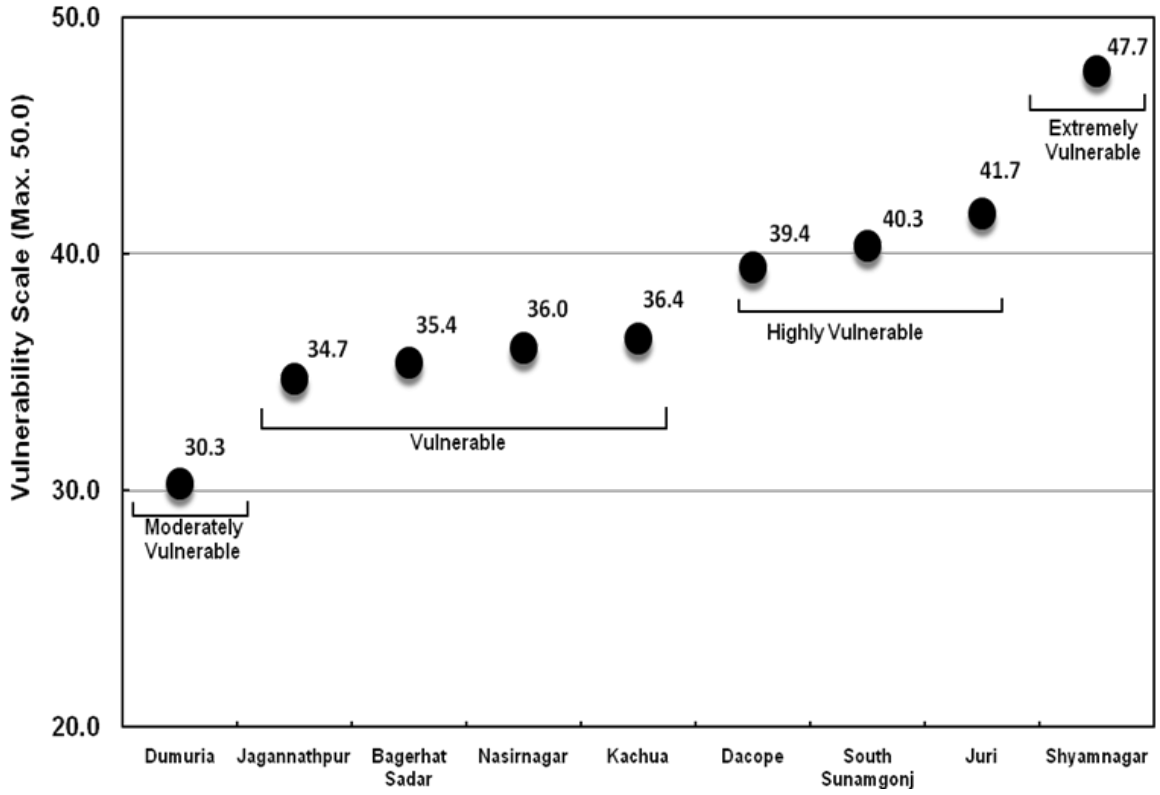


Figure 4: Comparative vulnerability indices of nine pilot upazilas based on exposure, sensitivity and adaptive capacity. [***Note:*** Dumuria upazila – *Moderately vulnerable*; Jagannathpur, Bagerhat sadar, Nasirnagar, and Kachua upazilas – *Vulnerable*; Dacope, South Sunamganj and Juri upazilas – *Highly vulnerable* and Shyamnagar upazila – *Extremely vulnerable*].

1.1.5 Barriers to adapt to climate change impacts on the fisheries sector

Although Bangladesh is considered to be one of the most vulnerable countries to climate change in the world, the level of understanding and capacity to assess, plan and implement fisheries adaptation to climate change impacts is still constrained due to lack of knowledge, funding, institutional capacity, and policy gaps. Moreover, the common understanding of climate change is biased towards extreme events such as cyclones, storm surges, and flooding, and less attention has been paid to the threats that are associated with slow and gradual onset of climatic impacts on social-ecological systems. These slow onset climate events appear to have created greater impacts on fisheries and aquaculture systems than that of "one off" climate extreme events, as acknowledged by the recent UNFCCC's 2012 report from the regional experts meeting on loss and damage due to CC. The following are the key barriers (Table 3) to adapting to climate change in the fisheries and aquaculture sector:

- ***Limited understanding of comprehensive and broader approaches to adaptation such as an ecosystem approach:*** In Bangladesh, limited awareness of climate resilient adaptation at the government and local level is a considerable barrier to the implementation of adaptation options. Although these stakeholders are involved in activities for ecosystem restoration and management, ecosystem-based adaptation is a relatively new concept in the country. As a result, there is limited knowledge on: i) what constitutes CC adaptation best practice; ii) the costs and benefits of this approach; and iii) how to tailor CC adaptation for particular ecosystems. Therefore, an ecosystem-based approach (EbA) has not yet been considered or used as a means of adapting to the adverse effects of climate change.
- ***Deficiency in policy and processes:*** National fisheries and aquaculture policies focus on adoption of technologies to enhance productivity, livelihood security, and export earnings but lack attention to climate change threats that can significantly affect the chance of the policy achieving its goals. There is moreover a lack of focus on gender and social issues. Policies and strategies need review and updating.
- ***Lack of coordination among relevant government agencies:*** Although inter-ministerial coordination is explicitly mentioned in the policy, coordinated management of fisheries has not been achieved on the ground. Since climate change impacts cut across various relevant sectors and agencies, a coordinated approach to design and implementation of adaptation interventions with defined roles and responsibilities is essential for ensuring effective and sustainable adaptation measures. Establishing a functional/working relationship and data sharing with Meteorological Department and Flood Forecasting Centre of BWDB is also a requirement for disaster early warning dissemination on fisheries. Such linkages are inadequate now.
- ***Limited knowledge and capacity to respond to CC impacts:*** The government's capacity to effectively assess, plan, implement and monitor fisheries adaptation to climate change impacts is very weak. Staff members within government ministries and departments lack appropriate training on climate resilient adaptation options. Therefore, these national-level institutions do not have the technical capacity for planning and implementing this approach and lacks technical capacity to plan and implement CC adaptation. The government, through its Comprehensive Disaster Management Programme (CMDP-II) has taken up initiative to establish a Climate Change Cell (CCC) at the Department of Fisheries (DoF). But formation of a cell in the DoF does not guarantee outcomes in the long run unless such structure is recognized in the strategy and receives continuous support to retain competent manpower, necessary logistics, equipment, and required funds.

- ***Limited integration of EbA into development planning, frameworks and guidelines:*** Policies and plans related to strategic ecosystem based management and national development do not include adaptation to climate change using a comprehensive ecosystem based perspective, e.g. addressing socio-economic, environmental and governance objetives simultaneously. Therefore, this approach is not integrated into development planning or management regimes of the relevant sectors including *inter alia* environment, water, forestry, conservation and tourism.
- ***Insufficient on-the-ground demonstration of EbA where benefits are being measured:*** To date, CC adaptation measures in the fisheries sector have not been implemented in Bangladesh. As a result, the benefits and cost-effectiveness of this approach have not been demonstrated to policy- and decision-makers, and local communities. Furthermore, with insufficient demonstration it is unlikely that: **i** the community- and ecosystem-based adaptation approach will be integrated into local, regional and national policies, plans and legislation for fisheries ecosystems; and ii) local communities will fully support such approaches.
- ***Lack of CC resilient fisheries and aquaculture technologies and management options at national and local levels:*** Already the CC induced impacts are visible in the country and concerned fishers and fish farmers communities are experiencing loss and damages due to CC impacts. Suitable fisheries and aquaculture technologies resilient to variable climate change induced stressors, though available, are yet to be recognized through exhaustive field testing and approved by the DoF for extension.
- ***Lack of information and analytical capacity:*** Climate change adaptation planning is complex as it requires forward looking scenarios while planning adaptive measures. Such planning can only be possible if a long term reliable database is maintained for trend and impact analyses Currently DoF does not have time series datasets on site-specific climate parameters and thus assessing impacts of CC on fisheries is difficult. Data from the Meteorological office is accessible, but synchronizing the climate data with site-specific fisheries data would be a difficult task for the DoF officials who lack training and reliable fisheries datasets.
- ***Lack of information services to communities:*** Currently there is no formal and effective information dissemination (or support) system functioning in the fisheries sector. The existing disaster early warning systems (EWS) does not disseminate any fisheries and aquaculture related information to fishers and fish farmers communities living on the coastline, except for disaster signals for sea-going vessels. The CDMP established a mobile phone-based warning system that facilitated sending information to users, but it also lacked specific information for fisheries and aquaculture famers as to what actions should they take to avoid or reduce risks. Also, there is no information and communication technology (ICT)-based fisheries information service in the country by which fishers and fish farmer communities can access the fisheries expert panel to get advice on how to adapt to climate change stressors.

The project would increase the knowledge base of the fishers and fish farmers regarding CC implications through practicing how to monitor environmental parameters, understanding what to do when, practicing climate resilient fisheries and aquaculture farming systems, restoration of fish habitats, conservation-management and non-fishery diversified alternate livelihood options. The communities' capacity would be increased and strengthened so as to enhance their resilience and ability to adapt to climate change.

The following table provides a summary of the key barriers, their underlying causes, and the key measures needed to be undertaken to address these barriers.

Table 3: Barriers, causes and measures to address barriers.

Barriers	**Causes**	**Key measures to address barriers**	**Project components to carry out the measures**
Lack of climate compatible fisheries and aquaculture policies and strategies impede the MoFL and DoF to address impacts of CC on fisheries sector development.	Deficiency in policy and processes, including limited integration of Ecosystem-based approach (EbA) into development planning, frameworks and guidelines Lack of coordination among relevant government agencies; Lack of monitoring and feedback systems on CC impacts on fisheries and aquaculture system within the DoF, from national to local levels.	• Enabling national fisheries (including fish and shrimp aquaculture) and related policies and strategies and enhance capacity that foster transformative fisheries adaptation and development not only within the MoFL/DoF but also among other relevant government and private agencies.	1. Climate resilient fisheries sector through relevant national capacity development.
DoF has limited capacity to support communities in responding to climate related stressors and fisheries adaptation to CC impacts.	Limited understanding of comprehensive and broader approaches to adaptation such as an ecosystem-based approach (EbA); Limited knowledge and capacity to respond to CC impacts; Lack of information and analytical capacity; Lack of information services to communities; Lack of monitoring and feedback systems on CC impacts on fisheries and aquaculture system within the DoF, from national to local levels.	• Strengthening knowledge, awareness and capacity of local communities including field level SUFOs of DoF and other relevant agency staffs to the extent they can assess, plan and identify adaptive measures to reduce climate change risks. • Promotion of appropriate technologies and approaches including information based on specific different sensitive ecological settings of the country that enhance fisheries and aquaculture productions and community livelihoods in the face of climate change impacts.	1. Climate resilient fisheries sector through relevant national capacity development. 2. Strengthening knowledge and awareness of fisheries/aquaculture dependent communities facing the adverse impacts of climate change.
The relevant fisheries and	Insufficient on-the-ground demonstration	• Strengthen capacity of local communities	1. Strengthening knowledge and

aquaculture dependent communities lack understanding on the issues of climate change and their impacts on fisheries and aquaculture and its consequent effects on their livelihoods.	of EbA where benefits are being measured; Limited knowledge and capacity of community to respond to CC impacts; Lack of information and low analytical capacity; Lack of information services to communities; Lack of CC resilient fisheries and aquaculture technologies.	including field level DoF and other relevant agency staffs to the extent they can assess, plan and identify adaptive measures to reduce climate change risks • Promotion of appropriate climate resilient technologies and approaches including information based on specific different sensitive ecological settings of the country that enhance fisheries and aquaculture productions and community livelihoods in the face of climate change impacts.	awareness of fisheries/aquaculture dependent communities facing the adverse impacts of climate change. 3. Enhancing local adaptive capacity of the relevant community to support climate resilient fisheries/ aquaculture management and alternative livelihoods in the face of climate change.
The current EWS in Bangladesh does not provide specific messages for the fishers and fish farmers as to what preparedness (measures) should they take to protect their fish/shrimp farms or fish habitats from CC induced disasters. The existing EWS does not disseminate specific measures against slow onset events such as drought, sea level rise, salinity, erratic rainfall, temperature rise, cold spells, etc.	EWS largely focuses on maritime aspects and sea safety, only during climate extreme events (cyclonic, flooding). DoF does not collect, maintain database on various climate factors that affect/ influence the fisheries and aquaculture production systems and habitats, viz. salinity, drought, rainfall, water flow, temperature and analyse their trends and impacts on fisheries. This renders the DoF unable to understand and support communities to respond to climate related stressors and fisheries adaptation to CC impacts.	• Appropriate climate resilient technologies and approaches including information based on specific different sensitive ecological settings of the country that enhance fisheries and aquaculture productions and community livelihoods in the face of climate change impacts would be promoted and upscaled through the project activities.	1. Climate resilient fisheries sector and relevant national capacity development. 2. Strengthening knowledge and awareness of fisheries/aquaculture dependent communities facing the adverse impacts of climate change. 3. Enhancing local adaptive capacity to support climate resilient fisheries/ aquaculture management and alternative livelihoods in the face of climate change.

1.2 SECTOR GOVERNANCE AND STAKEHOLDERS

1.2.1 Legislation and Policies

After the Bali conference (COP 13 in 2007), the government formed the National Steering Committee on Climate Change (NSCCC), headed by the Minister, MoEF and comprises Secretaries of all relevant ministries and civil society representatives. At COP 13, Bangladesh enunciated four securities as inviolate for sustainable development – security of food, water, energy and livelihood. Since then these have acted as cornerstone for all Bangladesh climate change negotiation and positions. The first three have been recently announced by the Salzburg declaration for post 2015 sustainable development to be of similar importance. The NSCCC is tasked with developing and overseeing implementation of the National Climate Change Strategy and Action Plan. Five technical working groups were constituted on climate change adaptation and mitigation, technology transfer, financing and public awareness. It also provides guidance on international climate change negotiations, including bilateral, multilateral and regional programmes for collaboration, research, exchange of information and development. It reports to the national environment committee, chaired by the Prime Minister. On developing national policies and strategies, Bangladesh has been amongst the first two LDCs to produce *National Adaptation Programme for Action (NAPA)* in 2005 and was updated in 2009. The country also formulated the *Bangladesh Climate Change Strategy and Action Plan (BCCSAP)* in 2009 to lay the foundation of all activities regarding climate change particularly on adaptation. The BCCSAP was developed by the Ministry of Environment and Forests (MoEF). The BCCSAP is built around six thematic pillars and 44 programmes under those pillars. Bangladesh is the first developing country to have prepared such a document. This guiding document describes the climate-related problems in the country and provides recommended programmes for adaptation. However, policies and plans related to vulnerable sectors such as ecosystem management[22] were developed before: i. the BCCSAP was produced; and ii. awareness on climate change was enhanced amongst policy- and decision-makers. As a result, there is limited integration of adaptation to climate change into these policies and plans.

Bangladesh's response to climate change is robust and despite various limitations, actions are being pursued at two broad levels: within the country (at various levels from national to local) and at global level. Financial allocations for adaptation to climate change are included in Bangladesh‘s national budget. Moreover, in 2009 the Ministry of Finance (MoF) created two separate funds for adaptation finance in the country, in line with the development of the BCCSAP. The first one is the Bangladesh Climate Change Trust Fund (BCCTF)[23], which is resourced entirely from the government‘s own budgetary allocation. Over the past five years an amount of US $ 300.0 million has been put and up to now and about 100 projects are being implemented by various government ministries and agencies. The second one is the Bangladesh Climate Change Resilience Fund (BCCRF), established in 2011, which consists of funds provided by developed countries or groups and is managed by the World Bank. So far about US$ 170 million has been received. BCCRF supports projects worth 15-25 million and as of now, one project (construction of cyclone shelters) is being implemented and four others are at advanced stages of finalization. The BCCTF and BCCRF are mainly used for making hard infrastructures such as, roads, dikes, cyclone shelters and cyclone shelters-cum-

[22] Examples of such policies and plans include *inter alia:* i) the National Water Management Plan; ii) Forestry Management Plan; and Haor Master Plan.

[23] The Climate Change Act stipulated that 66% of this amount will be spent on the implementation of projects/programmes prioritized in the BCCSAP, and 34 per cent will be maintained as a fixed deposit for emergencies. Funds from the BCCTF can be used t o finance public sector and non-government projects, and it is not mandatory to spend the total grant within a given financial year.

schools renovation and establishment, and of short duration. The financial provisions within these funds enable: i. scientific research to inform climate change adaptation, and ii. implementation of projects for adaptation. However, budget provisions are not allocated to climate resilient adaptation and mitigation.

Vision 2021 (the 6th Five Year perspective Plan) has also given importance to the challenges of climate change and the need for addressing those issues and importance of mainstreaming climate change related activities.

The DoF has also prepared the *National Fisheries Strategy* in January 2006 forecasting the ways in which the *National Fisheries Policy* can be implemented and support can be offered to guide the sector. The strategy encompasses eight other sub-strategies (Aquaculture sub-strategy, Aquaculture Extension sub-strategy, Inland Capture Fisheries sub-strategy, Marine Sector Sub-strategy, Shrimp Sub-strategy, Monitoring and Evaluation Sub-strategy, Quality Control sub-strategy and Human Resource Development Sub-strategy) to give specific directions to the specific sub-sectors. It prioritizes more support for capture fisheries, both marine and inland, to reverse the current decline and prevent further biodiversity and habitat losses encouraging more ownership and management by the fishers through community or co-management. The DoF undertook review of the marine fisheries sub-sector while producing a 'Marine Fisheries Sector sub-strategy as part of a wider *National Fisheries Strategy and Action Plan*. In the sub-strategy, the need for major changes in the institutional setup was incorporated in future action plans. *The Marine sub-strategy* signifies sustainable management of the marine sector through allocation of fishing rights and its management by communities and relevant fishing groups through govt. regulatory framework for its management. The *National Fisheries Policy 199* and *National Fisheries Strategy 2006* deal with the overarching aspects of i. procurement, preservation and management of fisheries resources of the open water bodies, ii. fish culture and management in closed freshwater bodies, iii. culture of shrimps in coastal regions, iv. exploitation, conservation and management of marine fisheries resources, and v. other related policy interventions. Bangladesh has also recently endorsed the *Strategic Action Programme (SAP) for the Bay of Bengal Large Marine Ecosystem (BOBLME)*, which has a component on social and economic considerations that focuses on reducing vulnerability to naural hazards, climate variability and climate change, and increase climate resilience. The aquaculture demonstration activities in the southwest coastal area are within the remit of the BOBLME SAP.

Unfortunately, fisheries acts, rules, policies and strategies do not include adaptation to climate change using ecosystem based approaches (EbA) and Ecosystem Approach to Fisheries Management (EAFM) and lack proper indications how to address emerging climate change implications. Therefore, this approach is not integrated neither into development planning nor management of relevant sectors including *inter alia* environment, water, forestry, conservation and tourism. An effective national response to climate change requires coordination among different line ministries and departments. Only recently (November 2011 through April 2015) the DoF in collaboration with the Comprehensive Disaster Management Programme II (CDMP-II, Fisheries component) of the Bangladesh Meteorology Department ran a development project for formulating guidelines for review and update the *National Fisheries Policy 1998* incorporating CCA and DRR issues; establishing a functional climate change cell (CCC) at DoF along with CC Core group; implementing the prepared 'Plan of Action' of fisheries DRR/CCA for DoF; establishing CC knowledge management centre in the DoF with adequate resources at the CCC; preparing training manuals (Climatic Risks Management in Fisheries & Aquaculture) both for DoF Officials and Fishers/Farmers; and support DoF to organize various events of CC awareness campaign.

To further strengthen the governance and management of inland capture fisheries and aquaculture in Bangladesh in the face of climate change, a large number of other sectoral policies and legislation need to be taken into consideration in a cross-sectoral approach. Fisheries related most relevant policy is the *National Agricultural Policy (NAP, 1999)* developed by the Ministry of Agriculture, which proposes several strategies and in summary promotes coordination, integration of the various sectors as well as a pluralistic and decentralized approach. The *National Extension Policy 2012* is still as a draft policy. focusing on, *inter alia*, coordination and integration of the extension services; implementation of a market-led, demand responsive, pluralistic and decentralized bottom-up approach to extension; enhanced disaster management and adaptation to climate change; addressing gender issues in agriculture by valorising and encourage women's participation; and strengthening monitoring and evaluation. The other relevant one is the *National Water Policy* developed by the Ministry of Water Resources and aimed to provide direction to all agencies working with the water sector, and institutions that relate to the water sector in one form or another. It is however largely outdated as it dates back from 1999.

Relevant/appropriate policies, strategies, action plans, guidelines and legislation relating to relevant/appropriate environment, climate change and disaster management, fisheries and aquaculture, water/land, agriculture, forestry/wildlife, and sustainable development are summarized in Appendix-8. Besides, various Multilateral Environmental Agreements relevant to the LDCF/GEF financed project, and with which the project will comply are also presented in Appendix-8.

Bangladesh is also a signatory to a number of multilateral environmental agreements for sustainable management and conservation of habitats, environment and biodiversity, the important ones are: Convention on Biological Diversity (CBD), signed in 1992 and ratified in 1994; Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), signed in 1975 and ratified in 1982; Convention on the Conservation of Migratory Species of Wild Animals (CMS or the Bonn Convention) ratified in 2005; Convention on Wetlands of International Importance especially as Waterfowl Habitats was ratified by the GoB in 1992. United Nations Convention to Combat Desertification (UNCCD) was signed in 1994 and ratified in 1996; United Nations Framework Convention on Climate Change (UNFCCC) was signed in 1992 and ratified in 1994; Convention on the Elimination of Discrimination against Women (CEDAW) was acceded to in 1984 and the Optional Protocol on CEDAW was ratified in 2000; Bangladesh also signed MoU in 2004 to conserve Marine Turtles in the Indian Ocean and South-East Asia.

This Project will address contradictions and gaps in the policy framework with the view to harmonize aquaculture and fisheries related issues, and enhance resilience of the sub-sector through national capacity development and incorporation of adaptation priorities to cope with climate change. The proposed intervention by the LDCF-financed project will: i. increase technical knowledge on Ecosystem-based Approaches (EbA) and Ecosystem Approach to Fisheries and Aquaculture (EAF and EAA) Management amongst government stakeholders and local communities; ii. improve and facilitate the dissemination of relevant information on climate change and EbA and iii. demonstrate benefits and cost-effectiveness of EbA through the implementation of on-the ground climate resilient interventions together with the fishers and fish farmers' communities. The Project will address contradictions and gaps in the policy framework with the view to harmonize aquaculture and fisheries related issues, and enhance resilience of the sub-sector through national capacity development and incorporation of adaptation priorities to cope with climate change.

1.2.2 Agencies and Stakeholders

The highest development policy making and programme/project approving institution is the National Economic Council (NEC), which is headed by the Prime Minister. After the NEC is the Executive Committee of National Economic Council (ECNEC), headed by the Finance Minister that reviews the plans and programmes sent by various ministries and endorses them. Thus all projects/programmes under the Annual Development Plan (ADP) have to be cleared by NEC /ECNEC.

Thus policies and actions for 'sustainable development' come under the purview of NEC /ECNEC for endorsement and approval. No project or programme is approved unless environmental and other sustainability issues are properly evaluated. The government's strong commitment to sustainable development is reflected in its plan and other policy documents, which guides the decision taken by the NEC /ECNEC.

Major institutions involved in the development of plans and policies in the public sector in this context and their implementation include the Planning Commission (PC) under the Ministry of Planning and Economic Relations Division (ERD) under the Ministry of Finance. The PC is the principal planning authority for the country. The Commission sets the goals, objectives and strategies for the country's short- and medium-term plans using a long-term perspective as a framework and also works on improving governance. Its activities include policy planning, sectoral planning, programme planning, project planning, and evaluation.

Besides, Ministries of Agriculture, Fisheries and Livestock, Water Resources, Local Government, Rural Development and Cooperatives, Power, Energy and Mineral Resources, Health and Family Welfare, Education, Housing and Public Works, Information, Posts, Telecommunications and Information Technology, Science and Technology, Expatriates' Welfare and Overseas Employment, Labor and Employment, Women and Children Affairs, Industries, Commerce, Disaster Management and Relief, etc. have its own Planning Cell which coordinates reciprocal synergies on common issues of national development and livelihood improvement. The Ministry of Foreign Affairs takes overall responsibility in global negotiations. The following stakeholders have been identified as key actors in the Project (Table 4):

Table 4: Project Stakeholders.

Stakeholders	Roles and responsibilities during the project implementation
Ministry of Fisheries and Livestock (MoFL**)**	The main functions of the MoFL, GoB are to preserve fisheries resources, fulfil the requirement of animal protein through proper management and planned development, increase socio-economic conditions of fishermen, create employment opportunities for rural unemployed and landless people, and expand foreign exchange earnings by exporting fish and fishery products. In addition to planning and management, MoFL also regulates and oversees research on the conservation and development of innovative new, adaptive fisheries technologies. The MoFL will coordinate with other relevant ministries (e.g. MoEF, PC, ERD, IMED, MoRDM, etc.) during implementation of this project.
Economic Relations Division (ERD**)**	The ERD is one of the four divisions of the Ministry of Finance (MoF), GoB and leads as the focal point of the GoB for interfacing with the development partners as well as for coordination of all external assistance inflows into the country. The ERD of the Bangladesh Planning Commission (PC) is the principal planning authority for the country, sets the goals, objectives and strategies for the country's short and medium-term plans using a long-term perspective as a framework. Its activities include policy planning, sectoral planning, programme planning, project planning and evaluation. This Commission will provide critical observations on capacities developed, in particular through the use of these skills in the learn-by-doing mainstreaming of Rio Conventions in planning development frameworks.
Planning	The PC under the Ministry of Planning (MoP), GoB is the principal planning

Commission (PC**)**	authority of the country. It sets the goals, objectives and strategies for the country's short- and medium-term (5-years) plans using a long-term (15-20 years) perspective as a framework, formulates policy measures for the achievement of planned goals and targets and also works on improving governance. It prepares Annual Development Programme (ADP) within the framework of Three Year Rolling Investment Programme (TYRIP) in consistence with the Five Year Plan. Its activities include policy planning, sectoral planning, programme planning, project planning, and evaluation. The PC appraises project proposals for the ECNEC and the MoP and does evaluation of plans and impact on the economic development of the country.
Implementation Monitoring and Evaluation Division (IMED)	The IMED is one of the three divisions of the MoP, GoB central and apex organization of the GoB for monitoring and evaluation of the public sector development Projects included in the ADP. The IMED provides support to all Ministries/Divisions on project implementation through a structured way of collecting, compiling and analyzing project information in its central MIS and gives feed back to the Ministries/Division on problems and bottlenecks of projects during implementation. It also reports the progress of implementation of public sector development projects to the NEC and its ECNEC headed by the Chief Executive of the Country.
Ministry of Environment and Forest (MoEF) **including CCU, BCCTF and BCCRF**	The MoEF, GoB is the nodal agency in the administrative structure of the government for the planning, promotion, co-ordination and overseeing the implementation of environmental and forestry programmes. In addition, the MoEF works with other line ministries and agencies to ensure that environmental concerns, including climate change issues are given due priority in their development programmes/projects. The MoEF will ensure that environmental concerns, including climate change issues are given due priority in this projects. The MoEF can also provide environmental and climate change related advice and guidance during the implementation of the project. Drawing on various climate change-related projects being implemented by the BCCTF and BCCRF, the MoEF will provide baseline co-financing for this project. The CCU is a DoE project-based unit established in 2010 with a mandate to manage the Bangladesh Climate Change Trust (BCCT). The CCU operates under the MoEF. Bangladesh Climate Change Trust (BCCT) is a statutory body formed under *Climate Change Trust Act, 2010* to administer Climate Change Trust Fund (CCTF). The CCTF is a self-financing mechanism of the Government of Bangladesh to address the adverse impacts of climate change. It is an annual block allocation from the revenue budget of the Government. The Bangladesh Climate Change Resilience Fund (BCCRF) is a coordinated multi-donor trust fund by the Government of Bangladesh, development partners and the World Bank to address the impacts of climate change. The BCCRF financing activities are designed to achieve the BCCSAP's goals and support one or more of the BCCSAP's six pillars (Food security, social protection and health; comprehensive disaster management; Infrastructure; Research and knowledge management; Mitigation and low carbon development; and Capacity building and institutional strengthening). The CCU will be linked to this project implementation for coordination, technical and administrative support and policy advocacy and related funding of BCCTF and BCCRF will provide baseline co-financing.
Department of Fisheries (DoF**)**	The DoF, GoB is under the administrative control of the MoFL. It is headed by a Director General and there are administrative set-ups at division, district and Upazila (sub-district) levels headed by Deputy Director, District Fisheries Officer and Senior/Upazila Fisheries Officer and Fisheries Extension Officers respectively. DoF has fish and prawn hatcheries and nurseries and training centers all over the country. The DoFs mandates are: disseminate improved aquaculture technologies through training and demonstration and to extend extension advisory services to the focal stakeholders; enhance fisheries resources through enacting conservation and management measures; assist the administrative ministry to formulate policies, acts etc.; facilitate alternative income generating activities for rural poor and unemployed

	people towards poverty alleviation; formulate and implement development projects/programs towards sustainable utilization of fisheries resources to ensure food security; and disseminate improved aquaculture technologies through e-Extension service. The DoF will be the main technical agency of the project with responsibility for coordination with BFRI, DoE, DAE, FD, FAO, WorldFish and IUCN. It will house the project technical team and be responsible documentation and reporting.
Bangladesh Fisheries Research Institute (BFRI**)**	The BFRI is the nodal fisheries research institute and an autonomous organization under the MoFL, GoB. Under this institute there are 5 stations located at Mymensingh, Chandpur, Cox's Bazar, Bagherhat and Paikgacha (Khulna); and 5 substations at Santahar, Jessore, Rangamati, Khepupara and Sayedpur. These stations conduct basic and applied research on freshwater aquaculture, inland fisheries management, lake management, fish diseases, marine fisheries, brackish water aquaculture, fish breeding genetics, etc. Some of the technologies innovated by this institute are being disseminated to the fields by DoF. The BFRI will support the project by prescribing best on-farm climate resilient aquaculture technologies for the coastal aquaculture affected by the adverse impacts of climate change. The BFRI could also collaborate in training on climate resilient fisheries and aquaculture practices.
Department of Environment (DoE**)**	The DoE is the technical arm of the MoEF, GoB and the lead institution for sectoral environmental management plan and deals specifically with the environmental issues. The DoE has wide ranging responsibilities from enforcement of environmental laws and codes in addition to EIA in respect of public and private sector projects. During implementation of this project the DoE's involvement would be ensured as being a member of the Project Steering Committee (PSC) and the DoE will provide climate change data and impact predictions to the project. Various climate change-related projects being implemented by the DoE can provide baseline co-financing for this project.
Bangladesh Forest Department (BFD**)**	The BFD, another arm of the MoEF, GoB works towards ensuring natural sustainability and biodiversity conservation through social forestry, forest management, afforestation, reforestation, protected area management, etc. The BFD facilitates collaborative management of the Sundarbans fisheries and aquatic resources jointly with the DoF. Best lessons learned from the BFD's on-going IPAC, SEALS, CABCC-CF projects working in the Sundarbans Impact Zones (SIZ) and adjacent coastal areas will be linked during this project implementation and could provide baseline co-financing. Project communities will be linked with Co-management Committees (CMCs) formed under IPAC to facilitate raise their voices at upazila-level decision making spaces. The project will thus be aided in supporting poor and women headed households to take up climate resilient aquaculture systems.
Department of Agricultural Extension (DAE**)**	The DAE of the Ministry of Agriculture (MoA), GoB is one of the largest public sector agricultural extension providers in Bangladesh. DAE is responsible for carrying out agricultural extension services at the grassroots level throughout the country. DAEs concepts of Farmers Field School (FFS) and Farmers Climate School (FCS) will be linked to this project for e-disseminating early warning systems, capacity and awareness improvement of the fishers' and fish/shrimp/prawn/crab farmers, especially emphasizing poor and women headed households to take up climate resilient fisheries and aquaculture systems.
Bangladesh Meteorological Department (BMD**)**	The BMD, under the Ministry of Defense (MoD), GoB is the authorized government organization for all meteorological activities in the country. It maintains a network of surface and upper air observatories, radar and satellite stations, agro-meteorological observatories, geomagnetic and seismological observatories and meteorological telecommunication system. The BMD will be linked to this project and provide climate data and impact predictions.
Ministry of Disaster Management and Relief (MoDMR)	The MoDMR, GoB is the focal ministry for disaster risk reduction and emergency management and takes the lead in coordinating disaster management efforts. MoDMR has been successful in shifting the paradigm from relief culture to risk reduction management through the development of a comprehensive disaster management programme, a cyclone preparedness programme in coastal areas, and a

	huge safety net support programme. These initiatives have yielded a number of encouraging results in terms of environmental protection and disaster management that the project will build on.
Disaster Management Department (DMD**)**	The DMD is the technical arm of MoDMR, GoB which coordinates all activities related to disaster management from national to the grassroots level. The DMD through its Comprehensive Disaster Management Program-II (CDMP-II) provide training of the communities and staff on DRR and climate change adaptation; facilitate setting up of early warning systems for the coastal aquaculture communities. The DMB will be linked to this project and provide training of the communities and staff on disaster risks reduction (DRR) and climate change adaptations, and facilitate setting up of early warning systems for the fishers and aquaculture communities.
Food and Agriculture Organization (FAO) **of the United Nations, Bangladesh**	FAO, with 191 member countries, is the United Nations agency with competency in all areas of fisheries and aquaculture. Since November 1973, Bangladesh and FAO have been working closely together in developing the areas of agriculture, food, forestry, fisheries, livestock, rural development and climate change. These efforts were further strengthened with the establishment of the FAO Representative office in Dhaka in 1978. The FAO Country Programming Framework, CPF (2014-2018) for Bangladesh is a strategic planning and management document which provides FAO with a sound basis of developing its mid-term country programme, in line with the policies and development priorities of the Government of Bangladesh. It is also a tool to help mobilize resources in a programmatic manner, rather than on a project-by-project basis. The core goal of CPF is to identify country level priority areas of work, required technical assistance and investment opportunities; to help coordinate and contribute to the multilateral goals relating to the sustainable agriculture; rural development, food security and nutrition. The CPF in Bangladesh lays out the basis for more integrated and 'bottom-up' approach to the FAO programming in Bangladesh. Bangladesh has, as well, contributed significantly to FAO initiatives, commissions, committees and the working panels. FAO Bangladesh team is ready to be incorporating all the responses to these growing concerns in its cooperative development initiatives, as it has been doing for more than 40 years now.
WorldFish	WorldFish is one of the Consultative Group of International Agricultural Resarch (CGIAR) Centers. Its headquarters is in Penang, Malaysia and has a South Asia office with approximately 22 numbers of staff scientists based in Dhaka, Bangladesh. WorldFish is committed to meeting two key development challenges: **i.** improving the livelihoods of those who are especially poor and vulnerable in places where fisheries and aquaculture can make a difference and **ii.** achieving large scale, environmentally sustainable, increases in supply and access to fish at affordable prices for poor consumers in developing countries. WorldFish is supporting the GoB and implementing projects in the southwest coastal area of Bangladesh and is particularly experienced and have comparative advantage in identifying and developing best practices and innovations related to fisheries, brackish water shrimp culture, freshwater prawn culture, crab fattening and white fish couture in that area in the face of climate changes. WorldFish's experience will be leveraged to this project in implementing best lessons learned, capacity and awareness improvement trainings of the fishers' and fish/shrimp/prawn/crab farmers and other technical areas (quality fish seeds) through Feed the Future (FTF) Aquaculture and Aquatic Agricuture System (AAS) projects including in improving the relevant national policies and strategies. Besides, its investment in various adaptive fisheries and aquaculture projects will provide baseline co-financing.
International Union for the Conservation of Nature (IUCN**)**	The IUCN is the largest professional global conservation network and is an important institution that has provided important technical services to support the GoB in the past, and may be called upon to do so in future. With respect to this project, their comparative advantage in identifying and developing best practices and innovations related to wetland (*haor* basin) management will be very valuable.

International Fund for Agricultural Development (IFAD)	Since creation in 1977, IFAD has focused exclusively on rural poverty reduction, working with poor rural populations in developing countries to eliminate poverty, hunger and malnutrition; raise their productivity and incomes; and improve the quality of their lives. IFAD has implemented *Haor infrastructure and livelihood improvement project* (HILIP) and now upscaled that project into Climate Adaptation and Livelihood Protection (CALIP) project in NE haor area, Bangladesh for scaling up best practice and testing new adaptation interventions of the HILIP. The projects provided support for building upazila and union roads including submersible roads, bridges and culverts, community (village) roads, village markets and protection works against wave action and erosion in flooded haor wetlands. It also provided support to beel user groups (BUG) and water bodies under community management in the NE haor region. The project strengthened the institutional arrangements for beel management and invest resources in developing water bodies to improve their productivity and biodiversity through beels re-excavation, livelihood protection by protecting existing sources of livelihood such as crop cultivation particularly rice, horticulture, livestock and fisheries.
Centre for Environmental and Geographic Information Services (CEGIS)	CEGIS, a scientifically independent centre of excellence and technically sound entity, is a Public Trust and not-for-profit organisation functioning under the aegis of the Ministry of Water Resources, Bangladesh. It started with intellectual services for natural resources and disaster management planning using GIS, Remote Sensing and database technology for integrated environmental and social analysis. CEGIS is a pioneer in integrated environmental and social analysis and monitoring studies using the latest concepts and GIS and space technologies. Its services include initial environmental examination (IEE), environmental impact assessment (EIA), social impact assessment (SIA), Resettlement Action Plans (RAP), analytical framework for integrated water resources management (IWRM), spatial analysis using GIS and Remote Sensing for flood monitoring, drought assessment and monitoring, monitoring of river plan form changes, river erosion and accretion prediction, flood damage assessment, land use planning and zoning, urban planning, database and IT services, development of meta-database and web-based spatial database, MIS and Decision Support Systems for planning, designing, implementation and monitoring of projects, etc.
Non-Governmental Organizations (NGOs**)**	There are a number of NGOs such as, Bangladesh Shrimp and Fish Foundation (BSFF), Centre for Natural Resources Studies (CNRS), Bangladesh Centre for Advanced Studies (BCAS), Centre for Advanced Research in Natural Resources & Management (CARINAM), Nature Conservation Management (NACOM), that are undertaking important and related resource studies related to conservation and management on fisheries, environment and biodiversity addressing related policy issues in Bangladesh. During project implementation national and local NGOs, particularly working in the envisioned demonstration places will be mobilized, and involved in relevant participatory project activities, such as RRA/PRA, gender equity awareness, livelihood vulnerability and risk assessment in fisheries and aquaculture in the face of climate changes, and development of extension materials (leaflets, booklets, posters, etc.).
Bangladesh Shrimp and Fish Foundation (BSFF)	Bangladesh Shrimp and Fish Foundation (BSFF) is a non-profit private research and advocacy organization created through a USAID project. It works closely with industry associations and GoB and facilitates exchange of opinions between and among various stakeholder groups, e.g., hatchery, nursery, grow out farm, feed mill, ice plant, field depot or service centre and processing plant operators, government, non-government and donor organizations to reach sound consensus. Help establish good harmony and coordination throughout the entire chain of the industry. Develop a database and a central information repository. Conduct technical, social, environmental and market research and studies. Training and Information dissemination on relevant aspects and provide technical assistance.
Village/rural level Community Institutions (CIs): Community-based	There are Self Help Groups (SHGs), Women's Groups, Fishermen's Associations, Youth Groups, Co-Management Committees (CMCs), Village Forum (VFs), Community-based organizations (CBOs), community organizations, local leaders, women organizations, etc. in both the northeast and southwest. Those organizations,

Organizations (CBOs), local community organizations, local leaders, women organizations, etc.	leaders, and women groups will be mobilized and involved in participatory implementation of the project activities. Emphasis will be given to community-based participatory adaptation supporting poor and women headed households, awareness and capacity improvement trainings for their livelihood improvement vis-a-vis sustainable exploitation and management of the renewable finite natural resources of fisheries.

Apart from the above organizations, other ministries/departments/agencies including the Ministry of Land (MoL), Ministry of Agriculture (MoA), Ministry of Water Resources (MoWR), Water Resources Planning Organization (WARPO), Institute of Water Modeling (IWM), Bangladesh Water Development Board (BWDB), Bangladesh Space Research and Remote Sensing Organization (SPARRSO), Ministry of Industries (MoI), Ministry of Power (MoP), Ministry of Energy & Mineral Resources (MoEMR), Bangladesh Navy (BN), Coast Guard (CG) and Port Authority (PA) have defined mandates and jurisdiction over matters concerning aquatic resources, overall environmental management and cross-cutting environmental issues.

All these line ministries are responsible for implementation of public projects through their line agencies and departments. Over the years, many institutions have been created under these ministries to carry out their mandates related to sustainable development. The ministries have their own policy and program frameworks which provide a basis for addressing fundamental issues of sustainable development in their respective areas of concern with due regard to the three pillars (economic, social and environmental) for sustainable development. Each of the ministries has a Planning Cell within it which works closely with the Planning Cell of the MoEF with due emphasis on environment and climate change sensitivity in the formulation of respective sectoral policies and plans.

During project implementation support and cooperation from the district and local administration would be taken as and when deemed necessary.

1.3 RATIONALE

1.3.1 Baseline Initiatives and Investments

Over the last decades, the Government of Bangladesh, with the support of development partners, has invested over US$ 10 billion to make the country less vulnerable to natural disasters. These investments include flood management schemes, coastal polders, cyclone and flood shelters, different adaptation activities and the raising of roads and highways above flood levels. Also, the Government has developed state-of-the-art warning systems for floods, cyclones and storm surges, and is expanding community-based disaster preparedness. Climate resilient varieties of rice and other crops have also been developed for different vulnerable locations. The challenge Bangladesh now faces is to scale up these investments to create a suitable environment for the poorest and most vulnerable groups, including women and children. The aquaculture and fisheries sector has so far received limited attention and funding for adaptation. Some major initiatives on adaptation to CC include:

- Bangladesh has been making greater efforts to *mainstream climate change issues into national development planning* and decision making processes, so that different sector ministries and line agencies will take climate change issues into account, in development planning as well as in implementation on the ground. Ministry of Environment and Forests (MoEF) is the main focal ministry for all work on climate change, including international negotiations.

- Development partners have also established Bangladesh *Climate Change Resilient Fund (BCCRF)* and have already allocated US$ 161.6 million. Bangladesh signed the agreement to set up BCCRF with the UK, Sweden, Denmark and the EU on May 2010 with the World Bank as the Trustee. The main objective of BCCRF is to implement BCCSAP by Government line agencies. The Governing Council of BCCRF has 17 members where the Minister of MoEF is the Chairperson and Secretary. A total of 10% of the BCCRF will be channeled for Civil Society Organizations (CSOs)/NGOs. The Palli Karma-Sahayak Foundation (PKSF) is the lead implementation agency to coordinate separate operating procedures for grants for the NGOs. Under BCCRF a total US$ 161.60 million is available currently and 14 large-scale government projects are being funded.

Various other initiatives are ongoing in the water resources and health sectors. Construction and rehabilitation of embankments and cyclone shelters in the coastal regions (regarded as the most vulnerable area) are noteworthy initiatives undertaken by the government for protection against storm surges and salinity ingression. It includes coastal embankments projects, involving over 6,000 km of embankments and polder schemes, designed to raise agricultural productivity in coastal areas by preventing tidal flooding and incursion of saline water. The Emergency Cyclone Recovery and Restoration Project of the government launched in 2007 has so far improved 456 cyclone shelters, built 230 new ones and is going to build another 2,700 new multipurpose cyclone shelters in the next 10 years in the coastal belt. Massive plantation has been carried out which also involved social afforestation and rehabilitation of degraded forests as well as coastal 'green belt" projects, involving mangrove planting along nearly 9,000 km of the Bay of Bengal shoreline.

Some major baseline projects focusing on the fisheries and aquaculture sector would include the following. Though some of the base line projects (base line investments) have phased out or nearing completion, the results are still within the community. This LDCF project would upscale those baseline activities. Part of these baseline activities account for the in-kind co-financing support, through alignment of geographical coverage, complementarities/ realignment of activities and mutual contribution of outputs towards climate resilient inland capture fisheries and aquaculture.

DoF - Department of Fisheries - (GoB)

Title:	**1. Aquaculture and Fisheries Management Project in Haor Areas**	
Objectives	• Increase production and protect natural biodiversity in the selected water bodies/ fisheries through establishment of beel nurseries, fish sanctuaries, fingerling stocking, and improving natural habitat	**Remarks** relates to Comp. 3 of this LDCF project
	• Poverty reduction of fishers and fish farmers through technology dissemination and employment generation	relates to Comp. 3 of this LDCF project
	• Development of knowledge and skills of DoF, selected NGO employees and CBO members involved in the project;	relates to Comp. 2 of this LDCF project
	• Capacity building of DoF technical personnel for managing ICF resources along with CBO members and other stakeholders	relates to Comp. 1 of this LDCF project
	• Development of sustainable community-based improved management framework for the selected water bodies/fisheries	relates to Comp. 1 of this LDCF project
Project area	48 Upazilas of Netrokona, Kishoreganj, Sunamganj, Moulvi Bazar, Hobiganj, Sylhet and Brahman Baria districts.	
Budget	US$ 4.77 million	

Duration	October 2010 – June 2016 (1st revised)

Title:	**2. Establishment of Beel Nursery and Fingerling Stocking in Inland Open Waters**	
Objectives	• Increase fish production from capture fisheries through beel nurseries	**Remarks** relates to Comp. 3 of this LDCF project
	• Develop fish stock in the open water bodies through stocking fish fingerlings	relates to Comp. 3 of this LDCF project
	• Improve socio-economic condition of the open water dependent poor fishers	relates to Comp. 2 and 3 of this LDCF project
	• Restore aquatic biodiversity through stocking endangered fish species	relates to Comp. 3 of this LDCF project
	• Creat awareness among the open water dependent people for sustainable management	relates to Comp. 2 and 3 of this LDCF project
Project area	All over the country (60 districts);	
Budget	US$ 15.28 million	
Duration	February 2014–June 2016	

DoF-WorldFish

Title:	**3. Feed the Future (FTF) Aquaculture project**	
Objectives	• Improved quality &/or genetically improved lines of tilapias, carps, prawns and shrimp seeds to aquaculture farmers for increasing fish yield up to 12-27% for ponds & ghers, promote culture of salt-tolerant commercial aquaculture species benefiting around 721,672 HHs in the southern area	**Remarks** relates to Comp. 1 and 2 of this LDCF project
	• Support public & private fish hatcheries to source quality brood stocks, establish management systems to maintain and develop quality lines, and to accelerate distribution of improved strains of fish and shrimps to farmers across the southern region	relates to Comp. 3 of this LDCF project
	• Deliver improved nutrition and incomes through aquaculture and horticulture to poor and vulnerable HHs through demonstrating improved aquaculture technologies, training and communication programmes. Nutrition education and promotion of Vitamin-A rich orange fleshed sweet potato cultivatiuon and production of indigenous nutrient-dense fish species	relates to Comp. 3 of this LDCF project
	• Facilitate collaboration with project partners to stimulate investment, employment and incomes	relates to Comp.4 of this LDCF project
Project area	South-western coastal districts: 100,000 shrimp and prawn farmers and 20,000 entrepreneurs in high value commercial fish culture	
Budget	US$ 5.0 million	
Duration	2011-2016	

DoF-DAE (Department of Agriculture Extension)-**WolrdFish**

Title:	**4. Aquatic Agricultural Systems (AAS)**

Objectives	• Enhance sustainable AAS productivity and thereby benefitting AAS dependent communities	**Remarks** relates to Comp. 3 of this LDCF project
	• Create improved and enable markets for small-holders AAS producers;	relates to Comp. 3 of this LDCF project
	• Strengthen resilience and adaptive capacity of vulnerable poor and marginalized communities;	relates to Comp. 3 of this LDCF project
	• Reduce gender disparities in access to and control over resources and decision making;	relates to Comp.3 of this LDCF project
	• Improve policy and institutional structure and processes to support pro-poor, gender equitable sustainable development	relates to Comp. 1 and 2 of this LDCF project
	• Create relationships, partnerships, and networks for knowledge sharing and sutained development outcomes	relates to Comp.4 of this LDCF project
Project area	US$ 9.77 million	
Budget	Greater Sylhet, greater Mymensingh, greater Khulna, greater Barisal, greater Noakhali and greater Comilla: Aquatic agricultural system-dependent people rather than fishers and aquaculture farmers	
Duration	2012-2016.	

WorldFish-USAID (United States Agency for International Development)

Title:	**5. Enhanced Coastal Fisheries (EcoFish) Project**	
Objectives	• Improved resilience (IR) and governance of estuarine ecosystem and livelihoods of communities reliant on the Hilsa fishery" of the Ganges/Meghna Rivers in Bangladesh.	**Remarks** relates to Comp. 1 and 2 of this LDCF project
	• Improved science-based fisheries management decision making	relates to Comp. 1 and 2 of this LDCF project
	• Strengthened fisheries adaptive co-management	relates to Comp. 2 of this LDCF project
	• Enhanced socio-ecological and economic resilience of target communities;	relates to Comp. 3 of this LDCF project
Project area	Hilsa fishery of the Ganges/Meghna Rivers in Bangladesh (Munshiganj, Chandpur, Shariatpur, Bhola, Barishal, Chittagong, and Cox's Bazar).	
Budget	US$ 15.0 million	
Duration	01 July 2014 - 30 June 2019.	

IFAD (International Fund for Agricultural Development), Bangladesh

In addition, the International Fund for Agricultural Development (IFAD) financed the Sunamganj Community Based Resource Management Project (SCBRMP), and the Haor Infrastructure and Livelihood Improvement Project (HILIP)[24]. The supplementary Climate

[24] HILIP (Haor Infrastructure and Livelihood Improvement Project) 2011. Enabling poor people to adapt to climate change. Report No.: 2263-BD. IFAD, Dhaka, Bangladesh. 45 p.

Adaptation and Livelihood Protection (CALIP)[25] project provided the opportunity for scaling up of some key components such as, construction/ renovation of village roads; block building technology for submersible roads construction (more durable and cost-effective), and strengthening and expanding community management of water bodies, found to have significant impact on fish production and increasing incomes of poor fishing households in the haor basin. HILIP was designed for scaling-up a number of successful innovations piloted under IFAD's Sunamganj Community Resource Management Project (SCBRMP) during 2003-2014. CALIP is a supplementary project integrated with IFAD's HILIP launched in 2012. CALIP is thus financed from IFAD's newly established Adaptation for Smallholder Agriculture Programme (ASAP) grant of US$ 15.0 million and the combined total financing of HILIP and CALIP amounts to US$133.0 million. Several of the SCBRMP innovations are being scaled up by HILIP, and those that have proven to be useful climate change adaptation responses will be scaled up by CALIP.

Those projects also expanded its positive experience of building rural markets which have proved very successful as part of the Market Infrastructure Development Project in the Char land Regions (MIDPCR) of Bangladesh.

Title:	**6. Haor Infrastructure and Livelihood Improvement Project (HILIP) & Climate Adaptation and Livelihood Protection (CALIP) Project**	
Objectives	Communication Infrastructure (Focus on submersible Union and Upazila roads, culverts, bridges and boat landings)	**Remarks** relates to no Comp. of this LDCF project
	Community infrastructure that includes village protection works(Focus on village roads, markets and protection against wave action); US$ 8.6 million	relates to Comp. 1 and 2 of this LDCF project
	Community resource management (Focus on strengthening existing Beel User Groups - BUGs, creation of 200 new BUGs, improved management and excavation of beels to increase productivity	relates to Comp. 3 of this LDCF project
	Livelihoods protection (Focus on protecting existing livelihoods such as rice and other crops, horticulture and livestock using a value chain approach);	relates to Comp. 3 of this LDCF project
	Capacity and knowledge for building resilience (Addition of this Component through CALIP significantly strengthens HILIP;	relates to Comp. 2 of this LDCF project
	Project management	relates to Comp. 4 of this LDCF project
Project area	4 Upazilas in Netrakona (Khaliajuri, Kolmakanda, Modon, Mohanganj), 4 Upazilas in Kishoreganj (Itna, Mithamoin, Astagram, Nikli), 6 Upazilas in Brahmanbaria (Nasirnagar, Nabiganj, Sarail, Ashuganj, Brahmanbaria Sadar, Bancharampur), 3 Upazilas in Habiganj (Azmiriganj, Lakhai, Baniachong) and 11 Upazilas in Sunamganj (Sunamganj Sadar, Dakshin Sunamganj, Bishwambarpur, Tahirpur, Jamalganj, Dherai, Sulla, Dowarabazar, Dharmapasha, Chhatak, Jagannathpur); Poor communities of NE haor area	
Budget	After inclusion of CALIP in HILIP, the total project cost stands at US$ 133.0 million	
Duration	2014–2020	

[25] CALIP 2013. Climate Adaptation and Livelihood Protection (CALIP): Scaling Up Best Practice and Testing New Adaptation Interventions in the Haor Infrastructure and Livelihood Improvement Project (HILIP). Design completion Report, 22 February 2013. IFAD, Dhaka, Bangladesh. 41 p.

Title:	**7. Enhancing aquaculture production for food security and rural development through better seed and feed production and management with special focus on public-private partnership**	
Objectives	• Improved brood banking pilot project for major and Chinese carps in 7 selected Govt. fish hatcheries	**Remarks** relates to Comp.3 of this LDCF project
	• Pilot-scale selective breeding programme involving cooperative arrangement among 7 Govt. fish hatcheries and 6 private hatcheries	relates to Comp. 3 of this LDCF project
	• Comprehensive long-term implementation plan of selective breeding programme of major carps, Chinese carps, Nile tilapia and Thai pangas	relates to Comp. 3 of this LDCF project
	• Capacity of private hatchery for breeding, hatchery management and operation is upgraded through upgradation of hatchery facility, better hatchery management practices, process of certification for hatchery operations and 90 Hatchery Technicians (Govt. & Private) trained-------- relates Comp. 2,3 LDCF project	relates to Comp. 2 and 3 of this LDCF project
	• Set of implementing guidelines for Fish Hatchery Act developed and a provision made	relates to Comp. 1 of this LDCF project
	• Set of Technical implementing guidelines for Fish & Animal Feed Act and a provision made	relates to Comp. 1 of this LDCF project
	• Formation of National Network of Fish Seed Producers; Formation of National Association of small- and medium-scale feed producers; Capacity of small- and medium-scale feed producers improved	Relates to no Comp. of this LDCF project
	• A pilot-scale feed quality analytical lab. Established & feasibility of country-wide feed quality analytical service; Inventory of all feed additives being used, their efficacy studied and disseminated	
	• Proposal for credit facility for small-scale farmers, hatchery operators and small- and medium-scale feed producers	
Project area	60 districts of Bangladesh	
Budget	US$ 0.45 million	
Duration	November 2014 – October 2016	

1.3.2 Additional Cost Reasoning (added value of the LDCF financing) and Contribution from the Baseline

Increasing fisheries production output especially from aquaculture sector is expected through technological innovations and improved management practices in fish seed production, grow out technologies, use of extension tools and availability of information and fish farming inputs through a number of the mentioned baseline projects. The proposed LDCF Project will build on the identified baseline and address the gaps using a coherent approach to CC adaptation as follows:

Component 1: Climate resilient fisheries sector and relevant national capacity development

Baseline: A number of baseline initiatives aer attempting to support the strengthening of fisheries institutions on climate change aspects; however only a few of them are relevant as a baseline to adaptation in the fisheries and aquaculture sector: The multi-donor supported UNDP *Comprehensive Disaster Management Programme, CDMP* (CDMP I and II) (2005-2014)[26] have included strengthening the technical and institutional capacities of national and local government for effective disaster risk reduction and climate change adaptation. Some of the stakeholders have received training on: i. the effects of climate change; ii. management and relief of climate-related disasters; and iii. climate resilient crops for adaptation. The CDMP-II (Fisheries Component), has established Climate Change Cell (CCC) at DoF. Although this is a very important effort, the CCC at the DoF may not be sustained unless relevant capacity is built and charter of duties are allocated through the National fisheries policy and strategy which is now lacking in the current policy directives. However, government staff has not received training on EbA. As a result, these authorities have limited knowledge on: i. the costs and benefits of EbA; ii. best practice for this approach; and iii. how to tailor EbA for particular ecosystems.

The *Feed the Future Aquaculture Project* implemented by DoF has a component that focuses on policy and regulatory reforms and institutional capacity building within public and private sectors to help improving the capacity of government, private sector associations and business, and assist both public and private bodies to be more actively engaged in managing production systems and the project itself including support for improvements in the collection of fisheries statistics.

This project will work with AIN (Agriculture for Income and Nutrition) which has, together with its partners, the Bangladesh Shrimp and Fish Foundation, collected spatially resolved datasets on pond distribution in four entire Unions. Salinity intrusion is threatening the food production in all these areas and generating conflict. The idea would be to use these data to identify and ameliorate flashpoints and explore the potential impacts of changing climate on food production and vulnerability[27].

FAO supports the project *Improving Food Safety in Bangladesh* through policy and regulatory reform in the agriculture and fishery sector coupled with capacity building for monitoring compliance and enforcement. FAO also supports activities that will strengthen the enabling environment for establishment of Public-Private Partenrships (PPPs) in the aquaculture sub-sector. However, climate change scenarios and factors that enhance resilience of the sector are not explicitly addressed in these initiatives. This is especially relevant in the case of food safety, since higher temperatures, increased floods etc. can increase food safety risks.

With LDCF funding, DoF will build its capacity to address climate change risks to fisheries and aquaculture production systems. The key aspect of capacity building will include training and engagement of DoF central and field staffs in climate change impact assessment on fisheries and aquaculture. Under the proposed project, DoF will carry out a national level assessment of climate change-induced risks to fisheries and aquaculture sub-sectors and opt for revision of the existing policies and strategies with focus on the country's climate sensitive areas jointly with relevant competent agencies. A monitoring system that will be established under Component 4 will ensure that information on risks and climate-sensitive areas is continuously updated.

[26] This project is funded by the Department for International Development – DFID, UK; European Union (EU), Norwegian Agency for Development Cooperation (NORAD), Australian Agency for International Development (AusAID), Swedish International Development Cooperation Agency (SIDA), the United Nations Development Programme (UNDP) and the Government of Bangladesh.

[27] Drs. Parvesh and Andy Nelson of IRRI have built an entire model for this area.

Total baseline co-financing in Component 1 would be around USD 2.45 million. See Table 5 below and Appendix-3,Results Based Budget.

Component 2: Strengthening knowledge and awareness of fisheries/aquaculture dependent communities facing the adverse impacts of climate change

Baseline: The baseline for this component includes a number of community-based projects in the Southwest coastal areas and in the Northeast *Haor* basin that intend to introduce sustainable and responsible fisheries and aquaculture management practices. These include: the DoF supported *Aquaculture and Fisheries Management Project in the Haor Area*, the *establishment of beel nursery and fingerling stocking project in inland open waters*, the *Wetland Biodiversity Rehabilitiation Project, the Feed the Future project* and the *Aquatic Agricultural Systems (AAS)* project; and the DoE project on *Community-based Adaptation to Climate Change in Ecologically Critical Areas*, Other initiatives include the MoEF project on *Community-based sustainable management of Tanguar haor programme* and the WorldFish supported *Enhanced Coastal Fisheries (EcoFish^{BD}) Project;* IFAD's *Haor infrastructure and livelihood improvement project (HILIP) and Climate Adaptation and livelihood protection project (CALIP).* Several FAO projects also contribute to the baseline including the *Building trade capacity of small-scale shrimp and prawn farmers in Bangladesh: Investing in the bottom of the pyramid approach, Providing recovery assistance to waterlogged people of south-west Bangladesh, Improving food safety in Bangladesh,* and *Enhancing aquaculture production for food security and rural development through better seed and feed production and management with special focus on public-private partnership* (Table 5). Many of these initiatives include activities on raising awareness of local communities, on the effects of climate change. In addition, Community-based Adaptation (CbA) has been promoted amongst these communities by previous and current projects. However, they lack focus on assessment of community risks and vulnerabilities to climate change and relevant capacity building of aquaculture and inland fisheries dependent communities. Besides, EbA has not been promoted as one of these options. As a result, there is limited understanding among local communities on the benefits of this approach including alternative livelihoods from functional ecosystems. Moreover, these communities have not received formal training on planning and implementing resilient adaptation options. Consequently, there is limited opportunity for local communities to maximize the benefits of ecosystem restoration to increase their adaptive capacity to the adverse impacts of CC.

With LDCF funding, the Project will strongly promote comprehensive risk and vulnerability assessment of local communities, and strengthen knowledge on climate resilient fisheries and aquaculture. It will enhance awareness about climate change impacts both at local and national level through targeted training of fishermen, fish farmers and consumers with strong consideration of gender apects of livelihood options. It will ensure that disaster risk management is institutionalized in local development plans and programmes, thus improving climate change resilience. This Component will also foster local capacity through the implementation of simple local environmental monitoring systems also connected to early warnings and to improve decision making by fishermen and fish farmers.

Total baseline co-financing in Component 2 would be around USD 5.1 million. See Table 5 below and Appendix-3, Results Based Budget.

Component 3: Enhancing local adaptive capacity to support climate resilient fisheries and aquaculture management and alternative livelihoods in the face of climate change

Baseline: Projects under Component 2 with field activities will also contribute baseline funding to this component, although they lack focus on climate change impacts on fisheries and aquaculture. Major baseline funding will also be provided by the *Community Based Sustainable Management of Tanguar Haor Programme* by MoEF through IUCN. Although this initiative does not have a CC explicit component, it provides good baseline support in terms of technical capacity building on improved management of some fishery resources, this being an essential basis for CC adaptation. Baseline funding to the Haor area will also be provided by the IFAD funded initiatives on *Haor Infrastructure and livelihood improvement project (HILIP)* and *Climate Adaptation and livelihood Protection (CALIP)* project.

FAO will provide substantial baseline funding the aquaculture in the Southwest through the projects on i. *Building Trade Capacity of Small-scale Shrimp and Prawn Farmers in Bangladesh: Investing in the Bottom Pyramid Approach,* ii. *Integrated Agriculture Interventions for Improved Food and Nutrition Security in Selected Districts in Southern Bangladesh,* iii. *Providing Recovery Assistance to Waterlogged People in South-West Bangladesh,* iv. *Improving Food Safety in Bangladesh* and v. *Enhancing Aquaculture Production for Food Security and Rural Development through better Seed and Feed Production and Management with special focus on Public-Private Partnerships.* Although development and application of technologies for CC resilient fisheries and aquaculture management at the field level are considered in all these projects there is no programmatic approach and coherence with national and local policies.

The aim of the Management of Aquatic Ecosystems through Community Husbandry (MACH) project (1998-2008), implemented by the GoB, supported by USAID was to establish community based co-management of three large wetland systems in Bangladesh. MACH benefited local communities by: i. increasing fish catches by an average of 140%; ii. increasing fish consumption by 45% with equal benefits to rich and poor households; iii. doubling the incomes of 5,200 households through the project‘s micro-credit program; iv. funding the Upazila Fisheries Committees; and v. creating a wildlife sanctuary in Hail Haor. The LDCF-financed project will build on experiences, lessons learned, impacts and the work done by the MACH project to integrate those in the NE and SW areas.

The *Community Based Adaptation in the Ecologically Critical Areas through Biodiversity Conservation and Social Protection* (CBA-ECA) Project (July 2010 to June 2014) implemented by the DoE had the overall objective of strengthening co-management model for ECAs. The project was implemented at three ECA sites of Teknaf Peninsula (Cox‘s Bazar), Sonadia Island and the Hakaluki haor. The specific objectives of the project were to strengthen: i. biodiversity conservation activities; ii. alternative livelihoods activities; iii) institutional mechanisms, and iv. introduce climate change adaptation measures in the area. This LDCF-financed project will promote biodiversity management by training stakeholders – including local communities, and user groups – on adapting community livelihoods to climate change by using specific resilient techniques for restoring degraded wetlands in both the hot spots.

The DoE supported *Community-based Adaptation to Climate Change in Ecologically Critical Areas* mentioned above would act as a baseline project under Component 2 but would also provide baseline support under this component in terms of improved fisheries management and adequate use implementation of fisheries sanctuary areas. The DoF supported *Aquaculture and fisheries Management project in haor areas, Establishment of beel nursery and fingerling stocking in inland open waters, Wetland biodiversity rehabilitation project (WBRP), Feed the future (FTF) aquaculture project* and the *Aquatic Agricultural Systems (AAS)* program has several experimental sites that cross cut with the proposed Project. One of the focuses of this research programme is strengthening resilience and adaptive capacity of

vulnerable poor and marginalized communities and will incorporate lessons an innovative CC adaptation piloting entitled "smart farm" project now being implemented in four south-western coastal districts of Bangladesh. However, this project has emphasized more on the agricultural systems rather on the well-being of fishing communities and coastal aquaculture-dependent households.

The LDCF financed project is well aligned with the **i.** *Community based management of Tanguar haor program* (CBMTHP) (2005-15) funded by the Swiss Agency for Development and Cooperation (SDC) and implemented by International Union for Conservation of Nature (IUCN) on behalf of the MoEF and **ii.** *Wetland biodiversity rehabilitation project* (WBRP) of DoF funded by the GiZ. The major goal of the CBMTHP and the WBRP is aimed at strengthening technical and institutional capacity to manage natural resources. The LDCF-financed project will consult with the CBMTHP and the WBRP projects to build on experiences and lessons learned from work being done in other large wetlands in Bangladesh. In particular, the LDCF-financed project will apply lessons learned in the restoration of wetlands in the two reagions.

With LDCF funding, the Project will fill the gap in the area of climate resilient fisheries and aquaculture technologies and approaches at local pilot level and will support development and application to ensure that such technologies are widely available. It will also support innovative community-based dissemination systems and promote innovative environmental monitoring and information tools to ensure wider adoption and scaling up to new communities of best management pracices for climate resilient and gender sensitive fishing and aquaculture in climate sensitive areas in Bangladesh.

Total baseline co-financing in Component 3 would be around USD 8.0 million. See Table 5 below and Appendix-3, Results Based Budget.

Component 4: ***Dissemination of best practices and lessons learned, monitoring and evaluation***

Baseline: DoF has accumulated considerable capacity in adaptive, results-based management of projects, including monitoring and evaluation. The notable ones are *Feed the future (FTF) aquaculture project* and the *Aquatic Agricultural System (AAS) project*. Besides, FAO supported *Providing recovery assistance to waterlogged people of south-west Bangladesh* and *Enhancing aquaculture production for food security and rural development through better seed and feed production and management with special focus on public-private partnership* provide best lesson learned which need to be upscaled. Nevertheless, capacity is still weak to capture lessons learned and to disseminate best practices, especially related to adaptation in the fisheries and aquaculture sector that has so far received limited support to adapt to CC.

With LDCFfunding, the Project will capture and disseminate lessons learned from the use of different CC resilient fisheries, aquaculture, and livelihood technologies by putting in place a robust project monitoring and evaluation system hosted and maintained by DoF.

Total baseline co-financing in Component 4 would be around USD 0.80 million. See Table 5 below and Appendix-3, Results Based Budget.

Table 5: Component-wise baseline co-financing (in million US $) to LDCF project.

Organization and Name of the Project	**Component-wise base line co-financing to LDCF project** ***Community-based Climate Resilient Fisheries & Aquaculture Development in Bangladesh*** **(GCP/BGD/055/LDF) (Million US $)**	**Total (Million US $)**

	Component 1: *Climate resilient fisheries sector through relevant national capacity development*	**Component 2:** *Strengthening knowledge and awareness of fisheries/ aquaculture dependent communities facing the adverse impacts of climate change*	**Component 3:** *Enhancing local adaptive capacity to support climate resilient fisheries & aquaculture management & alternative livelihoods in the face of climate change*	**Component 4:** *Dissemination of best practices and lessons learned, monitoring and evaluation*	
DoF-GoB: Aquaculture and fisheries Management project in haor areas	0.25	0.50	0.50	0.00	1.25
DoF-GoB: Establishment of beel nursery and fingerling stocking in inland open waters	0.00	0.25	0.50	0.00	0.75
DoF-GiZ: Wetland biodiversity rehabilitation project (WBRP)	0.00	0.50	0.50	0.00	1.00
DoF-WF: Feed the future (FTF) aquaculture project	0.25	0.50	0.50	0.30	1.55
DoF-DAE-WF: Aquatic Agricultural System (AAS)	0.25	0.50	0.50	0.30	1.55
***DoF Sub-total* =**	**0.75**	**2.25**	**2.50**	**0.60**	**6.10**
DoE: Community-based adaptation in Ecologically Critical Areas (CBA-ECAs) through biodiversity conservation and social protection	0.00	0.10	0.15	0.00	0.25
***DoE Sub-total* =**	**0.00**	**0.10**	**0.15**	**0.00**	**0.25**
MoEF-IUCN: Community-based sustainable management of Tanguar haor programme	0.30	0.30	0.70	0.00	1.30
***MoEF Sub-total*=**	**0.30**	**0.30**	**0.70**	**0.00**	**1.30**
WF: Enhanced coastal fisheries (EcoFish) project	1.00	1.00	0.00	0.00	2.00
***WF Sub-total* =**	**1.00**	**1.00**	**0.00**	**0.00**	**2.00**
IFAD: Haor infrastructure and livelihood improvement project (HILIP) and Climate Adaptation and livelihood protection project (CALIP)	0.00	0.50	2.00	0.00	2.50
***IFAD Sub-total*=**	**0.00**	**0.50**	**2.00**	**0.00**	**2.50**
FAO: Building trade capacity of small-scale shrimp and prawn farmers in Bangladesh: Investing in the bottom of the pyramid approach (MTF/BGD/046/STF)	0.00	0.10	0.40	0.00	0.50

(STDF/PG/321)					
FAO: Integrated agriculture interventions for improved food and nutrition security in selected districts of southern Bangladesh (GCP/BGD/049/USA)	0.00	0.00	1.00	0.00	1.00
FAO: Providing recovery assistance to waterlogged people of south-west Bangladesh (OSRO/ BGD/ 402/ WFP)	0.00	0.05	0.05	0.10	0.20
FAO: Improving food safety in Bangladesh (GCP/BGD/047/NET)	0.30	0.70	1.00	0.00	2.00
FAO: Enhancing aquaculture production for food security and rural development through better seed and feed production and management with special focus on public-private partnership	0.10	0.10	0.20	0.10	0.50
FAO Sub-total=	***0.40***	***0.95***	***2.65***	***0.20***	***4.20***
Total=	**2.45**	**5.10**	**8.00**	**0.80**	**16.35**

1.3.3 Lessons learned from past and ongoing efforts, including evaluations

Key inputs derived from FAO's experience from similar projects incorporated into project design include the following:

i. The project should include a broad and diverse number of stakeholders with representatives of line ministries, the private sector and civil society at national and local level as appropriate;
ii. Flexibility should be integrated into project implementation to allow for changing conditions that may occur between the design phase and actual implementation;
iii. CC adaptation projects in the fisheries and aquaculture sector (and any project supporting aquatic resources conservation and management) should adopt a holistic ecosystem based approach to fisheries and address the associated economic regulatory issues at the design and implementation stage;
iv. A phased approach to the testing and upscaling of new technologies is required (e.g., on aquaculture technology) to inform the formulation of relevant legislation. Nevertheless, the policy dimension should be initiated at an early stage of project implementation;
v. Overly ambitious project design should be avoided and assumptions critically verified;
vi. The use of business models for sustained action beyond the project cycle; and
vii. Participatory design of an agreement on specific M&E plan elements and indicators is advisable.

1.4 FAO's COMPARATIVE ADVANTAGE

FAO, with 194 Member Nations, two associate members and one member organization, the European Union, is the United Nations Specialized Agency with competency in all areas of fisheries and aquaculture. FAO has led global work on implementing the FAO Code of Conduct for Responsible Fisheries, an ecosystem approach to fisheries and aquaculture and has produced codes of practices and standards related to product safety and responsible trade, including guidelines for the ecolabelling of fish and fishery products. FAO is currently engaged in developing Voluntary Guidelines on Securing Sustainable Small-Scale Fisheries through a global, participatory process.

FAO is contributing to bringing fisheries and aquaculture into the climate change discussions at national, regional and global level. This has included release of a Policy Brief on building adaptive capacity, a FAO Expert Workshop on Climate Change Implications for Fisheries and Aquaculture in 2008, and a global review of climate change implications for the sector in 2009. In 2009, FAO helped to form the Global Partnership for Climate, Fisheries and Aquaculture (PaCFA), a voluntary grouping of 23 international organizations and sector bodies sharing a common concern for climate change interaction with global waters and living resources and their social and economic consequences. With FAO support, the PaCFA has been raising awareness of issues relating to oceans, fisheries and aquaculture within the United Nations Framework Convention on Climate Change (UNFCCC) processes. FAO is currently engaged in a number of projects and activities around the world towards strengthening adaptation and mitigation of climate change in fisheries and aquaculture including through the project "Climate Change, Fisheries and Aquaculture: Understanding the Consequences as a Basis for Planning and Implementing Suitable Responses and Adaptation Strategies funded by the Government of Japan, the EAF-Nansen Project funded by Norway. Furthermore, climate change is always an important consideration in planning and implementation of an ecosystem approach to fisheries and therefore enters into most of FAO's extensive normative and field-based programmes of work on EAF and also EAA.

With respect to staff capacity, FAO has an Office in Bangladesh with 43 staff including operations staff and the Country Emergency and Rehabilitation Coordination Unit, while there is 208 project staff working throughout the whole country. FAO Bangladesh is supported both technically and administratively by the Regional Office for Asia and the Pacific (FAORAP) located in Thailand and FAO Headquarters in Rome. There are fisheries specialists in these offices with solid knowledge on fisheries, aquaculture and climate change issues in Bangladesh. A multidisciplinary Project Task Force will be set up with a range of technical expertise available throughout FAO to support the project, including the regional and sub-regional office-based fisheries officers, operational and other technical staff as required, and also from the Fisheries and Aquaculture Department and other technical units, as needed.

1.5 LINKS TO NATIONAL DEVELOPMENT GOALS, STATEGIES, PLANS, POLICY AND LEGISLATION, GEF/LDCF/SCCF AND FAO'S STRATEGIC OBJECTIVES

1.5.1 Alignment to National Development Goals and Policies

Bangladesh is considered as one of the most vulnerable countries of the world to be affected by the adverse impacts of climate change and climate variability. Recognizing the fact, the

Government of Bangladesh has taken up various proactive measures to combat the impacts of climate change and increase resilience of its people, assets and resources. To this end, Bangladesh developed and submitted the NAPA in 2005 in compliance of the UNFCCC requirements for LDCs earlier than many other LDCs.

NAPA priority actions on aquaculture and fisheries suggests taking up urgent adaptation measures in the southwestern coastal zone and the deeply flooded *haor* basin in the northeast due to their exposure to multiple CC induced hazards. In the coastal areas, cyclones, salinity intrusion, erratic rainfall, sea level rise and flooding are the major climate-induced visible threats that affect aquaculture and fisheries systems, and the *haor* basin is affected by increasing events of early flash floods, pre/early monsoon drought, erratic rainfall, monsoon flooding, increased siltation of wetlands.

The ProDoc components and outcomes cross-cut with the *Capacity building and institutional strengthening* of Bangladesh Climate Change Strategy and Action Plan (BCCSAP), 2009 and concepts 13 and 14 and intervention no.4 of NAPA 2009 (update). The project components, outcomes and outputs are aligned directly with four out of a total of six themes of BCCSAP viz. food security, social protection and health (*Theme 1*), comprehensive disaster management (*Theme 2*), research and knowledge management (*Theme 4*) and capacity building and institutional strengthening (*Theme 6*). In addition to NAPA 2009s Concept nos. 13 and 14, components of this project also cross-cut with *NAPA 2009s* intervention no. 4 on *Climate change and adaptation information dissemination to vulnerable community for emergency preparedness measures and awareness raising on enhanced climatic disasters* and intervention no. 6 on *Mainstreaming adaptation to climate change into policies and programmes in different sectors.* Specifically, the project addresses NAPA concept 13: *Adaptation to fisheries in areas prone to enhanced flooding in the northeast and central region through adaptive and diversified fish culture practices*, and concept 14: *Promoting adaptation to coastal fisheries through culture of salt-tolerant fish species in the coastal areas of Bangladesh.*

The Bangladesh Country Investment Plan (CIP) endorsed in June 2010 as a living document emphasizes the development of sustainable responses to climate change impacts. The CIP comprises a "Country Investment Plan for Fisheries Resources Development (2010-2015)" that sets out three priority areas: i) improved management of inland and marine fisheries resources, ii) increased productivity for small-scale inland aquaculture and iii) coastal shrimp and freshwater prawn culture. The proposed project interventions cut across all these three CIP priorities of the national fisheries sector development plan. The proposed project is also in line with the CIP Progarmme-1 that focuses on "integrated research and extension to develop and propagate sustainable responses to climate change" that emphasizes "increased food productivity and increased resilience/adaptation to climate change including application of resilient farming systems". The sixth five-year plan (SFYP) of Bangladesh (2011-2015) recognized the impacts of climate change as a new threat to development and sets out some targeted activities to tackle climate change impacts. The SFYP explicitly mentioned that the benchmark experience in adaptation in the fisheries sector at country level is very limited, and targeted to conduct studies to generate relevant knowledge to launch climate smart fisheries sector development programmes.

Poverty reduction and food security is the major agenda of Government of Bangladesh. The activities of the proposed project commensurate with the strategic goal of the Step towards change: *National Strategy for Accelerated Poverty Reduction-II (NSAPR)* of the Government. In the NSAPR strategic goal-14 of the policy matrix-3, it is stated to *increase productivity of the inland aquaculture.* In the strategic goal-15 and -16 of the NSAPR policy

matrix-3, it is also stated to, *increase in inland capture fishery and raising income of the poor fishers.*

The LDCF-financed project is aligned with the main development strategies and rural development programmes of Bangladesh. *United Nations Development Assistance Framework* (UNDAF) for Bangladesh was updated for the period 2012–2016. The LDCF-financed project will promote outcomes under three pillars of the framework. In particular, the project is well aligned with Outcome 5.1.1 under Pillar 5 by 2016, populations vulnerable to climate change and natural disaster have become more resilient to adapt with the risk. It is also adequately aligned with the FAOs country Planning document. Strategies to achieve these results focus on: system strengthening and capacity development, while supporting community-based approaches, better coordination of UN programmes and those of other development partners to mainstream environmental issues.

The objective of GoB's *Sixth Five Year Plan* (2011–2015) is to accelerate economic growth and reduce poverty by developing relevant strategies, policies and institutions. In particular, this plan prioritizes adaptation to climate change for vulnerable communities and degraded ecosystems. The LDCF-financed project will support these priorities by strengthening Bangladesh's institutional and technical capacity to plan and implement CCA to fisheries sector, thereby providing ecosystems and local communities with a means of adapting to CC.

Bangladesh is striving to translate its policy of environmentally sustainable development into on-the-ground level actions through implementing national level plans and strategies of *NAPA, 2009;, National Biodiversity Strategy and Action Plan (NBSAP), 2004*; *Sixth Five Year Plan of the Government of Bangladesh (FY 2011-FY 2015)*; *National Sustainable Development Strategy 2011-2021.* All of these documents highlighted capacity development as a priority issue. This ProDoc, as well, highlighted capacity development as a priority issue.

Engagement of parliamentarians in various national and international negotiation forums (such as UNFCCC COPs) on climate change issues has been the indicator of political commitment of the Government of Bangladesh to tackle climate change impacts in a collective manner. In 2010, Government of Bangladesh established a Climate Change Unit (CCU) under the Ministry of Environment and Forests (MoEF) as an apex body to coordinate activities relevant to climate change adaptation and mitigation at the national level. Besides, the government is facilitating establishment of Climate Change Cell (CCC) in each of the Ministries for better coordination and internalization of climate change activities in intra and inter Ministries and Departments. The Disaster Management Bureau (DMB), Government of Bangladesh through its comprehensive disaster management programme (CDMP-II) is supporting the DoF to establish a CCC to facilitate climate compatible fisheries sector development programmes.

1.5.2 Alignment with FAO Strategic Framework and Objectives

The Project is fully in line with FAO's Strategic Objectives (SOs) that provide the overall direction, goals and targets for the organization until 2018: (1) Contribute to the eradication of hunger, food insecurity and malnutrition; (2) Increase and improve provision of goods and services from agriculture, forestry and fisheries in a sustainable manner; and (3) Reduce rural poverty. These overall SOs are reinforced by strong alignment with two of the Regional Strategic Priority Areas for the Asia-Pacific region: (3) Enhancing equitable, productive and sustainable natural resources management and utilization; and (5) Coping with the impact of climate change on agriculture and food and nutritional security.

In terms of alignment with the FAO Country Priority Areas for Bangladesh (2014-2018), the project responds to two priority areas: (1) Reduce poverty and enhance food security and nutrition (access and utilization); and (2) Enhance agricultural productivity through diversification/intensification, sustainable management of natural resources, use of quality inputs and mechanization. The Project targets two of the identified geographic priority areas, namely the *haor* basin and the coast. The cross-cutting objective of gender will also be addressed and all interventions will be tailored in such a way so that men and women benefit equally and inequality is not perpetuated.

1.5.3 Alignment with LDCF/GEF Focal Areas

Bangladesh is eligible to access funding from the LDCF as it has signed and ratified the United Nations Framework Convention on Climate Change (UNFCCC) in 1992 and 1994 respectively and met the compliance by submitting the NAPA in 2005. Bangladesh has benefited from previous funding from the LDCF in taking up the NAPA follow-up projects on "Community-based Adaptation to Climate Change through Coastal Afforestation" "Integrating Community-based Adaptation in to Afforestation and Reforestation Programmes" now being implemented in four coastal districts of Bangladesh by the Forest Department, with technical support from UNDP. The proposed project is consistent with the decisions of the Conference of Parties (CoP-9) to implement the priority interventions from the Bangladesh NAPA and thus meet the criteria as outlined in UNFCCC Decision 7/CP.7 and GEF/C.28/18.

The Project is formulated in alignment with the "Revised Programming Strategy on Adaptation to Climate Change for the Least Developed Countries Fund (LDCF) and the Special Climate Change Fund (SCCF)" October 2010 (GEF/LDCF.SCCF.9/4/Rev.1). This concept corresponds to the results-based management focal area framework objectives 1 - CCA Objective 1: *Reduce vulnerability to the adverse impacts of climate change, including variability, at local, national, regional and global level,* CCA Objective 2: *Increase adaptive capacity to respond to the impacts of climate change, including variability, at local, national, regional and global level* and to CCA Objective 3: *Promote transfer and adoption of adaptation technology* (Appendix-4, Adaptation risks screening matrix).

The proposed Project intends for the first time in Bangladesh to build adaptive capacity of the vulnerable fishing and coastal aquaculture-dependent communities that are already being affected by the adverse impacts of climate change. In the absence of any DoF-led national fisheries adaptation program this proposed project is expected to generate relevant knowledge and information that would form the basis for replication in other areas of Bangladesh and in other countries having similar situations. The LDCF resources sought through this project will address the climate change related threats to coastal fishing and aquaculture communities and enhance their adaptive capacity.

Bangladesh is party to the UNFCCC and the Kyoto Protocol. Accordingly, the LDCF financed project is aligned with the guidance and eligibility criteria defined in those documents, and few are summarized below:

All activities of the LDCF-financed project are of *participatory nature* and use *learning-by-doing approach.* Theywill address *Priorities identified in the NAPA,* using a multi-sectoral approach (lessons learned by other projects have been considered) on adaptation through ecosystem restoration and is relevant to a wide range of sectors including water, agriculture, fisheries and ecosystem conservation. The project will build as well on the activities of the identified baseline projects, increasing their capacity to achieve their objectives under conditions of climate change through a *Complementary approach.*

Climate-resilient fisheries and aquaculture adaptations will be piloted with a focus on including female-headed households. To ensure that the progress of *gender mainstreaming* can be monitored throughout the project, *gender disaggregated targets* will be developed and used to monitor indictors. Targets for involving women are included in the Results Framework of the project (see Appendix-1). As such, female representation will be encouraged in: i. training sessions and workshops; and ii. activities for climate-resilient fisheries and aquaculture adaptations demonstrations. To ensure that the progress of gender mainstreaming can be monitored throughout the project, gender disaggregated targets will be developed and used to monitor indictors. *Gender sensitivity* will be incorporated into training topics so that: i. female participants are empowered to participate meaningfully in the trainings; and ii. all participants are made aware of their responsibility to respect the views of all of their colleagues during training workshops. The project follows all the eligibility criteria as set out in the LDCF/SCCF operational guidelines.

2. PROJECT FRAMEWORK AND EXPECTED RESULTS

2.1 PROJECT STRATEGY (OBJECTIVEs, OUTCOMES, OUTPUTS)

The strategy of the project is to build and enhance the adaptive capacity and resilience of vulnerable coastal communities and deeply flooded *haor* wetland communities in Bangladesh dependent on fisheries and aquaculture for their livelihoods, so as to reduce their vulnerability and improve their resilience. The ecosystems and the communities in the hotspots in the south-western coastal area and north-east *haor* basin are highly exposed to climate change induced hazards and perturbations. The Project will take a three-pronged approach that builds the resilience of the fishery sector through capacity development and policy reform, and enhancement of local adaptive capacity through transfer and adoption of appropriate site-specific climate resilient fisheries and aquaculture technologies and approaches. These will be underpinned by a knowledge management component that will strengthen awareness and knowledge of local communities (e.g. use of ICT-based climate and disaster information services; enable national environments & institutional arrangements to address CC risks to fisheries and aquaculture production systems) ensuring wider dissemination of best practices and lessons learned.

The intervention of the LDCF-financed project will: i. increase the knowledge base of government stakeholders and local communities; and ii. improve and facilitate the dissemination of relevant information on climate change and adaptation. This will be achieved through four types of activities under Outputs of Components 1, 2, 3 and 4. Firstly, technical and institutional capacity of DoF officials and community will be developed/increased to face climate change risks and implications with appropriate policy support at national level. These would generate socio-economic benefits for the environment, community and the local economy [28]. Secondly, the knowledge base of the relevant government officials and communities on CC and benefits of EWS and coordination between government departments and institutions involved in ecosystem restoration and climate change adaptation will be improved. Thirdly, implementation of on-the ground climate resilient fisheries and aquaculture interventions and alternative, diversified livelihood options/approaches will be demonstrated. Fourthly, the knowledge base will be enhanced and the Climate Change Unit in the DoF to collect and share information (availability, accessibility and dissemination) on fisheries and aquaculture related CC risks and EWS will be strengthened.

[28] Rao *et al.* 2013. An economic analysis of ecosystem-based adaptation and engineering opt ions for climate change adaptation in Lami Town, Republic of the Fiji Islands. A technical report by the Secretariat of the Pacific Regional Environment Programme. Apia, Samoa.

Component 1: **Climate resilient fisheries sector through relevant national capacity development** (LDCF: USD 1 000 000; Appendix-3, please also see Budget notes sheet in Results Based Budget Excel file; co-financing: USD 2 450 000)

National Fisheries Strategy 2006 was formulated in January 2006 forecasting the ways in which the *National Fisheries Policy 1998* can be implemented and support can be offered to guide the sector. Unfortunately, fisheries acts, rules, policies and strategies lacks focus on CC issues, adaptation to climate change using ecosystem based approaches (EbA) and proper indications how to address emerging climate change implications and directives on how to make the sector climate resilient to sustain the production systems and livelihoods of the fisheries and aquaculture dependent communities. Therefore, this approach is not integrated neither into development planning nor management of relevant sectors including *inter alia* environment, water, forestry, conservation and tourism. However, the National Aquaculture Strategy and Action Plan has been developed and endorsed by the MoFL in September 2013.

As per the *National Fisheries Policy 1998*, in the current mandate of the DoF, there is less activity on monitoring and analysis of climate variables, trends, annual variability and impact on specific fisheries production systems (both capture and culture fisheries), which limits the DoF to develop climate compatible programmes and actions. An effective national response to climate change requires coordination among different line ministries and departments.

Present planning system of the DoF does not reflect entirely field-based participatory planning with the participation of the fishery dependent communities and stakeholders. At present, lines of planning, implementation and monitoring sections of the fishery sector and its dependent communities lack proper understanding and capacity to adopt climate resilient and climate smart fisheries programmes. Current 'business as usual' scenario of the fishery sector focuses on increasing aquaculture production, achieved through various production enhancement technologies and options. However, this will not be sustained in the long run under the climate change influences unless a comprehensive fisheries and aquaculture adaptation programme with clear incorporation of CC issues in fisheries policies, strategies and action plans are developed and made operational.

It is thus urgent to develop capacities of DoF and other relevant government agencies and the private sector to integrate climate resilience into their policies, development plans and processes.

Outcome 1: *Improved relevant national policies and strategies to facilitate climate resilient fisheries sector and development at all levels*.

This *LDCF project* funding would further build the capacity of the DoF and take forward the works so far done by the CDMP II (Fisheries component) to address climate change risks to fisheries and aquaculture production systems.

The revision of the policies, strategies and plans will strengthen the institutional capacity of government to coordinate and implement resilient adaptation approach. Without LDCF funding, community-based climate resilient adaptation will remain a term that is not well understood among the general public including policy and decision-makers and the relevant communities. In addition, these stakeholders will not be aware of the full range of benefits that result from CCA. Importantly, there will be limited capacity among relevant stakeholders to implement and integrate CCA into planning at local and national scale.

Activities under Component 1 will leverage the DoF's present effort to review and analyze current fisheries and other relevant national development policies and strategies, and identify gaps. It will be possible to suggest improvements incorporating lessons learned from projects that cater to climate resilient fisheries development at national level, and assess climate induced risks and vulnerabilities of fisheries and aquaculture with focus on climate sensitive hotspots identified in the vulnerability assessment (Appendix-4 and Appendix-7). Development of climate smart fisheries strategies and policies will create opportunities for mainstreaming gender considerations, such as maintaining equal access to information and knowledge, empowerment of women and work load balance. A capacity building strategy for DoF and other related GoB agencies/stakeholders will be developed with specified roles, responsibilities and budgets. This will make the core DoF team more skilled in developing strategies and policy briefings and hold high level policy dialogue in developing climate resilient fisheries sector policy and in bargaining for allocation of budgetary provisions to climate smart fisheries sector planning. The assessment outcomes will also leverage activities under Component 3. The outcome will be delivered through the following outputs:

Output: 1.1: *Climate induced risks and vulnerability of fisheries and aquaculture sub-sectors at national level assessed with special focus on gender and climate sensitive areas.*

Livelihoods of rural communities and farmers face *risks* associated with climate variability and climate change. Climate induced risks and vulnerability with special focus on gender, and knowledge gaps of fisheries, aquaculture sub-sectors at national level will be identified. These will be categorized and assessed together with the participation of relevant stakeholders and knowledge partners, such as IUCN, CEGIS that have wide experience of doing such assessment and DoF field officials at project sites of the NE and the SW. *Risk identification* and *assessment* will incorporate identification and assessment of current (climate variability) and future (climate change) risks and associated societal vulnerabilities building on the preliminary vulnerability assessment conducted in the PPG (project preparation grant) phase (Appendix-7).

Children, young adolescent girls and elderly women are the most vulnerable to climate change impacts. Some of the factors that influence the higher vulnerability of women to disasters include lack of means and assets to ensure their own safety. Special attention would be focused on identifying women's perception, what are the risks they are facing, their adaptive capacity or capacity to mitigate climate change impacts. This would also partially fulfill the expected outputs as described in Output 2.1.

A climate risk assessment (CRA) activity will be carried out in both hotspots (SW coastal brackish water shrimp farming area and NE *haor* basin). The process of CRA will adopt a participatory approach and generate a climate risk reduction action plan:

- **Broader risks and vulnerability assessment of the entire SW coastal area and entire NE haor area.** Detailed and comprehensive climate change risks and vulnerability of fisheries and aquaculture in the entire SW coastal districts and NE haor districts will be assessed with collaboration of WorldFish or IUCN or CEGIS and involvement of DoFs field level and CDMP II experienced personnel to confirm fisheries climate change sensitive areas. Special focus will be given on the climate induced risks and vulnerability to women folk (*gender sensitivity*). Separate climate risks map would be produced for the entire SW coastal and NE haor basin targeting water and soil salinity and climate-anthropogenic hazards, which may help resolving conflicts of fisheries and other sectoral interests. This assessment report with a short summary in native Bangla language will be in hard copy for distribution and circulation to Government, Non-Government

Organizations, private agencies and communities. While soft copy will be uploaded in the project web portal.

The objective of the assessment will be to evaluate the vulnerability of local fishers and fish farmers to the observed and predicted effects of climate change on their allied livelihood activities (fisheries and aquaculture), in particular: i. increasing annual precipitation and heavier, more erratic rainfall events; ii. increase in air temperature and decrease in annual precipitation; iii. increase in drought spell; iv. Increase of disease events; v. Water salinity ingression (into further inland) and water salinity increase (increased salt content); and vi. sea level rise.

A MoU/LoA will be signed between the PMTSU (FAO) and the relevant experienced organization/agency to conduct the detailed National vulnerability and disaster risks assessment with special focus on climate sensitive areas. This will include compilation of data and production of a comprehensive report on *National Climate Changed induced Fisheries and Aquaculture Vulnerability and Disaster Risks Assessment for the SW and the NE* (under output 1.1) with the development of an early warning system (EWS) under output 2.2. Selected stakeholder would elaborate the work plan, expertise for the assessment, methodologies to be followed and time-schedule in an inception workshop. Recommendations and comments of the inception workshop at the project launch would be incorporated for fine tuning of the assessment work. After completion of the Assessment a draft report would be submitted by the selected partner.

Verifiable indicators: (see Appendix-1, Results Framework)

- Confirmation of Fisheries CC sensitive areas.
- Risk and vulnerability assessment report with special focus on gender and the climate sensitive areas in SW coastal zone and NE *haor* basin (addressing large geographical area).

Output 1.2: *Relevant national policies and strategies reviewed, gaps analysed and revised by incorporating climate smart fisheries and aquaculture adaptation to CC needs.*

This output will build on work completed by other projects and organizations in Bangladesh. For example, the GEF-funded *Community based Adaptation to Climate Change through Coastal Afforestation in Bangladesh* project, GEF/LDCF funded *Integrating Community-Based Adaptation into Afforestation and Reforestation Programs in Bangladesh* project (both implemented by UNDP) and CDMP II project of DoF reviewed national policies, plans and strategies related to coastal development and fisheries respectively and integrated CC effects into these strategies. To develop policy briefs on proposed revisions of policies and strategies, the proposed LDCF-financed project will consider: i. lessons learned by those and other similar projects; ii. collate and review existing policies and plans and develop policy briefs on proposed revisions to policies and strategies including budget allocations to promote future replication and upscaling; iii. conduct technical training workshops with staff from national ministries to present the policy briefs; iv. develop technical guidelines to support the move from policy to implementation and will be supplemented by challenges and successes of implementing revised policies; and v. Develop a brief on lessons learned during the revision of policies and plans – including *inter alia* barriers to revisions – to inform future medium- and long-term adaptation planning for fisheries sector and CC adaptation in Bangladesh.

The *National Fisheries Policy 1998* and the related *Fisheries Acts* and *Strategies* will be reviewed and updated incorporating DRR and CCA issues to meet the present climatic and contextual demands. The following actions are envisioned;

i. Propose an updated institutional set up and financial arrangement mechanisms for further mainstreaming DRR and CCA in the fisheries sector and functioning of the already set up CCC/ Disaster Reduction Wing at the DoF;

ii. Create a mechanism in which DoFs CCC/Disaster Reduction Wing has access to updated national level information and data on assessment of climate change-induced risks to fisheries and aquaculture sub-sectors with focus on the country's climate sensitive SW coastal and NE haor areas;

iii. Further strengthen knowledge management, review *Fisheries DRR/CCA Plan of Action* prepared by the CDMP II for upscaling, mainstreaming and integrating it into DoF's activities,take forward capacity building and dissemination system of fisheries DRR and CCA within DoF for providing better services to all levels of stakeholders in the fisheries sector;

iv. Establish an Early Warning System (EWS), through increasing the knowledge base and by strengthening the CCC of the DoF to collect and share information through widened availability and accessibility on fisheries and aquaculture related CC risks and EWS;

v. Strengthen collaboration and coordination for effective training, extension services, innovation and updating existing proven adaptive measures for the fisheries sector with national and international development partners who are working in the areas of DRR and CCA;

vi. Update and enrich Training manual, dissemination/extension materials on climate change issues, adaptation and mitigation options for the fisheries and aquaculture sector;

vii. Capacity building training of fisheries officials. The key aspect of capacity building will include training and engagement of DoF central and field staff in climate change impact assessment on fisheries and aquaculture (Training of Trainers - ToTs, fishers, fish farmers, private entrepreneurs and community people);

viii. Strengthen disaster preparedness – early warning and activities during and immediately after disaster for the fisheries sector and support DoF to organize various events of CC awareness campaigns; and

ix. Further improve and recommend ways forward to endorse for implementing the Fisheries DRR and CCA Mainstreaming Guideline prepared by the CDMP II Project (Fisheries component). A monitoring system that will be established under Component 4 will ensure that information on risks and climate-sensitive areas is continuously updated.

Amendments and improvement of policy and strategy will be made and proposed to the competent authority so that the policies and strategies can address the CC implications with other recently completed and on-going initiatives for sustained fisheries conservation and management. The Project activities and this output would facilitate making the current fisheries strategies climate resilient incorporating proper adaptation measures in on-going development activities in the sector. In addition, this project will strengthen the Climate Change Cell (CCC) of the DoF through providing needed technical support. Key members of the CCC, DoF officials, staffs, members of other relevant government agencies, private sector and NGOs will be trained on CC issues and its impacts on fisheries including methods for assessing, planning, implementing and monitoring climate resilient fisheries projects in the country.

Fisheries policies need to address issues and ways of monitoring and minimizing impacts from CC hazards, and must conform and be harmonized with other related national policies In order to include the monitoring of impacts of CC, response measures, institutional strengthening and coordination and disaster risk reduction issues in the policy, the project will furnish policy advocacy and amendments to meet the CC challenges. Broad approaches for various policy amendments to mainstream climate change will include:

- Policy encourages participatory community-based planning processes and result-based monitoring system.
- Policy and strategies prioritize legal ways of DoFs active inclusion in the conservation-management of the mangrove fisheries (with BFD), fish sanctuaries and protected areas (with MoL, DoE and BFD).
- Policy and strategies device judicious achievable targets of women's involvement (in %) during short-, mid- and long-term aquaculture and ancillary activities, both in inland and coastal aquaculture.
- Policy would ensure easy and equal access rights of local beneficiaries to common water bodies (floodplains, flooded haors, water logged areas, etc.) and allow productive use (cage and pen culture) of those areas.
- Policy and strategies would include suggestions for appropriate levels of budgetary allocation for research and development (preferably in %) on climate change impacts on fisheries during short-, mid- and long-term scenarios both in inland and coastal/marine fisheries sub-sectors to achieve sustained fisheries sector development.and indications to.

Verifiable indicators: (see Appendix-1, Results Framework)

- Revised and updated review report of relevant fishery sector policy (1) incorporating CC considerations with gender differentiated adaptation measures.
- Revised and updated inland capture fisheries and aquaculture strategies (2) incorporating gender differentiated CC adaptation considerations and forecast budget allocations to adaption actions in revised strategies.

Output 1.3: *Capacity building strategy for DoF, other relevant GoB agencies, private sector and community-based organizations developed to facilitate climate resilient fisheries sector.*

The current capacity and knowledge base of the DoF and other agencies both at the central and field level is inadequate to effectively assess and quantify the specific CC impacts on fisheries and aquaculture production systems. Skills of DoF and other relevant government personnel need to be developed through training on emerging CC implications and Ecosystem based approaches (EbA) of resilient management and adaptation, such as EAFM. Therefore, these national-level institutions often lack technical capacity for planning and implementing climate resilient approach. Without the technical capacity to plan and implement climate resilient approach, local and line government officials are unable to share information on climate resilient approaches with local communities. Hence capacity building of them is essential.

National and local government agencies – including the DoF, BFRI, DoE and other personnel will be trained on: i. planning and implementing climate change implications and resilient adaptations; and ii. the benefits of this approach across the sectors. International best practices

and lessons learned from similar projects in South Asia and ecosystem restoration projects in Bangladesh will be used in the development of the training programmes and manuals. These trainings will build on previous training materials so far developed by BFRI, DoF and other organizations on tried/piloted climate resilient adaptations to ecosystem. Trainings would include workshops, group discussions, lectures and field trips to climate resilient piloting/interventions sites.

The key aspect of developing a capacity building strategy will include: i. a detailed capacity needs assessment of DoF, BFRI and other related GoB agencies; ii. training and engagement of DoF central and field official/staff in CC impact assessment and conservation-management of fisheries; and iii. technical backstopping by competent relevant institutions and partners (organizations and universities imparting CC and related education) in strengthening the CC and build their capacity to assess, plan, implement and monitor CC adaptation projects in the fisheries sector. Developed Fisheries policy and strategy review reporst will also highlight ways and areas of capacity development needs of DoF personnel and local communities. The following capacity development is envisaged under the project:

- Training of DoF personnel on CC impacts, Early Warning System (EWS) development; ecosystem approach to fisheries and to aquaculture (EAF and EAA) as relevant sustainable and resilient approaches[29]; integrated coastal zone management (ICZM); hatchery techniques and management of potential saline tolerant species like golda, mud crab[30], seabass and mullet; gender issues in aquaculture; protected areas; management of native indigenous fish species; and fish sanctuaries restoration and management;
- Training sessions with other GoB agencies involved in fisheries sector and private sector on integration of climate change considerations into management plans and supply chains;
- Formation of clusters and training of communities[31], particularly women on weather and climate change, CC impacts, risks and vulnerabilities, disaster preparedness and management. Improved climate information and prediction is one of the most important elements of adaptation. Adaptation requires working in multiple time scales, from short-term to the long-term, addressing climate variability and changes through a range of forecasting systems to add incremental value to the entire adaptation process. In coordination with the technical personnel of BMD and the CDMP-II an updated user friendly training module will be produced. One user friendly Training manual would be prepared on ***Climate forecast application, Disaster risk management and adaptation, mitigation options and EWS.*** The Training manual would cover these broad areas:
    - Guide on defition on various weather factors (temperature, wind speed, humidity, rainfall, fog/mist, storms, storm surges, cyclone, floods, droughts, difficulty in prediction of extreme weather events etc.); difference between weather and climate (variability versus long-term trends), the planet's diurnal and annual cycles[32]);

[29] As noted earlier, the emerging issues of climate change implications, risks and vulnerabilities on fisheries and aquaculture sector is poorly understood by the Govt. officials and the community people. The country lacks proper institution/organization and resource persons for training/capacity building of the Govt. officials and communities. Hence training of the Govt. officials and the community people through this LDCF funded project would be needed.

[30] To lessen the extra pressure of wild crablet harvesting Bangladesh Government is planning to establish mud crab (*Scylla serrate*) hatcheries in feasible areas. This LDCF project should train DoF and BFRI officials in a country well experienced in mud crab hatchery operation and management (Indonesia or elsewhere as appropriate) for 3-4 months so that DoF and BFRI can manage those hatcheries and train the needed technicians in future.

[31] Resource persons from BMD, CDMP II, DoF, BFRI, DoE, BAU, IM&SF, WorldFish, IUCN will be engaged to train the local communities at their Union Parishad centres. Lecture notes would be compiled and updated into a training module, which would be used for later trainings.

[32] Diurnal and annual cycles refer to the pattens days/nights and seasons repeat year after year.

- Water quality criteria (surface water temperature, pH, salinity, dissolved oxygen, free carbon dioxide, nitrite-nitrate, phosphate, general idea about heavy metals) and acceptable limits for fisheries and aquacultures; a general guidance on the commonly-used insecticides (e.g., carbamates, organochlorines, organophosphates and cypermethrins) and their effect on the biodiversity. Such knowledge enables the fishers and fish farmers to be better prepared for crises and better manage their resources.
- Relations of soil salinity to fisheries and agriculture; relations of drought and floods on fisheries (availability, migration, spawning, dispersal) and aquaculture.
- Weather and climate forecast and early warning system (EWS) products currently available in Bangladesh;
- Early warning systems (EWS), sources of EWS, category and explanation of warnings, measures to be taken as per predicted severity of threats/ warning, how to translate EWS in fisheries and aquaculture related risk management; ways of decision making (adaptations) to prescribed measures;
- Elaborate how current forecast products may be used for drought or flood risk management in aquaculture and fisheries sub-sectors, and understand rainfall forecasts and their use in decision making;
- General information about weather and climate, greenhouse gas emissions, global warming and climate change, its causes; risks, impacts and vulnerability to ecosystem, biodiversity, livelihood (agriculture, fisheries and livestock) and human life and health.
- Knowledge about the weather signals and steps to be taken, ; various protocols and measures of Safety at Sea;
- Easy-to-understand information about adaptation and mitigation options for climate induced changes;
- Community's (especially women's[33]) awareness building on perception, risks and vulnerability of fisheries, aquaculture and livelihoods to the adverse impacts of climate changes including knowledge gaps, their empowerment in disaster risk management and decision making.

Upon completion of these trainings (Table 6), participants should be able to: describe the various types of forecast products available in Bangladesh; elaborate how current forecast products may be used for drought or flood risk management in agriculture, aquaculture and fisheries sub-sectors, and understand draught and rainfall forecasts and their use in decision making, and be better aware and their overall capacity enhanced to assess, plan and implement agriculture, fisheries, aquaculture and livelihood adaptations to climate change risks.

The training strategy and manuals produced under Output 1.3 will guide the activities under Output *2.2: Communities'awareness and capacity enhanced to assess, plan and implement fisheries, aquaculture and livelihood adaptations to climate change risks.*

Verifiable indicators: (see Appendix-1, Results Framework)

- 1 Detailed Report on capacity needs assessment of DoF, BFRI and other related GoB agencies and design of a capacity building strategy to strengthen them (complemented by output 1.2);

[33] Please refer to Gender in Aquaculture - http://www.boblme.org/documentRepository/BOBLME-2012-Socioec-02.pdf and *genderaquafish.org*; Gender in Agriculture http://www.genderinag.org/content/e-learning-course

- 1 Training manual developed on *Climate forecast application, DDR management and adaptation, mitigation options, and EWS in fisheries and aquaculture.*
- 01 DoF and 01 BFRI personnel to be trained on mud crab hatchery techniques in Indonesia for 3-4 months (Bangladesh lacks mud crab hatchery and skilled manpower who can run mud crab hatchery. Forest Department's recent project is planning to establish a mud crab hatchery to conserve mud crabs' biodiversity. This project would up scale that work by producing skilled man power for running the hatchery);
- 100 DoF, BFRI and other GoB personnel to be trained in-country on climate resilient adaptation and management approaches for the fisheries and aquaculture sector.
- 30 GoB (DoF and other partner organization's personnel to be trained [34]) in neighbouring country(ies) on climate resilient adaptation and management approaches for the fisheries and aquaculture sector.
- 24 advanced community leader/people (40% female) and partner GoB personnel to be trained in the Asia region in 2 batches on EAF and EAA as climate resilient management approaches and each batch lead by 01 GoB official.
- 14 Private entrepreneurs to be trained in-country on climate resilient adaptation and management approaches for the fisheries and aquaculture sector.

Component 2: **Strengthening knowledge and awareness of fisheries/aquaculture dependent communities facing the adverse impacts of CC** (LDCF. USD 480 000; Appendix-3, please also see Budget notes sheet in budget Excel file; co-financing: USD 5 1000 000)

Fisheries and aquaculture dependent communities residing in the project area are constantly affected (loss of income, livelihoods and nutrition) by CC induced shocks (increasing temperature, draughts, erratic rainfall, floods, cyclones, sea level rise, salinity intrusion, etc.) and are unable to take measures to overcome the impacts due to high poverty levels and limited access to knowledge and information about adaptation options. The CC threats are outweighing the contribution of fisheries and aquaculture to the national economy and overall developments in terms of poverty reduction, employment generation and improved nutrition in the densely populated Bangladesh. Improved climate information and prediction is one of the most important elements of adaptation. Adaptation requires working in multiple time scales, from short-term to the long-term, addressing climate variability and changes through a range of forecasting systems to add incremental value to the entire adaptation process. The component will therefore focus on improving the local-level knowledge base on CC risks and vulnerabilities, CC awareness and governance (see Table 6).

Outcome 2: *Local community organizations have institutionalized disaster risk management (DRM) in their local development plans and programmes, thus improving local CC related governance.*

At present governance in relation to CC impacts and implications for fisheries and aquaculture is poor. Local development plans do not adequately integrate DRM and EWS in the fisheries and aquaculture sectors. Coastal fishers and fish farmers lack awareness of the natural calamities. Most small-scale artisanal fishers do not have clear ideas about the environmental parameters and fisheries habitat, weather signals, consequences of climate

[34] All training will be based on the initial needs assessment done during the PPG phase (e.g. capacity building on an identified climate smart farming technique such as mud-crab) and further informed by the in-depth needs assessment during the year 1.

imapcts and what steps to be taken at what stage. For example, the fishers, due to their poor financial condition, cannot bargain with the boat owners to equip the boat with adequate safety equipment. Outcomes of the DRM of the CDMP II project will be integrated to address increased fisheries and aquaculture knowledge and awareness regarding DRM and EWS through focused and targeted training to the communities (including fishers, fish farmers, relevant community leaders, fisheries personnel and consumers) and contribute to supplementing national capacity development and policy improvements (*Component 1*). This would allow the communities to better understand emerging CC implications and integrate DRM and EWS in their farming and livelihood plans and programmes. Analysis of knowledge gaps in understanding and responding to CC risks of the sector will form the basis of designing appropriate site-specific long-term integrated adaptation interventions (piloting activities of *Component 3*) along with the EWS with direct participation of local communities and relevant stakeholders. Under Component 2, detailed consultations and design of methodologies to improve knowledge and awareness of fisheries/aquaculture dependent communities regarding CC will be carried out under the following outputs. This would link DRM and EWS and long-term adaptation to CC through "learning by seeing", by allowing the communities to participate in the pilot demonstration sites.

Output 2.1: *Community perceptions, risks and vulnerability of fisheries, aquaculture and livelihoods to the adverse impacts of CC including knowledge gaps of men and women assessed with participation of relevant stakeholders and DoF field officials at project sites.*

Based on the methodology developed for the preliminary vulnerability and risk assessment conducted during the PPG phase (Appendix-7), this output will support the following activities in the nine selected Project sites:

i. Adequate information and knowledge, attitude and practice (KAP) will be generated of the fisheries and aquaculture dependent communities on the pathways of CC induced impacts with direct involvement of men and women;
ii. Local understanding, response and knowledge gaps of climate variability will be assessed and analysed (detailed in output 1.1);
iii. Awareness, knowledge and skills will be strengthened on the adverse impacts of CC affecting the fisheries and aquaculture production systems including livelihoods of the dependent communities; and
iv. Communities will be trained and engaged in detailed understanding of CC impacts and vulnerabilities to fisheries and aquaculture including their livelihoods (also supporting implementation of activities under *output 3.1*) at the project sites (both coastal zone of southwest and *haor* basin of northeast). Community-led learning would be shared among themselves and disseminated (this should leverage on *output 3.2* as well) in Farmer Field Schools (FFSs). This would enrich the knowledge base; minimize knowledge gaps of the DoFs field officials and the communities on the risks and vulnerabilities of CC to fisheries and aquaculture.

The Project will also facilitate participatory workshop and group exercises to improve the understanding of the community regarding hazard census, hazard calendar, livelihood calendar, risk analysis, ranking of hazards in the context of risks, prepared risk reduction action plan, prioritize the interventions, impact analysis of interventions and identification of ongoing risk reduction activities.

Verifiable indicators: (see Appendix-1, Results Framework)

- Climate induced risks and vulnerability assessment completed among 70 communities in 9 upazilas
- 70 communities adopt 15 local development plans and integrate DRM and EWS considerations.

Output 2.2: *Communities' awareness and capacity enhanced to understand, assess, plan and implement fisheries, aquaculture and livelihood adaptations to CC risks.*

Due to limited access to knowledge and information awareness and capacity remains low among the local fishers and fish farmer's communities to adapt fisheries and aquaculture practices to CC. There are no local DRM systems and EWS in place for fisheries and aquaculture communities. In oder to overcome such obstacles, under the Output 2.2, communities at the nine selected upazilas will be engaged in the following:

i. A comprehensive awareness and skill development activity package (training, awareness campaign, exposure visits, field schools, use of ICT services, etc.) will be developed (summarised in output 1.3). This will take into consideration experience and lessons of on-going LDCF project on *Community-based adaptation to climate change through coastal afforestation* related to the fisheries/ aquaculture dependent communities, tailored to the needs of local men and women, and field personnel of DoF, NGOs, etc.;

ii. Early Warning Systems (EWS) will be developed based on the site specific baseline that will be scaled up jointly with the Bangladesh Meteorological Department, CDMP-II, Flood Forecasting Centre of BWDB and other related departments, Community Radio Operators and Mobile Phone Operators for taking preparedness measures against potential climate related hazards (detailed in output 1.1);

iii. An ICT based information dissemination systems at project sites will be developed through which the project communities will get technical messages on actions to be taken to address risks of CC on fisheries and aquaculture production systems.

In the nine pilot upazilas, the Upazila team (comprising SUFO/UFO office technical staffs and project personnel) will be trained and assisted to better use EWS, adaptation technologies for slow progression of normal events and short- and long-term strategies for extreme weather events. Due to the lack of wide coverage, technical manpower, sufficient training and skills, the information and services provided by BMD are not currently effectively operationalised. The upazila team, through proper training, skill development programme and appropriate logistical support, will be able to deliver the crucial early warning information obtained from the BMD.

In this regard, the project will forge a working and strategic linkage with different services and service providers of BMD, CDMP II, BWDB, etc. and other organizations involved in EWS in Bangladesh. The project would facilitate sharing of database and all other relevant available information particularly on trends, and seasonality of extreme weather events, among the relevant agencies (BMD, DoF, local administration, etc.).

Verifiable indicators: (see Appendix-1, Results Framework)

- Collaborative Early Warning System (EWS) and DRM in place and appropriately connected to the local environmental monitoring (including community radio, mobile SMS gateway and training manuals/ mass awareness materials, etc.) in at least 50 communities of the SW coastal and NE haor areas.

- 5,880 households (40% female) to be trained in-country on climate variability and CC risks and general climate resilient adaptation and management approaches for the fisheries and aquaculture sector.

Component 3: **Enhancing local adaptive capacity to support climate resilient fisheries and aquaculture management and alternative livelihoods in the face of CC** (LDCF: USD 3 448 680 ; Appendix-3, please also see Budget notes sheet in budget Excel file; Co-financing: USD 8 000 0000)

The CC threats are becoming evident for the vulnerable coastal communities. Coastal shrimp farmers have been repeating the same old traditional and extensive technologies of brackish water shrimp (bagda, *Penaeus monodon*) culture in the dry season (November-May), and mixed culture of white fish (carps, pangas, etc.) with freshwater prawn (golda, *Macrobrachium rosenbergii*) sometimes integrated with local rice in the monsoon (June-October) year after year. This system is not resilient to CC risks, as the fish farmers have no control over the water exchange and the resulting salinity fluctuations, limited knowledge on water quality dynamics, the critical thresholds and appropriate measures to be taken at times of crises. Similarly in the *haor* area, which is the reserve of mother fisheries, capture fisheries-based livelihood is predominant, yet water sector and wetland planning in that region is heavily biased on increasing revenue earning, flood control and infrastructure development targeting cereal crop production, ignoring fisheries and other natural resources management-based livelihoods of the wetland dependent communities. More climate resilient and sustainable policy and strategy support for extension services that promote and popularise farming of salt tolerant fish species (seabass, mugil, mud crab – *Scylla serrata* fattening, etc.) has not been properly explored and put in place as yet. To overcome these challenges and makes the libelihoods more CC resilient, the project will pilot activities in safe fish production along with capacity building.

The various on-going DoF and donor supported projects have recently started community-based adaptation activities to promote livelihood options among the fishery dependent communities. However, CCA has not been prioritized as one of these options. As a result, there is limited understanding among the local communities on the benefits of this approach including additional livelihoods from functional ecosystems. These communities have not received adequate hands-on training on planning and implementing CCA. Consequently, there is limited opportunity for local communities to maximise the benefits of ecosystem restoration to increase their adaptive capacity to the adverse effects of climate change.

This component builds on a strong baseline of the past and ongoing projects in the fishery sector, for example, the *Community Based Management of Tanguar Haor Program* (CBMTHP) (2005-2015) funded by the Swiss Agency for Development and Cooperation (SDC) and implemented by International Union for Conservation of Nature (IUCN) on behalf of the MoEF. The Project is also building on the practical lessons learned in the *Community Based Adaptation in the Ecologically Critical Areas through Biodiversity Conservation and Social Protection (CBA-ECA) Project* (July 2010-June 2014) implemented by the DoE, where the overall objective was to strengthen the co-management model for Ecologically Critical Areas (ECAs). The USAID-funded Climate-Resilient Ecosystems and Livelihoods programme (CREL) project (2013-2017) has provided technical advice and assistance to the government ministries, technical agencies and CBOs. The proposed LDCF-financed project will link with this USAID-funded project by developing the capacity of national and local government to implement ecosystem resilient adaptation approach and upscale this approach into national and local policies and plans.The Project will also incorporate lessons learned

from the Wetland Biodiversity Protection Project (WBPP) (2009–2015) funded by the German Federal Ministry for Economic Cooperation and Development (BMZ) through activities in restoring natural wetlands and fishery habitats. The Project will upscale biodiversity management by local communities' participation[35] and address climate change adaptations using specific techniques for restoring degraded wetlands in both the hot spots through lessons learned from the *Coastal and Wetland Biodiversity Management Project* (CWBMP) (2000–2007) implemented by the MoEF and funded by GEF.

The on-going project in the Haor area of Bangladesh, implemented by the Bangladesh Water Development Board (BWDB), addresses some of the baseline problems identified by the proposed LDCF project. This is being achieved by improving flood management, constructing and rehabilitating rural infrastructure and improving fisheries in the haor area. The Haor Flood Management and Livelihood Improvement Project (BWDB Part) (hereafter the Flood Management Project) funded by JICA and the GoB is being implemented by the BWDB. The LDCF-financed project will build on the activities of the Flood Management Project and contribute towards reducing the climate change vulnerability of its activities through strengthening the institutional capacity of the implementing agencies; developing policy briefs to promote revision of policies and plans to include CCA; and sustainable agriculture and fisheries by promoting productivity of fisheries.

Outcome 3: *Communities with strengthened adaptive capacity, maximize their incomes and access to nutrition through adoption of CC resilient fisheries and aquaculture technologies and management systems in targeted areas*.

The very low levels of adoption of climate resilient practices by the fisheries and aquaculture communities are due to the lack of knowledge, awareness and availability of potential technologies and approaches, insufficient community-led planning process. Under the current circumstances, desired national sectoral development is often not achieved. This outcome will be based on informations gathered during the PPG phase and on the detailed assessment of available technologies and practices during the first months of the project implementation, followed by design of site-specific community-level methodologies to implement local adaptation technologies. This component will represent the bulk of the LDCF funding and will consist of on-the-ground investments in demonstration activities to reduce the vulnerability of local communities to CC and to improve their livelihoods. Implementation of EAF/EAA will be the key added value of the LDCF funding.

Output 3.1: *Site specific climate resilient and gender differentiated fisheries and aquaculture technologies (e.g. fisheries information platform, innovative aquaculture systems, brood banks and satellite hatcheries, salt tolerant fish strains etc.) developed and adopted by the targeted communities*.

The overall objective of this output is to:

i. Implement climate resilient ecosystem approach to fisheries (EAF) management to develop natural waterbodies and create favourable aquatic environment so that native species can sustainably propagate and rejuvenate the stock even under the negative impacts of climate change;

35 http://www.thegef.org/gef/sites/thegef.org/files/gef_prj_docs/GEFProjectDocuments/M&E/TE/FY2012/UNDP/G000668/668_461_Bangladesh_BD_%20TE.pdf accessed 13/02/2015

ii. Implement climate resilient ecosystem approach to aquaculture (EAA) management in defined aquaculture areas;

iii. Provide technical support for feasibility of mud crab hatchery establishment and proper functioning of all existing government and private Golda hatcheries to make them fully operational. This would enable fishers and fish farmers to sustain their modest livelihood in the face of CC. The LDCF financed project would increase the capacity of government and local communities related to fisheries and aquaculture living in the SW coastal and NE haor area to adapt to the negative effects of CC using EAF and EAA; and

iv. Implement innovative fisheries and aquaculture CC-adaptation technologies at the local level.

A key aspect of this output will include piloting of site-specific, gender-differentiated fisheries and aquaculture technologies that are more resilient to changing climatic conditions in terms of trends and variability. These will include among others (described in Table 7) technologies that can be used under rapidly changing flooding patterns (e.g. flexible depth floating cages) or by using species more resistant to wide salinity ranges (e.g. mud crab) or which management can be rapidly modified guided by local monitoring of conditions. Technologies and options that provide non-fishery alternative livelihood options (duck rearing, nets/trap making) are also considered.

The Project will also supply small-capacity feed making machine (50-100 kg/day) and training of 16 communities (from all 9 upazilas) for managing farm-made feed, which has a lower climate impact with smaller carbon foot print compared to industrial floating or sinking feed[36]. The project will also provide insulated fish box on a rickshaw van and training to 16 communities (from all 9 upazilas) for delaying post-harvest quality loss of their produce/harvest to facilitate fish marketing. These interventions would help enhance the communities' awareness, building capacity and implementing CC adaptation in the fisheries, aquaculture and livelihood activities. A screening matrix of all adaptation options is shown in Appendix-4. This will consist of on-the-ground investments in pilot activities involving the local communities.

The Upazila team with the direct participation of the community people will develop a community micro plan (annual fish farming and fishing calendar) focusing on trends of climate change events. Climate vulnerable people will be trained and motivated to follow the calendar as best as possible. This will include training on pond, cage and pen fish culture, wetland and fish sanctuary management, rice (suitable varieties)-fish culture suited to their areas and making an environment friendly cropping pattern and good aquaculture practices. Training on Integrated aquaculture-agriculture (Rice-Fish/prawn) and particularly on the use of better seed and feed. The project will provide capacity building trainings on alternate income generating activities (AIGs) and opportunities through community mobilization, and group fund mobilization gradually. With proper training, Upazila team will prepare the preparedness and management plan in coordination with local relevant GOs, NGOs, CBOs and community people. Through the training and required logistic support provided by the project, the Upazila team will be able to dispatch the early warning forecast and related advices to the community.

[36] Centre of Excellence on Environmental Strategy for Green Business (VGreen). 2012. Life Cycle Assessment of Fish Feeds: Case Study in Bangladesh. WorldFish/USAID "Feed the future-Aquaculture Bangladesh and CSISA projects. Centre of Excellence on environment strategy for GREEN business (VGREEN). Kasetsart University, Thailand.

Table 7: Piloting activities in different communities[37].

Piloting Activity	Nos. of groups	Possible areas	Remarks
Depth flexible Cage fish culture	5	Kachua, Shyamnagar, South Sunamganj, Jagannathpur, Nasirnagar	Depth flexible *Cage* (easily adapted to different water depths and flooding) *fish culture* (with salinity tolerant seabass, mugil, mullets, nona tengra, etc. or with mono-sex tilapia and major carps) at best stocking density, combination and ratio and management regimes – ecosystem approach to aquaculture (EAA) management. This can be tried both by the fishers of openwater capture fishery and the shrimp/prawn/white fish aquaculturists. BFRI and some private entrepreneurs (viz. the Dakatia river cage culture, Chandpur and the Meghna/ Dhawleshwari river cage culture in Araihazar, Narayanganj and and in hilly creeks of Rangamati), are successfully operating cage cultures. Best practices from there can easily be piloted during May-November period.
Pen fish culture	6	Dumuria-Dacope (1), Bagerhat sadar-Kachua (1), Shyamnagar, South Sunamganj, Jagannathpur and Nasirnagar	*Pen fish culture* (with salinity tolerant seabass, mugil, mullets, nona tengra, etc. in the SW or major carps and SISs in the NE; at best stocking density, combination and ratio and management regimes) in sheltered river, khal, oxbow after developing risk maps to decide on the proper location of the pens (to make them more resilient) – an ecosystem approach to aquaculture (EAA) management. This can be tried both by the fishers of openwater capture fishery and the shrimp/prawn/white fish aquaculturists. BFRI and some private entrepreneurs have successfully demonstrated pen culture in borrow pits in Chandpur Irrigation Project and in hilly creeks of Rangamati; BFRI has tested the technology.
Kua fish culture	5	South Sunamganj (2), Jagannathpur (2) and Nasirnagar (1)	*Kua fish culture* (with major carps and SISs at best stocking density, combination and ratio and management regimes) in selected haors/beels – ecosystem approach to aquaculture (EAA) management. Both the fishers of openwater capture fishery and the shrimp/prawn/white fish aquaculturists can try this. Kua fish culture is traditionally practiced in haor regions, needs little improvement. Best practices and lessons learned from there can easily be piloted in the flooded haors during May-November period.
Pond fish culture	8	Dumuria, Dacope, Bagerhat sadar, Kachua, Shyamnagar, South Sunamganj, Jagannathpur	*Polyculture of white fish* in deeper, more CC resilient ponds (greater buffer to temperature changes and to flooding, also using best stocking density, combination and ratio and management regimes) by small-scale fish farmers having suitable water areas. Collaboration will be sought with other agencies (base line co-funding) for excavation work[38] to maintain needed water depth.

[37] These are primarily proposed communities/occupational groups in each area; the numbers may increase during implementation as some communities/occupational groups may opt for more than one piloting activities. In addition to these there will be CBOs/OGs having trainings supports and supports with small equipments

[38] In every case efforts will be made to implement the envisioned activities where earth works (pond, gher, and canal dikes) are done by other baseline projects. If the earth works are lacking and there remain risks of flooding or erosion then minor

		and Nasirnagar	
Bagda SI culture	6	Dacope (2), Bagerhat Sadar, Kachua and Shyamnagar (2)	*Bagda* monoculture (semi-intensive) 2 crops/yr, and *mud crab fattening* (an innovative salinity resistant combination, also using best stocking density and management regime) in separate ponds within the bagda gher/ cages/ plastic pots or in sheltered areas of rivers/khals (15-20 days cycle for each crop) in suitable high saline regime areas. This is also a type of ecosystem approach to aquaculture (EAA) management. This can be tried both by the fishers of openwater capture fishery and the shrimp/ prawn/ white fish aquaculturists. Collaboration will be sought with other agencies (base line co-funding) for excavation work to maintain needed water depth.
			In some cases mixed SI culture of *bagda-golda-tilapia-pangas* would be tried in the same *gher* in the pilot areas.
			In other cases alternate *bagda-golda-tilapia, mugils, seabass, nona tengra, pershe, etc.** SI culture (high salinity time, winter) and *Integrated* (salt tolerant or Locally Improved Variety or as per DAE) *and concurrent paddy-cum-FW prawn+ white fish* farming (in monsoon FW time) would be tried in the same *gher*.
Bagda+Rice-Fish culture	5	Dacope, Bagerhat sadar, Kachua and Shyamnagar (2),	Alternate *bagda-golda-tilapia, mugils, seabass, nona tengra, pershe, etc.* Semi-intensive (SI) monoculture (high salinity time, winter) and *Integrated* (slat tolerant or Locally Improved Variety or as per DAE) *and concurrent paddy-cum-FW prawn+ white fish* farming (in monsoon FW time) in the same *gher* – ecosystem approach to aquaculture (EAA) management. Collaboration will be sought with other agencies (base line co-funding) for excavation work to maintain needed water depth.
Golda+ Rice Fish culture	6	Dumuria, Bagerhat Sadar, Kachua, South Sunamganj, Jagannathpur and Nasirnagar	Alternate rice in winter and Integrated and concurrent integrated paddy-cum-FW prawn+ white fish farming (in monsoon) in the same field – ecosystem approach to aquaculture (EAA) management. Collaboration will be sought with other agencies (base line co-funding) for excavation work to maintain needed water depth.
Mud crab fattening alone	2	Dacope, Shyamnagar	Mangrove crabs, a wide range salinity adapted species, fetch a good price per kilo, and a strong export market exists. It can be done profitably with small amounts of space and also has the potential to work well for women. This is also a type of ecosystem approach to aquaculture (EAA) management. At present mud crabs are collected directly from Sundarbans and shrimp farms, and there is huge demand for crablets to stock crab fattening farms. The dependence on collection of larvae from the wild is, however, unsustainable in the long term. Hatchery establishment is essential.

earth works would be done by the CBOs/OGs. In this case provision for subsistence for food for the labour-providing CBOs/OGs would be needed from the project budget.

			Collaboration will be sought with other agencies (base line co-funding) for excavation work to maintain needed water depth.
			In some cases concurrent *mud crab fattening* with *mugils, seabass, nona tengra, pershe, etc.* (high salinity time, winter) and alternate mixed culture of *tilapia, pangas, mugils, seabass, nona tengra, pershe* (in monsoon) in the same *gher* for increasing farm income.
Fish Sanctuary	6	Bagerhat sadar -Kachua (1). Shyamnagar (1), South Sunamganj (1), Jagannathpur (1), Nasirnagar (1) and Agdar beel of Hakaluki haor (DoE managed fish sanctuary), Juri,	Establishment of Fish sanctuary and habitat restoration with macrophyte plantation to protect fish stocks in reproductive season under variable water levels – ecosystem approach to fisheries (EAF) management.Collaboration will be sought with other agencies (base line co-funding) for excavation work to maintain needed water depth, linking river and khals for enhancing water exchange facilities and for reestablishment/ reopening of fish migration and dispersal routes so far lost/degraded. Collaboration will be developed with IFADs CALIP/HILIP project (base line co-funding) for excavation of haor linking river and khal (important/ dead sections) in the NE area for reestablishment/ reopening of fish migration and dispersal routes so far lost/ degraded. Similar collaboration in the SW area will be sought. Reopening of fish migration and dispersal routes would augment fish yield in the haors.
Habitat restoration	Same 6 groups		
Openwater fish stocking	6	Bagerhat sadar -Kachua (1). Shyamnagar (1), South Sunamganj (1), Jagannathpur (1), Nasirnagar (1) and Agdar beel of Hakaluki haor (DoE managed fish sanctuary), Juri	Openwater fish stocking of small indigenous species (SIS) to allow alterantive and improved fisheries under variable climatic conditions would be done through beel nursery management in those fish sanctuaries to improve the depleted fish stocks, as SIS would establish and breed in the next year –ecosystem approach to fisheries (EAF) management. Openwater supplemental stocking of SISs (eg. shar punti – *Puntius sarana*, Bata – *Labeo bata*, Ghonia – *L. gonia*, Meni – *Nandus nandus*, Foli – *Notopterus notopterus*, Chirka baim – *Mastacembelas armatus*, koi – *Anabas testudineus*, magur – *Clarias batrachus*, Shing – *Heteropneustes fossilis*, snakeheads, etc.) along with major carps (rohu, katla, mrigel, kalibaush, etc.) through *beel nursery management system* would be piloted for rejuvenation of the depleted mother fish stocks. For this purpose 1-2 Fish Seed Multiplication Farms (FSMFs) of the DoF in the NE and the SW areas would be selected, minor renovation completed and functioning condition improved. Broods of SISs and mono-sex tilapia will be procured from the nearby areas, artificially bred there. Produced fingerlings will be transported in small trucks with steel tanks and aeration and stocked in the selected beel areas. Modalities and details will be elaborated later. Broods of other native SISs and larger species (Kholisha, Taki, Shoil, Gozar, Baila, Tengara, Aeir, Chital, etc.) will also be procured live and stocked live in the selected areas just before the 1st onset of monsoon, to allow them to breed in the openwater. This
Beel nursery management	Same 6 groups		

			would ensure quality fish seed both for aquaculture and openwater stocking. These SISs would act as mother stock and breed in the next year and help rejuvenating the depleted stocks.
Improve hatchery and Brood Banking	4	Dumuria-Dacope (1), Bagerhat-Kachua-Shyamnagar (1), South Sunamganj-Jagannathpur (1) and Nasirnagar (1)	Establishment of fish brood bank of major carps, golda, mono-sex tilapia, nona-tengra, pershe in suitable public/ private hatcheries for supporting enhanced aquaculture production. For this purpose minor renovation, functioning condition need to be improved, broods of major carps, golda, mono-sex tilapia, nona-tengra, pershe, and if possible, shar puti, bata, ghonia, nandus, koi, shing, magur and mono-sex tilapia will be procured from the nearby FSMSs, artificial breeding done there and fingerlings produced, transported in small trucks with steel tanks and aeration, stocked in the fish sanctuaries. Modalities and details will be elaborated later on. Broods of other native SIS and larger species (Kholisha, Taki, Shoil, Gozar, Baila, Tengara, Aeir, Chital, etc.) will be procured live and stocked live in the selected sanctuaries just before 1st onset of monsoon, so that those can breed in the sanctuary. This would ensure quality fish seed both for aquaculture and openwater stocking. The NIS/SIS would act as mother stock and breed in the next year and help rejuvenating the haors.
Duck rearing	3	South Sunamgonj, Jagannathpur and Nasirnagar	To further increase the adaptive capacity of the said communities at intervention sites, additional livelihoods– including duck rearing or Nets and traps making will be developed and demonstrated. Through these diversified approaches dependency of the communities on fisheries and aquaculture will be reduced, thereby promoting conservation of the fishery ecosystems. These additional livelihood options were identified during the PPG phase through workshops and consultations with a wide range of national and local government officials and the community. *Nets, Traps making or Duckery* (as alternative and diversified livelihood options) in sheltered river, khal, oxbow. *Nets, Traps making or Duckery* (with local DLS assistance) would be tried only in cases where cage/Pen fish culture seems difficult. This can be tried both by the fishers of openwater capture fishery and the prawn/white fish aquaculturists.
Net, trap making	8	Dumuria (1),Dacope (1), Bagerhat Sadar (1), Kachua (1), Shyamnagar (1), South Sunamgonj (1), Jagannathpur (1) and Nasirnagar (1)	
Technical support for feasibility study for a mud crab (*Scylla serrata*) hatchery establishment.		Munshiganj area of Shyamnagar Upazila.	Provide technical/technological support (field a short term International Consultant) to BFRI or FD project supported by GiZ or WorldFish/CREL Project for feasibility study, designing and producing an operational manual for a mud crab (*Scylla serrata*) hatchery establishment.
Technical support for proper functioning of all existing govt. and		Khulna-Bagerhat-Satkhir area	Provide technical support (field a short term International Consultant) for proper functioning of all existing govt. and private Golda hatcheries in the SW to make them fully operational and efficient. This would meet the demand of golda juveniles and boost golda production in the area.

private Golda hatcheries and make them fully operational and efficient.			
Organize fish/prawn seed dealer, establishment of fish/prawn seed market and ensure testing of PLs through PCR to get WSSV-free PLs.		Dumuria, Dacope, Bagerhat, Kachua and Shyamnagar are	Organize/ mobilize authorized prawn/shrimp PL and fish fry/fingerling dealer, and establishment of PL/fingerling markets in Bagerhat and Dacope and ensure testing of PLs through PCR to get WSSV-free PLs.

Community/Occupational Groups' criteria: (see Appendix-9)
A total of **70** communities/Occupational Groups (OCs/CBOs) proposed initially. All communities (OGs/CBOs) will be involved in all activities relating to achieving out puts of Components 1, 2, 3 and 4.
Each occupational group (based on the adaptive options that the project implements) under each upazila is considered as a community.
40% of the member of the communities will be **women**; some groups will be composed of by women only.
Each community will have **25** members.
Each of the Field Facilitator in the SW will be responsible for **8-10** community groups in an upazila, while in the NE each. Field Facilitator will be responsible for **8-9** community groups in each upazila.

Criteria for selection of beneficiaries: Each common interest groups (CIGs) or CBOs or occupational groups (OGs) will comprise 25 members and include men only, women only or mixed. The CIGs/CBOs/OGs (beneficiaries) will be selected and formed by the Upazila team and will be duly endorsed by the Upazila Coordination Committee (UCC)[39]. Overall there will be 40% women among the beneficiaries. Beneficiaries must be willing to contribute/participate in the project interventions. One person from a HH will be taken as CBO/CIG members, on the basis that HHs having pregnant or lactating mothers will be given priority. Both husband and wife of the targeted HH will be included in capacity building and training activities. Each CIG/CBO member can participate in only one adaptation option of the project, and each village will have one adaptation pilot. For details see Appendix-9.

Verifiable indicators: (see Appendix-1, Results Framework)

- At least 70% of the targeted 50 CBOs/ communities (of which 40% women) adopt 15 climate smart technologies.
- At least 15 adaptation technologies adopted including gender differentiated technologies (homestead pond fish culture, mud crab fattening, etc.).
- Feasibility survey and report of mud crab (*Scylla serrata*) hatchery establishment.
- Golda hatcheries' efficiency improvement report. Golda hatcheries existing in the area Golda farming faces challenges with a short seed supply, believed to be due to climate change impacts.) by the golda hatcheries existing in the area.
- Establishment of 01 PL/ fingerling markets in Bagerhat-Dacope area.

Output 3.2: *Community-led and gender differentiated dissemination systems (e.g. pilot farms, Farmer Field Schools) of adaptation technologies developed and adopted.*

[39] UCC will be detailed in the TAPP (Technical Assistance Project Proposal).

This output involves: i. Development of community-based gender differentiated dissemination systems; ii. Establishment of Farmer Field Schools (FFSs) targeting small and marginal farmers, and women (25 FFSs to be established), which would serve planning, implementation and monitoring of adaptation alternatives (covered by output of 3.1); iii. The ICT-based information services will reduce the vulnerability of small-holder fish/ shrimp farmers due to both rapid and slow onset of climate risks in both the hotspots (detailed in output of 4.1). ; and iv. Supporting and engaging women folk in assessing CC impacts, designing and operating climate smart farming and fisheries management by team would satisfy their special needs, enhance their knowledge base and skills to face climate adversity (covered by output of 3.1). Output 2.2 and 3.2 are related and complementary to each other.

User-friendly dissemination materials that will be developed include training manuals, flyers, booklets, leaflets, posters, fact sheets, video clips, etc.in the local language.

Verifiable indicators: (see Appendix-1, Results Framework)

- Gender differentiated ICT-based[40] dissemination systems in place in 9 upazilas and used by 60% of communities.
- 25 FFS established of which at least 75% is functional for diversification of livelihoods in 9 upazilas.
- Around 10 types of user-friendly dissemination materials (training manuals/ flyers/ booklets/ leaflets/ posters/ fact sheets/ video clips, special issues in news papers, etc.) produced and distributed among communities and stakeholders.

Output 3.3: *Innovative local environmental monitoring and information tools for the communities to obtain and exchange information to improve resiliency and increase production in the fisheries and aquaculture systems developed and implemented.*

The Project will support: i. Preparation of critical location-specific fishery habitat maps using GIS technologies; ii. Development of an aquaculture habitat monitoring system for the innovative technologies in collaboration with the target communities. For this purpose the project would train CBOs and supply small equipments for environmental monitoring of the aquaculture farms/ fish habitats; iii. Implementation of innovative environmental monitoring system connecting to DRM, early warning and improved management of aquaculture and fisheries resources, such as introduction and adoption of simple monitoring tool for water quality and establishment of information platforms for the communities to obtain and exchange data and knowledge to improve resiliency; iv. Train 20 DoF/community trainers on implementing local environmental monitoring systems (linked to the community EWS and DRM); and v. The project will establish linkages between community groups (men and women) with service providers at grassroot levels including disaster management committees and benefit the poor targeted communities through tapping available field level resources from public and private entities beyond the project life.

Follow up monitoring includes the appropriate actions taken by the communities based on the environmental monitoring data (particularly water temperature, light penetration, pH, level of dissolved oxygen and salinity) from the demonstration sites. Upazila (sub-district) level

[40] Despite the poverty level of Bangladesh, the mobile phone use is quite high. Even rural people are well accustomed to mobile money transfer, information exchange, using social media. Besides, e-extension by the DoF and DAE is in operation in limited sphere, which needs improvement and make more user-friendly.

Fishery Officers will be tasked with coordinating and ensuring long-term operation of this information base.

Training on the use of small equipments, including thermometer, metal Secchi disc, pocket pH meter, pocket dissolved oxygen meter, pocket salinometer will be provided for 100 CBOs/OGs/CIGs[41] of 9 Upazilas of both SW and NE areas to enable them to monitor water quality, such as environmental parameters of shrimp/fish habitats. This training will allow them to better manage the natural resrouces, assess risks or crises, plan and implement CC adaptation action in the fisheries, aquaculture and livelihood actvities. Such training will also inform them about implications of environmental parameters, need to take timely actions to reduce loss of natural resources, and bring changes in farmer's management practices for water quality control and feeding management.

Verifiable indicators: (see Appendix-1, Results Framework)

- Training of 20 DoF/community trainers on implementing local environmental monitoring systems (linked to the community EWS and DRM).
- 100 communities/CBOs (2,500 persons, of which 40% female) distributed with and trained in-country in using small equipment for implementing local environmental monitoring (shrimp/fish habitats) systems.
- Environmental monitoring systems (well connected to the EWS and DRM) are in place in 70 (70%) of the communities.
- 9 location-specific fishery habitat maps prepared.

Table 6: Training matrix showing various types of trainings under different outputs.

Output	Indicator	Target	Content/subject of training	Comment
Output 1.3: Capacity building strategy for DoF, other relevant GoB agencies, private sector and community-based organizations.	DoF, BFRI & other GoB personnel trained in-country.	100 officers.	Climate resilience approaches.	Climate resilient approaches include: vulnerability assessment, risk mapping, spatial planning, identifying main threats, design planning and management responses, DRM, EWS, adaptation approaches such as EAF and EAA, adaptation technologies, providing alternative livelihoods, etc.
	GoB personnel trained in neighbouring country/overseas.	1 DoF and 1 BFRI personnel.	Mud crab hatchery techniques	The country lacks mud crab hatchery and skilled manpower that can run mud crab hatchery. Forest Department's recent project is planning to establish a mud crab hatchery to conserve mud crabs' biodiversity. This project would up scale that work by producing skilled man power for running the hatchery.

[41] 70 CBOs/OGs/CIGs of Table 6 and other 30 OGs/CIGs from previous projects to upscale their activities.

	GoB personnel trained in neighbouring countries/ overseas.	30 GoB personnel.	Climate resilience approaches.	To be trained on climate resilient adaptation and management approaches for the fisheries and aquaculture sector.
	Community leaders trained overseas.	24 advanced community leaders.	EAF/EAA.	Advanced community leader/people (40% female) and partner GoB personnel to be trained overseas in 2 batches on ecosystem approach to fisheries (EAF) and ecosystem approach to aquaculture (EAA) as climate resilient management approaches and each batch to be lead by 01 GoB official.
	Private entrepreneurs trained in-country.	14 Private entrepreneurs.	Climate resilient adaptation and management approaches.	To be trained on climate resilient adaptation and management approaches for the fisheries and aquaculture sector.
Output 2.2: Communities' perceptions, awareness and capacity to respond to climate related emergencies enhanced.	Local authorities, DoF, and community leaders trained in-country.	70 local authorities, DoF, and community leaders.	Implementation of DRRM and EWS mechanisms.	To be trained on implementation of DRM and EWS mechanisms and plans focused on fisheries and aquaculture.
	Communities (HHs) trained in-country.	5,880 households (40% females).	Climate variability, CC risks and general climate resilient adaptation and management approaches.	To be trained on climate variability and CC risks and general climate resilient adaptation and management approaches for the fisheries and aquaculture sector.
Output 3.3: Innovative local environmental monitoring systems and information tools for the communities to obtain and exchange information to improve resiliency and increase production in the fisheries and aquacult. systems developed and implemented.	DoF/ community trainers trained in-country.	20 DoF/ community trainers.	Local environmental monitoring systems.	Local environmental monitoring systems are to be linked to the community EWS and DRM.
	Communities/CBOs (40% female) trained in-country.	100 communities/CBOs to be trained.	Using environmental equipment, tools and technologies for CC adaptation.	Small equipment distributed with and trained in using small equipment for implementing local environmental monitoring (shrimp/fish habitats) systems.

Output 3.4: *Manuals on climate resilient and gender differentiated fisheries, aquaculture and livelihoods technologies developed and adopted by the communities, DoF and other relevant GO and NGO entities.*

A methodology will be designed for the elaboration of manuals on climate resilient fisheries and aquaculture with due consideration to gender. Lessons learned will be identified including livelihoods development, DRR and market linkage development aiming to CC adaptations from various completed (viz. MACH project) and on-going projects (viz. CB-Tanguar *haor* Ramsar site management project, CB-ECA Hakaluki *haor* management project, IPAC project) for inclusion in the manuals for customizing and demonstration at the selected sites.

DoF and BFRI have already species-specific and management-specific fisheries and aquaculture technology manuals, but those are not climate and gender focused. In this context the following manuals will be developed under this project. Existing training manuals of both DoF and BFRI would be reviewed, synthesized, updated and translated with inclusion of adaptation to CC and women's involvement. New chapters will be drafted where no existing manual is available. Inclusion of the results of climate risks assessment translated in a local language will also be considered.

Three Training Manuals (TMs) to be developed: Training modules/manuals under this component would be of three broad categories as follows:

Manual #	Title	Broad areas	Remarks
Training manual #1	*Fisheries and Aquaculture Resources and Climate Resilient Best Practices.*	• Agro-ecological zones, fisheries resource bases and their quantification; • habitat specific climate resilient and suited aquaculture technologies; • production systems and yields; • yield predictions in the face of future climate changes; • simple idea about optimum water temperature, transparency, pH, dissolved oxygen, carbon dioxide, salinity conditions for fisheries and aquaculture; • Fishs', prawns', shrimps', crabs' etc. inbuilt capability to adapt to climate events, ranges and limits; • various available options to face CC risks, adaptation and mitigations; • importance of community consultations, FGDs on the climate variability (particularly difference between older and younger generation); •	Technical resource persons and Fishery expert will be engaged during the training sessions to explain their utility through class lectures, multimedia presentations to the fisheries and aquaculture dependent communities including women. These class lectures and presentation will be also used in synthesizing the training manual. Relevant experts in the sector to be involved in the formulation of training manuals. Contents can be updated as needed/appropriate and per DoFs suggestions.
Training manual #2	*Fisheries Habitats Conservation-Management*	• Importance of fisheries and aquaculture to economy, food security & employment; • habitat-specific fishing methods; • Coastal zone and importance of integrated coastal zone management; • Wetland management, wetland	

		types, plants, animals of wetlands and their inter- and intra-relations, importance of wetlands in respect to biodiversity, source of common resource pool, and carbon sink; • present status of Bangladesh's wetlands; • Protected areas, ecologically critical and sensitive areas, sanctuaries and their importance in biodiversity conservation-management; • Habitat restoration, fish sanctuary, openwater supplemental stocking and ways forward; • General idea about Laws, Acts and Policies related to fisheries & aquaculture; • Ecosystem approach to fisheries management (EAFM).	
Training manual #3	*Community management and women empowerment in fisheries and aquaculture activities*	• Conflicts in public water management; • community dynamics, women participation in fisheries and aquaculture interventions; • existing policies relevant to women participation and empowerment, etc.	

Verifiable indicators: (see Appendix-1, Results Framework)

- Three (3) training manuals on i. *Fisheries and Aquaculture Resources and Climate Resilient Best Practices*, ii. *Fisheries Habitats Conservation-Management Community management* and iii. *women empowerment in fisheries and aquaculture* activities, are developed and produced.

***Component 4*: Dissemination of best practices and lessons learned, monitoring and evaluation** (LDCF: USD 238 095; Appendix-3, please also see Budget notes sheet in budget Excel file; Co-financing: USD 800 000)

The existing situation without the project with poor information dissemination processes in the DoF, and lessons learned from various recently completed and on-going projects will be recorded and disseminated. The activities under the Component 4 will ensure systematic data collection from project pilot sites to effectively monitor and evaluate project progress indicators, monitor risk mitigation measures and collect lessons learned (including successes and failures) to inform future adaptation and LDCF/GEF initiatives.

Outcome 4: *Project implementation through results based management and application of project findings and lessons learned in future operations facilitated.*

This outcome will contribute to the designing of the project's gender sensitive monitoring and evaluation system and complitation of lessons learned from adaptation technologies/ approaches/ options and the relevant communication and dissemination tools developed by the Project.

Output 4.1: *Lessons learned and best practices from the use of different CC resilient fisheries, aquaculture and livelihood technologies/ approaches documented and communicated to the relevant stakeholders and a wider audience*.

Under this output, a central information base will be designed, established, maintained and strengthened to enable the sharing and exchange of CC related information products on fisheries and aquaculture. These products will include *inter alia* scientific reports and papers, climate resilient adaptation protocols and research dissertations on fisheries and aquaculture. The central information base will be housed within the DoF's Climate Change Cell. The activities to be implemented are: Review existing information bases for climate change implications on fisheries, its habitats and biodiversity and ways and means mitigation and resilient adaptations – including related websites (of MoFL, DoF, BFRI, MoEF, DoE, DAE, CEGIS, WorldFish, IUCN, CBD, Wetland International, etc.); identify an appropriate portal for the DoFs CCC. If no appropriate existing portals are identified, a new interactive and user-friendly web portal would be established and linked to all related national and international web portals. Data, information and videos (video clips) will be collected and collated from relevant departments and institutions to share on the web portal including the lessons learned through implementation of this LDCF-funded project. This output also includes the development of the project's communication and awareness raising strategy.

Verifiable indicators: (see Appendix-1, Results Framework)

- Project website linked to DoF and FAOBD portal;
- Dissemination materials (Training manuals/flyers/ booklets/ leaflets/ posters/ fact sheets; videos, news on web); promotional materials (desk calendar, note book, year planner, caps, T-shirts, etc.); documents etc. produced and distributed to wider stakeholders;
- Newspaper Issues (special issues on Fish week, World Food Day, World Environment Day, International Biodiversity Day, etc.) and CC awareness issues of DoF-DoE.
- Project Newsletters (biannual; 8 issues) produced and distributed to wider stakeholders.

Output 4.2: *Project monitoring system operating providing systematic information on progress in meeting project outcome and output targets.*

Activities under this output include: **i)** The design and operation of the project's M&E system based on results-based management; **ii)** Refinement of indicators for monitoring of project targets and results.

Verifiable indicators: (see Appendix-1, Results Framework)

- 3 annual PIRs and monitoring reports (as per FAO-GEF guidelines).

Output 4.3: *Mid-term and final evaluation conducted.*

The output includes: **i)** Mid-term evaluation; and **ii)** Final project evaluation, including defining response strategies to recommendations provided by these evaluations and, if necessary, adjustment of project implementation.

Verifiable indicators: (see Appendix-1, Results Framework)

- Mid-term and final evaluation reports with recommendations (as per GoB, FAO-GEF requirements).

2.2 ADAPTATION BENEFITS

The project intends to build adaptive capacity among the fisheries and aquaculture dependent communities that are vulnerable to climate change impacts in two priority sites (south-western coastal zone and deeply flooded *haor* basin in the northeast) that are highly exposed to climate change induced perturbations. This will be done through the promotion of climate resilient fisheries, aquaculture and livelihoods technologies/approaches including relevant institutional capacity and policy improvements. A detailed screening of adaptation options and their benefits is presented in Appendix-4 (adaptation risks screeing matrix).

In the south-western coastal area of Bangladesh, the majority of the poor households' livelihood is dependent on small scale aquaculture (both fish and shrimps) and fishing related activities. Many poor and marginal households in the coastal area operate small scale fish and shrimp farms in ponds/ghers including homestead ponds. While in the deeply flooded *haor* site, the poor are more dependent on fishing during the monsoon season while working as farm labourers and in small scale aquaculture in perennial and seasonal ponds in dry season. However, in years when flooding damages crops and fish ponds, the poor are forced to out migrate to cities for cash income. Recognizing the fact that the poor households will be the hardest hit by the adverse impacts of climate change due to their low adaptive capacity, the proposed project will target the poor and smallholder aquaculture and fishing dependent households in both sites towards building their adaptive capacity to overcome the impacts of climate change on their livelihoods and livelihoods assets.

Engagement of men and women in local level climate vulnerability assessment and development of gender disaggregated adaptation needs and actions in the planning processes will promote gender inclusive adaptation to climate change impacts. Further support to these women headed aquaculture farm households in acquiring climate smart aquaculture practices, social mobilization, capacity building, value chain and market linkage development and access to local level decision making spaces will contribute to enhanced household incomes, inclusivity and adaptive capacity. All this will collectively facilitate ensuring gendered adaptation to climate change impacts in the fisheries sector.

The poor and smallholders in the project areas will benefit from project interventions both socially and financially including capacity development to adapt to the adverse impacts of climate change and variability. A total of 4,790 km^2 of coastal and inland aquatic ecosystems will be under climate resilient plans and management practices; 400,000 people will have reduced vulnerability to climate change, including 160,000 women, by the end of the Project. A summary of the adaptation benefits that will be generated by the Project is provided in Table 8 and they will be monitored using the Climate Change Adaptation Tracking Tool (CCA-TT).

Table 8: Summary of adaptation benefits by Project components (also refer to Appendix-1: Results Matrix for details).

Project Component	Project Adaptation Benefits and Targets
Overall impact (after replication through training and dissemination)	• Fisheries and aquaculture communities within 4,790 km^2 of coastal and inland aquatic ecosystems (command area) under initial climate resilient plans and management practices. • An estimated 400,000 people (22% of total population of the project sites) with reduced vulnerability to CC, about 40% women.
Component 1: Improved relevant national policies and strategies to facilitate climate resilient fisheries sector and development at all levels	• Revised national fisheries policy and aquaculture strategies leading to improved and climate resilient governance of the sector. • Enhanced capacity and knowledge of GoB and partners personnel, community leaders (at least 40% female), and private entrepreneurs on climate resilient inland capture fisheries and aquaculture.
Component 2: Strengthening knowledge and awareness of fisheries/aquaculture dependent communities facing the adverse impacts of climate change	• 70 communities adopt 15 local development plans and integrate DRM and EWS considerations in their fisheries and aquaculture management systems. • Collaborative Early Warning System (EWS) in place and appropriately connected to local environmental monitoring in at least 50 communities.
Component 3: Enhancing local adaptive capacity to support climate resilient fisheries and aquaculture management and alternative livelihoods in the face of climate change	Improved income, food security and nutrition in 70 communities, as measured by: • At least 15% increase in fisheries and aquaculture productivity in the targeted HHs. • At least 15% increase in income generation in targeted beneficiaries. • Around 70% of targeted households adopt climate resilient livelihoods under existing and projected climate change.
Component 4: Dissemination of best practices and lessons learned, monitoring and evaluation	• Strengthened knowledge base on climate resilient fisheries and aquaculture technologies and livelihoods. • Communication and dissemination materials on CCA options and lessons learned produced and disseminated to the beneficiaries and other stakeholders.

2.3 COST EFFECTIVENESS

Cost-effectiveness has been fully considered in the design of the Project, through broad consultations held with co-financing partners and relevant stkeholders during the PPG phase. The activities of the baseline and co-financing partners cover most of the development issues related to inland capture fisheries and aquaculture in Bangladesh. This FAO/GEF Project builds on a large baseline co-financing of USD 16 350 000 – the GEF/LDCF funding constitutes around 25% of the entire Project cost. The project is designed to engage the

government staff, including those providing extension services at District/Sub-district levels, to reach the vulnerable communities in the pilot areas, which cost is partially borne by the government as in-kind contribution to the project.

3. FEASABILITY (FUNDAMENTAL DIMENSIONS FOR HIGH QUALITY DELIVERY)

3.1 Environmental and Social Risk Screening

Environmental and social risk screening was conducted during the PPG phase and LTO certifies the risk to be **Low**. The risk screening checklist and certification form can be found in **Appendix 11a/11b** .

Below are the summary of review by components:

Component 1: Climate resilient fisheries sector through relevant national capacity development

There are no on-the-ground activities under this Component, so there is no apparent danger of unintended environmental impacts.

Component 2: Strengthening knowledge and awareness of fisheries/aquaculture dependent communities facing the adverse impacts of CC

Based on previous experiences, there are no anticipated negative environmental impacts of these activities. On the contrary, strengthening knowledge and awareness of local communities forms the basis for introducing climate resilient adaptation technologies, which contributes to reducing negative environmental impacts.

Component 3: Enhancing local adaptive capacity to support climate resilient fisheries and aquaculture management and alternative livelihoods in the face of CC

Under this Component, the Project will work with 9 sub-districts (upazilas) in the Southwestern coastal zone and the Norhteastern *haor* basin to introduce CC resilient fisheries, aquaculture and alternative livelihood technologies that generate socio-economic and adaptation benefits. Under component 4, the Project will introduce mechanism to monitor the socio-economic and environmental impact of activities under this Component to ensure that they are indeed beneficial.

Component 4. Dissemination of best practices and lessons learned, monitoring and evaluation

The project will undertake monitoring and evaluation (M&E) at the upazila, district and national level of ecological, social and economic variables. The outcomes of this monitoring will be communicated to the national stakeholders to inform their decision-making on climate resilient fisheries and aquaculture options. Overall, this will support national capacity to monitor environmental impacts.

The following assumptions underlie the project design.

- Project activities are unlikely to be undermined by extreme climate events during implementation.

- Adaptation priorities for climate change are unlikely to be undermined by national emergencies or civil unrest.
- Local communities and the DoF personnel at intervention sites will take ownership of activities on the ground.
- Infrastructure (for piloting climate resilient adaptations) constructed will be safe from theft and vandalism.
- Local communities participating in developing and implementing the project interventions will accept the piloting activities proposed by the project.
- There is sufficient surface water and groundwater available, with appropriate management, to meet local demand.
- Governmental institutions will have sufficient capacity to support the project‘s activities.
- Sufficient national financial resources will be available to maintain the project‘s interventions in the long term.
- Large-scale infrastructural developments – that would disrupt project activities – will not take place within the project areas during project implementation.
- The areas/habitats where climate resilient adaptation technologies will be implemented are not completely degraded.

3.2 Risk Management

Risks and Mitigation measures

The project's potential risks, the risk rating and the mitigation strategy can be seen in Table 9, below:

Table 9: Risk matrix.

Risk	Level of risk	Mitigation strategy
Inadequate knowledge and skills among the relevant agency officials on climate change issues and adaptation strategies for the fisheries sector	Low	Training and orientation of DoF and relevant agency officials on climate smart fisheries management strategies and approaches
Lack of availability of relevant climate related data and information	Medium	Establish instant access to data on relevant weather parameters (rainfall, drought, temperature, cyclones, flooding, cold spells, etc.) for the project areas by means of strengthened collaboration between the National Meteorological Department and Flood Forecasting Center of BWDB.
Current weather forecasting/ early warning systems focuses on maritime aspects (safety of sea going vessels/boats) ignoring the needs of the aquaculture farmers who frequently face disaster risks	High	Develop specific protocols with the Meteorological Department, for disseminating weather messages that the coastal aquaculture farmers need to protect their farms from climate related extremes. Specific weather forecasting systems can be developed with the organizations operating ‘community radio’ in the coastal areas or using mobile phones.
Lack of data on localized	Medium	Train and equipped local DoF officials with salinity

salinity concentration of waters		meters to collect salinity data on regular basis and map the project sites by plotting spatiotemporal data on salinity concentrations and plan the aquaculture farming systems accordingly
Non availability of quality fish and shrimp seeds in the locality	Medium	Support quality fish/shrimp seeds via the private sector and interested fish farmers. Leverage different projects (viz. FTF Fisheries and IAPP) to achieve greater focus on quality fish and shrimp seeds production at the local level
Weak coordination between relevant government agencies (e.g. DoF, DAE, DoL, BWDB) both at national and local levels	Medium	Formation of inter-departmental coordination committee at the HQ level, while at the district and upazila levels through the District Development Coordination Committee (DDCC) and Upazila Development Coordination Committee (UDCC) respectively, to achieve greater coordination among the relevant government agencies.
Increased disaster risks and climate change threats in the coastal area in the form of cyclones, storm surges, salinity intrusion, increased climate variability etc.	Medium	Time climate related extremes events or stressors better with aquaculture cycles/ systems. For example, stocking of ponds can be done after the possible timing of cyclones/flooding and the fish/shrimps can be harvested before the possible time of such disaster events. Inclusion of fast growing, saline and drought tolerant fish species can be adopted to reduce risks. In addition, rapport can be built with the local disaster volunteers to ease early warning systems targeting the coastal aquaculture communities.

4. IMPLEMENTATION AND MANAGEMENT ARRANGEMENTS

4.1 INSTITUTIONAL ARRANGEMENTS

4.1.1 General Institutional Context and Responsibilities

The MoFL will be the project steering agency for smooth implementation of the project activities. The government agencies, partner organizations and institutes those will be involved in project implementation and coordination are presented in Section 1.2.2: Agencies and Stakeholders.

The Department of Fisheries (DoF) has overall responsibility for management of fisheries and aquaculture in Bangladesh, and will be the lead agency of the the Project implementation. Several other government agencies also have policies, plans and activities related to fisheries and aquaculture. The DoF will coordinate with the other relevant government agencies, such as BFRI, DoE and DAE, which are also involved in policies, plans and acvitities related to fisheries and aquaculture.

4.1.2 Coordination with other Ongoing and Planned Related Initiatives

This Project will coordinate with and build on the activities of other ongoing, planned and recently phased out projects. Some GEF and non-GEF national projects that focus on adaptation to climate change have been or are currently being implemented in Bangladesh. These initiatives would provide opportunities for synergies and knowledge exchange with this LDCF-financed project. The project management team will coordinate efforts and establish linkages with similar on-going and recently finished projects. This Project will focus on

collating, synthesizing and disseminating the lessons learned from these projects. This approach will: i. maximize synergies; and ii. avoid duplication of activities.

In addition to the baseline activities that are described in the Section 1.3.1, close in-country coordination will be sought specifically with the following initiatives:

a. Coordination with other non-GEF/LDCF financed projects

Comprehensive Disaster Management Programme Phase II (CDMP-Phase II) [42] is a collaborative initiative of the Ministry of Disaster Management and Relief, Government of Bangladesh and UNDP with the support of UK Aid, European Union, Australian Aid, Norwegian Embassy and Swedish SIDA. During its Phase I, it laid the foundations for institutionalizing risk reduction approach and framework. The Phase II (2010-2015), with overall budget of USD 76.32 million, is designed to further scale up and mainstream the Disaster Risk Reduction (DRR) and Climate Change Adaptation (CCA) into all sectors. The key mandate of CDMP-II is to strengthen the national disaster management capacities to reduce risk and to improve response and recovery through comprehensive approach. Its Activity 5.5.1: 'Strengthening technical capacity of Department of Agricultural Extension (DAE) and Department of Fisheries and Livestock (DoFL) for effective assessment and management of climate change risks', is directly relevant to the proposed LDCF project. CDMP-II is supporting the DoF to establish an office of Climate Change Cell (CCC) to facilitate climate compatible fisheries sector development programmes.

Community-based Adaptation to Climate Change in Ecologically Critical Areas (CBA-ECA) is a project (2011-2014) funded by the Department of Environment, Climate Change Trust Fund, the Ministry of Environment and Forest and UNDP, and is implemented by IUCN Bangladesh, Sukhi Bangla Foundation (SBF) and Hand to Embrace the Less Privileged (HELP) Cox's Bazar. The Cox's Bazar is located in Teknaf Peninsula Ecologically Critical Areas (ECA) and Sonadia Island ECA, in the Southern-East Coastal Region. The area is located on the seafront, and is very vulnerable to climate change induced impacts, which is adversely affecting the life and livelihood of local people and further causing additional stress on the local biodiversity. The project worked with the vulnerable communities in Cox's Bazar to increase local resilience to climate change impacts, promote conservation of biodiversity and diversify livelihood options.

b. Coordination with other GEF/LDCF financed projects

Bay of Bengal Large Marine Ecosystem (BOBLME) (2009-2015) is a GEF-funded International Waters (IW) project, with GEF funding of USD 12 million. It concerns a large marine ecosystem stretching across eight countries: Bangladesh, India, Indonesia, Malaysia, Maldives, Myanmar, Sri Lanka and Thailand. It is executed by FAO in close coordination with the participating countries. The Strategic Action Programme (SAP) was adopted in 2015 and a BOBLME follow-up project to support the implementation of the SAP is under preparation. The aquaculture demonstration activities in the southwest coastal area of the LDCF project will directly contribute to the implementation of Component 4 of the BOBLME SAP on social and economic considerations and its focus on reducing vulnerability to natural

[42] The CMDP-II Project website is found at: http://www.cdmp.org.bd/. The UNDP Project Document is found at http://www.bd.undp.org/content/dam/bangladesh/docs/Projects/CDMP/Final%20Signed%20CDMP%20II.pdf

hazards, climate variability and climate change, and increasing climate resilience of coastal communities as well as coastal ecosystems.

Community-based Adaptation to Climate Change through Coastal Afforestation[43] is a LDCF-funded project (2009-) implemented by UNDP and executed by the Forest Department of the Ministry of Environment and Forestry (MoEF), with LDCF funding of USD 3.3 million. It is implemented in five coastal districts (Barguna, Patuakhali, Bhola, Noakhali, and Chittagong) most susceptible to the effects of climate change. The project aims to enhance resilience of coastal communities as well as introduce new options for income generation, by adopting the successful community-based adaptation intervention known as the "Forest, Fish and Fruit" (FFF) model. By planting protective and productive vegetation, with an elevated mound and ditch structure interspersed with fish nursery ponds, the FFF model not only provides additional sources of income, but has also established a 'green shield' surrounding some of Bangladesh's most vulnerable communities. An estimated 14,350 households have been able to use this model to manage and protect their capital in a changing climate.

Ecosystem-based Approaches to Adaptation (EbA) in the Drought-prone Barind Tract and Haor "Wetland" Area is a LDCF-funded project, to be implemented by UNEP with LDCF funding of USD 5.2 million and executed by the Minsitry of Environment and Forestry (MoEF).

The Project will also be aligned with **i.** the GEF-funded *Assisting Least Developed Countries (LDCs) with country-driven processes to advance National Adaptation Plans (NAPs)* is a UNEP/UNDP support programme for strengthening technical capacity of local and national institutions to plan, implement and upscale ecosystem based approach (EbA) of conservation-management and **ii.** the GEF-funded project *Enhancing Capacity, Knowledge and Technology Support to Build Climate Resilience of Vulnerable Developing Countries* by sharing lessons learned on implementing and maintaining EbA through the web-based platform that has been developed by the project.

4.2 IMPLEMENTATION ARRANGEMENTS

4.2.1 Roles and esponsibilities of Government partners

The project will be implemented jointly by the DoF, Government of Bangladesh, and the FAO, in close consultation with the Bangladesh Fisheries Research Institute (BFRI), the Department of Agricultural and Extension (DAE), and the Department of Environment (DoE). The DoF will be the lead government agency and will bear a lead technical responsibility for the project. FAO will provide technical supervision and operational support to the Project. The DoF will appoint its senior staff member to be the Project Director (PD) , who will be the lead person responsible for ensuring smooth execution of the project on behalf of the Government of Bangladesh. The PD will be supported by a DPD (Deputy Project Director) and three support staffs, appointed from the DoF, which will be duly reflected in the Technical Assistance Project Proposal (TAPP) for the GoB internal clearance. The relevant field offices of DoF (DD, DFO and SUFO/UFO) will also be actively involved in the implementation process of the project. A Project Implementation Unit (PIU) will be established at DoF and PD will lead the PIU, supported by one support staff. These will be

[43] The full information is found at:
https://www.thegef.org/gef/sites/thegef.org/files/documents/document/Bangladesh%20-%20Coastal%20Afforestation%20-%20November%202011.pdf

treated as their co-financing support to the project. The PD will actively participate in the selection and recruitment process of consultants and project personnel. PD will also recommend and provide clearance to specifications for procurement of all goods and services including Letter of Agreements (LoAs). The Terms of Reference of PD is included in Appendix-6.

Project Steering Committee (PSC): The PSC will assume the overall responsibility of providing guidance to the Project imeplemetation team, and will meet at least once a year. The PSC will be established and chaired by the Secretary of MoFL. The PSC will be the highest level committee to steer the Project and will comprise representatives from DoF, BFRI, ERD, IMED, Planning Commission, MoEF, FAO, IFAD, WorldFish and IUCN. The Project Director (PD) as the Member-Secretary of the PSC will call PSC meeting in consultation with the Chairman of the PSC. The composition of PSC is proposed as in the following, while the PSC Chair can co-opt additional members or observers when necessary and appropriate:

1	Secretary, MoFL	Chairman
2	Director General, DoF	Member
3	Joint Secretary (Fisheries), MoFL	Member
4	Joint Chief, MoFL	Member
5	Director General, BFRI	Member
6	FAO Representative in Bangladesh	Member
7	National Project Coordinator, FAO	Member
8	Representative of ERD	Member
9	Representative of PC	Member
10	Representative of IMED	Member
11	Representative of MoEF	Member
12	Representative of DoE	Member
13	Representative of WorldFish	Member
14	Representative of IUCN	Observer
15	Representative of IFAD	Member
16	Representative of Private sector, to be co-opted by the PSC.	Member
17	Representative from fishers/ fish farmers' society, to be co-opted by the PSC.	Member
18	Representative from Civil Society, to be co-opted by the PSC.	Member
19	Project Director (PD)	Member Secretary

FAO and DoF may also endorse inclusion of the representatives of fishers/fish farmers' society, private sector and civil society organizations as PSC members. The PSC will review and approve results-based Annual Work Plans, Budgets and Procurements and provide recommendations for resolving any issues or constraints faced by the project. The PSC will be critical to ensure:

- close linkages between the Project and other relevant ongoing projects and programmes;
- sustainability of key Project outcomes, including up-scaling and replication;
- effective coordination among the Government partners working under this Project; and
- review and approve Annual Work Plans, Budgets and Procurement (AWP/B and Procurement).

Project Implementation Committee (PIC): A PIC will be established under the PSC, and will be chaired by the Director General, DoF. The PIC will comprise representatives from DoF, BFRI, FAO, DAE, CDMP, MoEF. World Fish, IFAD and other co-funders can be invited to PIC meetings and other relevant institutions can be invited as observers as appropriate. The Project Director (PD) as the Member-Secretary of the PIC will call meetings in consultation with the Chairman of the PIC and NPC. The PIC will meet regularly as required to oversee, monitor and discuss project implementation and management. The composition of PIC will be as follows:

1	Director General, DoF	Chairman
2	PSO (FRSS & Planning), DoF	Member
3	FAO Representative in Bangladesh	Member
4	Deputy Chief, MoFL	Member
5	District Fisheries Officer, Khulna	Member
6	District Fisheries Officer, Bagerhat	Member
7	District Fisheries Officer, Satkhira	Member
8	District Fisheries Officer, Sunamganj	Member
9	District Fisheries Officer, Brahman Baria	Member
10	District Fisheries Officer, Moulvibazar	Member
11	Representative of MoEF	Member
12	Representative of BFRI	Member
13	Representative of DLS	Member
14	Representative of DAE	Member
15	Representative of DoE	Member
16	Representative of BMD	Member
17	Representative of WorldFish	Member
18	Representative of IUCN	Observer
19	Representative of IFAD	Member
20	Representative of Private sector related to fisheries, to be nominated by DG, DoF	Member
21	Representatives of fishers/ fish farmers society, to be nominated by DG, DoF	Member
22	Representative from Civil Society, to be nominated jointly by DoF and FAO.	Member
23	National Project Coordinator, FAO	Member
24	Project Director (PD)	Member Secretary

The PIC will provide technical guidance in preparation of the technical reports; endorse annual work plan and procurement, review progress, implementation and M&E reports. The PIC in consultation with PMTSU will provide recommendations to the PSC in addressing project activities and issues of concern.

Project Management and Technical Support Unit (PMTSU): A Project Management and Technical Support Unit (PMTSU) will be established at FAO Bangladesh Office for better coordination, management and implementation of the project. Both PIU and PMTSU will work in close collaboration for achieving the targeted outputs of the project. The PMTSU will comprise national and international technical and operational team.

The PD and the NPC would have strong and active coordination, cooperation and consensus for expediting and smooth implementation of all project activities and they will ensure the quality and timing of the tasks and delivery of the technical experts hired by the project. The

PD and the NPC will also support the PMTSU with jointly agreed consensus to settle all LoAs, CoAs, MoUs, recruitments and procurements.

The eight Field Facilitators (FFs) and two Field Supervisors (FSs) will be working in the project field sites. In addition to their usual reporting lines under the DoF field officials, they will also report to the PIU. The project personnel will be recruited by the PMTSU and is expected to maintain strong and active participation of PD, report to the NPC and to the BH – the FAOR in Bangladesh. The PMTSU will carry out its functions in line with the FAO rules and regulations.

The following are the key functions of the PMTSU:

- technically identify, plan, design and support all activities;
- liaise with the government agencies;
- prepare the Annual Work Plan and Budget (AWPB) and Procurement plan;
- responsible for day-to-day implementation of the project in line with the AWPB and all procurements;
- ensure a results-based approach to project implementation, including maintaining a focus on project results and impact as defined by the RF indicators;
- monitor project progress;
- responsible for the elaboration of FAO PPRs and the annual PIR, and the PCR; and
- facilitate and support the midterm review and final evaluation of the Project.

Field Offices will be established for the demonstration site activities and the field office staff will work under the supervision of the PIU. Two Field Offices will be established in local district fisheries offices - one in the South-western coastal area (suggested location: Khulna) and one in the North-eastern *haor* area (suggested location: South Sunamganj). Required repair, renovation and furnishing of field offices would be borne by the project fund. The project will strengthen IT communication among field offices, PIU and PMTSU, including interactive conference facilities and systems to provide early warning information to the communities. The Field Offices will work closely with fishers, aquaculture farmers, and other local stakeholders as well as local district/sub-distrcit DoF staff. Each Field Office consists of a Field Supervisor, and five Field Facilitators (FFs) in the SW area office and three Field Facilitators (FFs) in the NE area office. The Field Sueprvisors and Field Facilitors are recruited under the LDCF funds and report to the both PMTSU and PIU. The Field Offices will also be staffed with other specialised, part-time national consultants who will support demonstration site activities.

Project provisions: The PMTSU will also be supported by a series of national and international consultants (see Appendix-3, Results-based budget) to provide inputs to the Project. The LDCF-financed project will prioritize the appointment of national consultants. Consequently, international consultants will only be appointed when local expertise is limited. In such cases, national and international consultants will collaborate to develop national expertise on CCA and promote the sustainability of project activities. The detailed Terms of Reference (ToR) for key Project personnel is shown in Appendix-6. These provisions will be finalized at the early stage of the project implementation, and are tentatively identified as:

International positions:

1) International Team Leader, 01 position, 08 man-months (4 mms in Y1, 2 mms during mid-term evaluation of Y2 and 2 mms before terminal evaluation)
2) Golda Hatchery Expert (International), 01 position, 02 man-months
3) Crab Hatchery expert (International), 01 position, 02 man-months

4) Climate change and adaptation expert (international), 01 position, 03 man-months
5) Gender and socio-economic expert (International), 01 position, 05 man-months
6) M&E Expert (International), 01 position, 01 man-month

National positions:

1) National Project Coordinator (NPC), 01 position, 04 years
2) Operations Manager, 01 position, 04 years
3) Capacity building and training expert, 01 position, 04 years
4) Training and Logistic Associate, 01 position, 04 years
5) National Income Generation Expert, 01 position, 04 years
6) National Gender and Socio-economic Analyst, 01 position, 04 years
7) National Climate Change and Risk Management Expert, 01 position, 04 years
8) National Community Management Expert (Fishery & Livelihood), 02 positions, 04 years
9) Field Supervisor, 02 positions (1 in the SW and 1 in the NE), 04 years
10) Field Facilitators, 08 positions (5 in the SW and 3 in the NE), 04 years
11) National M&E Specialist, 01 position, 03 years
12) Fisheries Policy and Strategy Analyst, 01 position, 01 year
13) IT support and Data Management Expert, 01 position, 10 man-months
14) Procurement and Administration Support Officer, 01 position, 04 years
15) Finance and Accounts Support Officer, 01 position, 04 years
16) Office/logistics assistant, 01 position, 04 years

National Project Coordinator (NPC) is to be funded by LDCF, will lead work of the MTSU and coordinate closely with the PD on behalf of FAO. The NPC reports to the BH on operational issues and to the LTO/LTU on technical issues. The NPC is a full-time position. The NPC is physically accommodated at FAO Bangladesh Office and is occasionally accommodated at DoF when necessary for smooth and timely implementation of project activities. The NPC will lead and organize the day-to-day execution of the project, and lead communications with government agencies. The NPC will also be responsible for providing technical advice and guidance in his/her area of technical expertise. The detailed Terms of Reference (ToR) of NPC is shown in Appendix-6.The NPC will report on Project progress to PSC meetings, and will develop and submit semi-annual PPRs and annual PIRs. In addition to technical and substantive duties, the NPC will:

- Oversee creation of a participatory monitoring and evaluation system for the Project's work;
- Ensure real-time monitoring of Project progress and alert the PD, BH and LTO of potential problems that could result in delays in implementation;
- Help identify consultant candidates and work with the BH to ensure their timely recruitment;
- Ensure the Project's effective and efficient work with stakeholders in the pilot areas;
- Help organize and supervise consultant inputs;
- Oversee creation of the Project's approach to managing and sharing knowledge, and to identifying and disseminating lessons learned; and
- Communicate, advocate and engage in policy dialogue.

Field Supervisors (FS): Two FSs will be recruited (1 for the SW area and 1 for the NE area), who will be responsible for overall supervision of the project activities in their respective

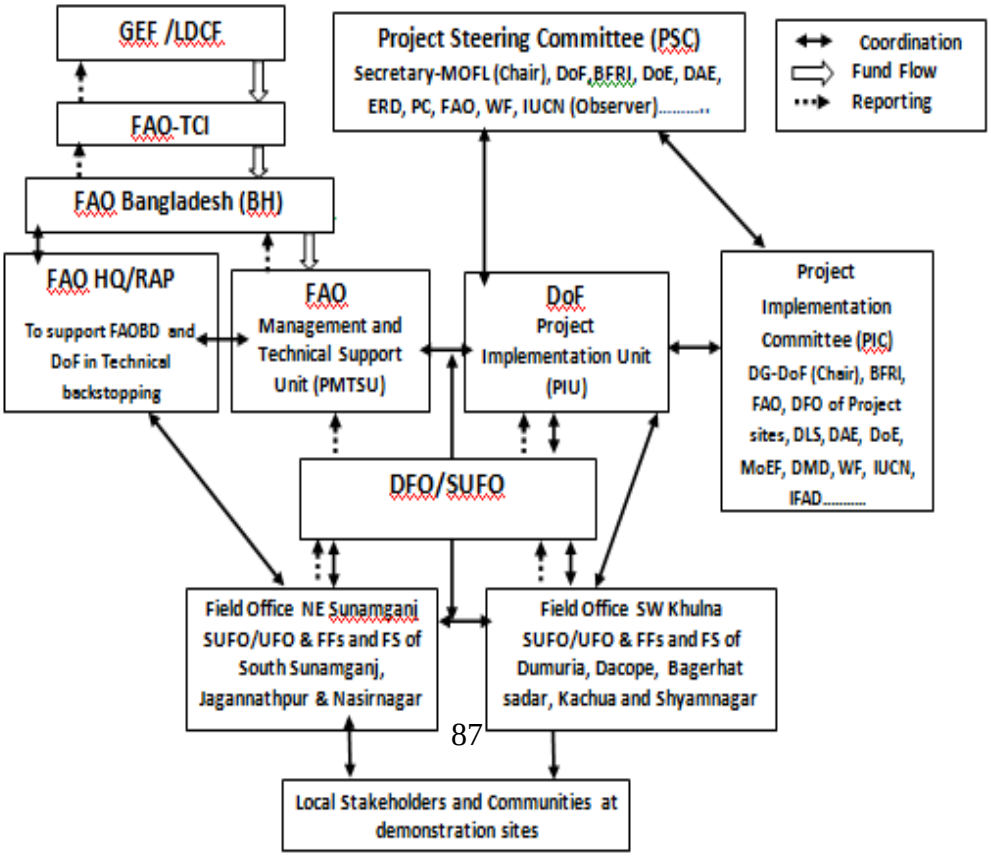
areas of coverage. The FSs will take the lead in communicating with districts/sub-districts, advising on the preparation of local work plans, designing and running training for district/sub-district officials and other district-level stakeholders, designing local-level activities, trouble shooting at the local level, ensuring Project inputs are delivered effectively to local stakeholders. The detailed Terms of Reference (ToR) of FS is shown in Appendix-6.

Field Facilitators (FF): Eight FFs will be recruited (1 each for the upazilas of Dumurai, Dacope of Khulna district, Bagerhat Sadar and Kachua of Bagerhat district and Shyamnagar of Satkhira district in the SW area; and South Sunamganj, Jagannathpur of Sunamganj district and Nasirnagar upazila of Brahman Baria district in the NE area). They will be responsible for the coordination and planning of all activities at the demonstration sites. Field Facilitator of Jagannathpur will coordinate works of Agdar beel of Hakaluki haor, Juri Upazila of Maoulvibazar district with field DoF officials. The FFs are the Project's key strategic mechanism for working with local communities and for building the capacity of districts/sub-districts in climate change adaptation in the fisheries and aquaculture sector. The detailed Terms of Reference (ToR) of FF is shown in Appendix-6.

Other key partners: Other partners supporting the execution will work closely with the DoF through their nominated technical focal points at the national and local levels. These other key partners include: BFRI, DAE, DoE, DMD, WorldFish, IFAD, CEGIS, IUCN and the concerned districts/sub-districts.

One important mechanism for collaboration will be through Letters of Agreement (LoA), Contract Agreements (CoA) and Memorundum of Understanding (MoU) that will be elaborated and signed between FAO and the respective collaborating partner. This will include government and civil society organizations, for example this could be the mechanism to perform some of the activities through WorldFish (e.g. covering some of the national and or international consultancies). Funds received under a LoA, CoA, MoU will be used to execute Project activities in conformity with FAO's rules and procedures.

4.2.2 Project Organogram: See Figure 5.



F**igure 5.** Project Organogram.

4.2.3 Executing responsibilities (GEF Agency)

a. *FAO's role and responsibilities, both as the GEF Agency and as an executing agency, including delineation of responsibilities internally within FAO*

FAO will be the GEF implementing and executing agency. As the GEF Agency, FAO will be responsible for Project oversight to ensure that project implementation adheres to GEF/LDCF policies and criteria, and that the Project efficiently and effectively meets its objectives and achieves expected outcomes and outputs as delinited in the Project document. FAO will report on Project progress to the GEF Secretariat and financial reporting will be to the GEF Trustee. FAO will closely supervise and provide technical guidance to the Project by drawing upon its capacity at the global, regional and national levels, through the concerned units at FAO-HQ, the Regional Office for Asia and the Pacific in Bangkok and the FAO Representation in Bangladesh. The project will be executed by FAO through Direct Execution (DEX) modality in close consultation with DoF. FAO, in consultation with the PD, will deliver procurement and contracting services of experts/ consultants to the project in accordance with FAO rules and procedures, as well as financial services to manage the GEF resources.

Under FAO's Direct Execution (DEX) modality, the FAO Representation in Bangladesh will hold the budget and operational responsibilities for this project. The budget holder (BH) will schedule the technical backstopping and monitoring missions as required. The FAO Representative will ensure timely operational, administrative and financial management of the Project's GEF/LDCF resources, including the disbursement of funds. The PMTSU (through the NPC or through the FAOR-Bangladesh as appropriate), in consultation with the PD will: (i) review and clear annual work plans and budgets and monitor them once approved; (ii) review procurement and sub-contracting material and supporting documentation and obtain internal FAO approvals; (iii) schedule technical backstopping and monitoring missions; (iv) participate in project supervision missions; (v) prepare financial and monitoring reports (see Section 4.4.5: "Financial management of and reporting on GEF/LDCF resources"); (vi) provide operational oversight to contracted activities carried out by the Project partners; and (vii) prepare budget revisions; (viii) be accountable for safeguarding resources from inappropriate use, loss, or damage; (ix) be responsible for addressing recommendations from oversight offices, such as Audit and Evaluation; and (x) establish a multi-disciplinary FAO Project Task Force to support the project. FAO will ensure required logistic supports for timely and smooth implementation of the field activities. For smooth implementation of the field level activities and better coordination with FAO and other relevant organizations vehicles to be hired from the project as per requirement (on requisition). Day to day logistic supports (stationaries, photocopy, computer, multimedia, furniture, cell phone/modem expenses, etc.) for DoF PIU and field offices will be provided from the project fund on requisition.

4.2.4 Operations and Reporting

Reporting of operations, including the procurement of goods and contracting of services for Project activities, will be done in accordance with the FAO rules and procedures. FAO will, in close coordination with the PD, be responsible for the timely recruitment of key project posts listed above such as the NPC, the FSs, and the FFs. In accordance with FAO rules and procedures, final approval of the use of GEF/LDCF resources rests with the FAO Representation in Bangladesh.

FAO Lead Technical Officer (LTO): The Aquaculture Officer of the Regional Office for Asia Pacific (RAP) will be the LTO for the Project and will have primary accountability for the timeliness and quality of the technical services provided throughout project execution. The LTO will request support of the FAO Fisheries and Aquaculture Resource management Division (FIR) when specific technical guidance is needed outside of his/her technical expertise. The LTO will work in close collaboration with the National Project Director. In cooperation with the FIR, the LTO will provide technical guidance to the Project team to ensure delivery of quality technical outputs. The LTO will coordinate the provision of appropriate technical backstopping from all the concerned FAO units represented in the Project Task Force (PTF). The primary areas of LTO support to the project include:

i. Review and ensure clearance by the relevant FAO technical officers of all the technical Terms of Reference (ToR) of the project team and consultants;
ii. ensure clearance by the relevant FAO technical officers of the technical terms of reference of the Letters of Agreement (LoA) and contracts;
iii. In close collaboration with the NPC, DoF and PD, lead the selection of the project staff, consultants and other institutions to be contracted or with whom an LoA will be signed;
iv. Review and clear technically reports, publications, papers, training material, manuals, etc.;
v. Monitor technical implementation as established in the project RF;
vi. Review the Project Progress Reports (PPRs) and prepare the annual Project Implementation Review (PIR);
vii. Represent FAO in the PSC;
viii. Provide technical support to the NPC and to Project Director;
ix. Provide technical inputs to procurement and contract documentation;
x. Review and clear final technical products delivered by consultants and contract holders financed by GEF/LDCF resources before the final payment can be processed;
xi. Support the PMTSU in preparing the AWPB, with support from the Budget Holder, LTO/LTU and clearing it prior to submission to the PSC.

FAO Project Task Force (FAO-PTF)*:* The FAO-PTF will be led by the Budget Holder and include LTO, TCI, and relevant officers from the technical units supporting the project's work. The main role of the PTF is to provide technical guidance to the LTO and the PMU for the implementation of the project, contribute to specific project activities as required, and troubleshoot should implementation issues arise. Participating units from across FAO will be involved in supporting the Project's work and in ensuring that the Project stays on track to achieve its overall objectives and indicators of success. When appropriate, other units within RAP or HQ will provide technical support in areas such as: land and watershed management, innovative funding mechanisms, gender, and climate change resilience. The FAO Investment Centre Division (TCI) will provide adaptive management support and results-based management oversight and guidance to the LTO and the participating units.

FAO GEF Coordination Unit in Investment Centre Division (TCI-GEF) will review and approve PPRs, annual PIRs and financial reports and budget revisions. The TCI-GEF will undertake supervision missions if considered necessary in consultation with the LTO and the BH. The PIRs will be included in the FAO GEF Annual Monitoring Review submitted to GEF by the TCI-GEF. The TCI-GEF will ensure that the project's mid-term review and final evaluation meet GEF requirements by reviewing evaluation ToRs and draft evaluation reports. Should the PIRs or mid-term review highlight risks affecting the timely and effective implementation of the project, the TCI-GEF will work closely with the BH and LTO to make the needed adjustments in the project's implementation strategy.

The FAO Finance Division will provide final clearance of any budget revisions will provide annual Financial Reports to the GEF Trustee and, in collaboration with the TCI-GEF will call for project funds on a six-monthly basis from the GEF Trustee.

4.3 LEGAL CONTEXT

All activities stipulated in the ProDoc shall be implemented accordingly. However, should there be a need to make changes/modifications to any of the agreed activities; all signatories of the Project Document must concur, before such changes are made.

The following amendments may be made to the original Project Document, even if they are signed by the FAO Representative only, provided the later assumes that all other signatories of the Project Document have no objections to the proposed amendments:

- Revisions in, or additions to, any of the Annexes of the Project.
- Revisions which do not involve significant changes in the project's immediate objectives, outputs, and which are attributable to a reordering of the activities or inputs in order to improve the realization of the objectives or the outputs.
- Mandatory yearly revisions which are made to reorganize the provision of already scheduled inputs, to reflect an increase in the cost of expert services or other services due to inflation.

The government cooperating agency designated on the cover page to this project document has been duly delegated by the government coordinating authority to carry out this project and accordingly will follow the DEX accounting, financial reporting and auditing procedures set forth in the documents as may be amended by FAO-GEF from time to time.

4.4 FINANCIAL PLANNING AND MANAGEMENT

4.4.1 Financial Plan by Component (refer to Appendix-3 for the Results-based budget) is shown in Table 10.

Table 10: Summary of component-wise LDCF funding and co-financing (in USD).

Component/output	DoF	DoE	MoEF/IUCN	FAO	World Fish	IFAD	Total Co-financing	% Co-financing	LDCF	% LDCF	Total
Component 1: Climate Resilient fisheries sector through relevant national capacity development	**714,286**	**0**	**285,714**	**380,952**	**952,381**	**0**	**2,333,334**	**70%**	**1,000,000**	**30%**	**3,333,334**
O 1.1: Climate induced risks and vulnerability of fisheries and aquaculture sub-sectors at national level assessed with special focus on climate sensitive areas	238,095	0	285,714	95,238	952,381	0	1,571,429	82%	355,305	18%	1,926,734
O 1.2: Relevant national policies and strategies reviewed, gaps analyzed and revised by incorporating fisheries and aquaculture adaptation to climate change	238,095	0	0	285,714	0	0	523,810	97%	17,820	3%	541,630
O 1.3: Capacity building strategy for DoF, other relevant GoB agencies, private sector and community-based organizations developed to facilitate climate resilient fisheries sector developed	238,095	0	0	0	0	0	238,095	28%	626,875	72%	864,970
Component 2: Strengthening knowledge and awareness of fisheries/aquaculture dependent communities facing the adverse impacts of climate change	**2,142,857**	**95,238**	**285,714**	**904,762**	**952,381**	**476,190**	**4,857,143**	**91%**	**480,000**	**9%**	**5,337,143**

O 2.1: Community perceptions, risks and vulnerability of fisheries, aquaculture and livelihoods to adverse impacts climate change	714,286	0	0	428,571	476,190	238,095	1,857,143	96%	82,000	4%	1,939,143
O 2.2: Communities' awareness and capacity enhanced to assess, plan and implement fisheries, aquaculture and livelihood adaptations to climate change risks	1,428,571	95,238	285,714	476,190	476,190	238,095	3,000,000	88%	398,000	12%	3,398,000
Component 3: Enhancing local adaptive capacity to support climate resilient fisheries and aquaculture management and alternative livelihoods in the face of climate change	**2,380,952**	**142,857**	**666,667**	**2,523,810**	**0**	**1,904,762**	**7,619,048**	**69%**	**3,448,680**	**31%**	**11,067,728**
O 3.1: Site specific climate resilient and gender differentiated fisheries and aquaculture technologies developed and adopted by the target communities	904,762	142,857	380,952	1,333,333	0	952,381	3,714,286	65%	2,019,280	35%	5,733,566
O 3.2: Community-led and gender differentiated dissemination systems of adaptation technologies developed and adopted	761,905	0	95,238	857,143	0	952,381	2,666,667	79%	724,400	21%	3,391,067
O 3.3: Innovative environmental monitoring and information tools for the communities to obtain and exchange information to improve resiliency and increase production in the fisheries and aquaculture systems developed and implemented	238,095	0	95,238	190,476	0	0	523,810	58%	380,000	42%	903,810

O 3.4: Manuals on climate resilient and gender differentiated fisheries, aquaculture and livelihoods technologies developed and adopted by the communities, DoF and other relevant government and non-government entities	476,190	0	95,238	142,857	0	0	714,286	69%	325,000	31%	1,039,286
Component 4: Dissemination of best practices and lessons learned, monitoring and evaluation	**571,429**	0	0	**190,476**	0	0	**761,905**	**76%**	**238,095**	**24%**	**1,000,000**
O 4.1: Lessons learned and best practices from the use of different CC resilient fisheries, aquaculture and livelihood technologies/approaches documented and communicated to relevant stakeholder groups	380,952	0	0	95,238	0	0	476,190	91%	45,940	9%	522,130
O 4.2: Project monitoring system operating providing systematic information on progress in meeting project outcome and output targets	190,476	0	0	95,238	0	0	285,714	83%	57,155	17%	342,869
O 4.3: Mid-term and final evaluation conducted	0	0	0	0	*0*	0	0	0%	135,000	100 %	135,000
SubTotal	*5,809,524*	*238,095*	*1,238,096*	*4,000,000*	*1,904,762*	*2,380,952*	*15,571,429*	**75%**	*5,166,775*	**25%**	**20,738,204**
Project Management	**290,476**	**11,905**	**61,905**	**200,000**	**95,238**	**119,048**	**778,571**	**75%**	**258,339**	**25%**	**1,036,910**
Total	**6,100,000**	**250,000**	**1,300,000**	**4,200,000**	**2,000,000**	**2,500,000**	**16,350,000**	**75%**	**5,425,114**	**25%**	**21,775,114**

4.4.2 LDCF Inputs

The LDCF funds will finance inputs needed to generate the outputs and outcomes under the Project. These include: (i) local and international consultants for technical support on adaptation technologies and Project management; (ii) support to capacity building; (iii) support to knowledge management; (vi) LoA/contracts with technical institutions and service providers supporting the delivery of specific Project activities on the ground; (v) international flights and local transport and minor office equipment; and (vi) training and awareness raising material.

4.4.3 Government Inputs

The Government of Bangladesh through DoF will provide in-kind support in terms of office facilities (including electricity, telephone and fax line, internet line facility, cleaning, etc.) and time of key staff, including the PD. The districts/sub-districts will provide technical assistance, coordination and participation in project activities. The Government – DoF, DoE, and MoEF - will also provide substantial investments into climate resilient fisheries and aquaculture practices across the concerned sub-districts. These investments in-kind – are estimated to value in total: USD7 650 000 (Table 10):

DoF: USD 6 100 000
DoE: USD 250 000
MoEF: USD 1 300 000

4.4.4 FAO and other Partner Inputs

FAO will provide technical assistance, backstopping, training and supervision of the execution of activities financed by LDCF resources. The LDCF project will complement and be co-financed by several projects and activities implemented by the FAO Representation in Bangladesh funded by the FAO Technical Cooperation Programme (TCP) and by various donors through trust fund arrangements. The total value of FAO's support amounts to USD 4 200 000 (Table 10), and consist of the following:

Building trade capacity of small–scale shrimp and prawn farmers in Bangladesh: USD 500 000
Integrated agriculture intervntions for improved food and nutrition security: USD 1 000 000
Providing recovery assistance to waterlogged people: USD 200 000
Improving food safety in Bangladesh: USD 2 000 000
Enhancing aquaculture production for food security and rural development: USD 500 000

WorldFish will provide baseline co-financing through its Enhanced Coastal Fisheries (EcoFish) project at a total value of USD 2 0000 000 (Table 10).

IFAD is providing co-financing through its two rpojects in the *haor* area on Haor infrastructure and livelihood improvement (HILIP) and Climate Adaptation and Livelihood Protection (CALIP) at a total value of USD 2 500 000 (Table 10).

4.4.5 Financial Management of, and Reporting on LDCF Resources

Financial Records - FAO shall maintain a separate account in United States dollars for the Project's LDCF resources showing all income and expenditures. Expenditures incurred in a currency other than United States dollars shall be converted into United States dollars at the

United Nations operational rate of exchange on the date of the transaction. FAO shall administer the Project in accordance with its regulations, rules and directives.

Financial Reports - The BH shall prepare six-monthly project expenditure accounts and final accounts for the project, showing amount budgeted for the year, amount expended since the beginning of the year, and separately, the un-liquidated obligations as follows:

1. Details of project expenditures on a component-by-component and output-by-output basis, reported in line with project budget codes as set out in the Project document, as at 30 June and 31 December each year.
2. Final accounts on completion of the Project on a component-by-component and output-by-output basis, reported in line with project budget codes as set out in the Project document.
3. A final statement of account in line with FAO Oracle Project budget codes, reflecting actual final expenditures under the Project, when all obligations have been liquidated.

The BH will submit the above financial reports for review and monitoring by the LTO and the FAO TCI-GEF. Financial reports for submission to the donor (GEF/LDCF) will be prepared in accordance with the provisions in the GEF Financial Procedures Agreement and submitted by the FAO Finance Division.

Budget Revisions - Semi-annual budget revisions will be prepared by the BH in accordance with FAO standard guidelines and procedures.

4.5 Local Contracts, Letter of Agreements or Contractual Service Agreements and Cost Overruns

The BH is authorized to enter into Local Contracts, Letter of Agreements or Contractual Agreements including the provision of technical assistance with any stakeholders/base line co-financiers for implementaing some of the specialized technical activities of the project outputs.

The BH is authorized to enter into commitments or incur expenditures up to a maximum of 20 percent over and above the annual amount foreseen in the Project budget under any budget sub-line provided the total cost of the annual budget is not exceeded. Any cost overrun (expenditure in excess of the budgeted amount) on a specific budget sub-line over and above the 20 percent flexibility should be discussed with the TCI-GEF with a view to ascertaining whether it will involve a major change in Project scope or design. If it is deemed to be a minor change, the BH shall prepare a budget revision in accordance with FAO standard procedures. If it involves a major change in the Project's objectives or scope, a budget revision and justification should be prepared by the BH for discussion with the GEF Secretariat.

Savings in one budget sub-line may not be applied to overruns of more than 20 percent in other sub-lines even if the total cost remains unchanged, unless this is specifically authorized by the TCI-GEF upon presentation of the request. In such a case, a revision to the Project document amending the budget will be prepared by the BH.
Under no circumstances can expenditures exceed the approved total Project budget or be approved beyond the NTE date of the project. Any over-expenditure is the responsibility of the BH.

Under no circumstances can expenditures exceed the approved total Project budget or be approved beyond the NTE date of the project. **Any over-expenditure is the responsibility of the BH.**

4.5.1 Audit - The Project shall be subject to the internal and external auditing procedures provided for in FAO financial regulations, rules and directives and in keeping with the Financial Procedures Agreement between the GEF Trustee and FAO.

The audit regime at FAO consists of an external audit provided by the Auditor-General (or persons exercising an equivalent function) of a member nation appointed by the Governing Bodies of the Organization and reporting directly to them, and an internal audit function headed by the FAO Inspector-General who reports directly to the Director-General. This function operates as an integral part of the Organization under policies established by senior management, and furthermore has a reporting line to the governing bodies. Both functions are required under the Basic Texts of FAO which establish a framework for the terms of reference of each. Internal audits of imprest accounts, records, bank reconciliation and asset verification take place at FAO field and liaison offices on a cyclical basis.

4.6 PROCUREMENT

Careful procurement planning is necessary for securing goods, services and works in a timely manner, on a "Best Value for Money" basis, and in accordance with the Rules and Regulations of FAO. It requires analysis of needs and constraints, including forecast of the reasonable timeframe required to execute the procurement process. Procurement and delivery of inputs in technical cooperation projects follow FAO's rules and regulations for the procurement of supplies, equipment and services (i.e. Manual Sections 502 and 507). Manual Section 502: "Procurement of Goods, Works and Services" establishes the principles and procedures that apply to procurement of all goods, works and services on behalf of the Organization, in all offices and in all locations, with the exception of the procurement actions described in Appendix A – Procurement Not Governed by Manual Section 502. Manual Section 507 establishes the principles and rules that govern the use of Letters of Agreement (LoA) by FAO for the timely acquisition of services from eligible entities in a transparent and impartial manner, taking into consideration economy and efficiency to achieve an optimum combination of expected whole life costs and benefits ("Best Value for Money").

As per the guidance in FAO's Project Cycle Guide, the BH will draw up an annual procurement plan (Appendix-5) for major items which will be the basis of requests for procurement actions during implementation. The plan will include a description of the goods, works, or services to be procured, estimated budget and source of funding, schedule of procurement activities and proposed method of procurement. In situations where exact information is not yet available, the procurement plan should at least contain reasonable projections that will be corrected as information becomes available. PD would recommend and coordinate preparation of proper specifications for all procurements in close collaboration with the NPC and reflect DoFs need and suggest best choices in all procurement of the project.

4.7 MONITORING AND REPORTING

Monitoring and evaluation of progress in achieving project results and objectives will be done based on the targets and indicators established in the project Results Framework (RF) (Appendix-1 and described below). A detailed schedule of project reviews will be developed by the project management, in consultation with project implementation partners and representatives of the participating communities, during the early stages of project initiation, and incorporated in the Project Inception Report. Such a schedule will include Annual Work Plan and Budget (AWPB; see Appendix-2)[44], methodologies and tentative time frames for Tripartite Reviews, PSC and PIC Meetings, Participatory Monitoring and Evaluation of the Project by the participating communities, Annual Project Report (APR). The project Monitoring and Evaluation Plan has been budgeted at USD 155 000 (see Table 11). Monitoring and evaluation activities will follow FAO and GEF monitoring and evaluation policies and guidelines. Mid-term M&E Report would justify achievements and lackings and reason thereof. Integrated into all Outcomes, the Project monitoring and evaluation approach will also facilitate learning and mainstreaming of project outcomes and lessons learned into international good practice as well as national and local policies, plans and practices.

4.7.1 Oversight and Monitoring Responsibilities

Monitoring & Evaluation Specialist will develop criteria for participatory Monitoring of the project activities in consultation with project team. Field data will be linked to Electronic Database developed by the project. Appropriate participatory mechanism and methodology for performance monitoring and evaluation will be established at the very outset of the project. The benefits reaching to the participating communities at every stage of the project cycle would be monitored with appropriate parameters will be endorsed at the inception meeting. The foundation of monitoring and evaluation activity will be based on Logical Framework Approach (LFA). Overall Monitoring and Evaluation format for the project will follow or subject to the instructions and guideline of the FAO-TCI-GEF Unit. The M&E tasks and responsibilities clearly defined in the project's detailed Monitoring Plan (see below) will be achieved through: (i) day-to-day monitoring and supervision missions of Project progress (PMTSU); (ii) technical monitoring of indicators (PMTSU); (iii) district-level monitoring of participatory land restoration plans (districts with support from FF and PMTSU); (iv) midterm and final evaluations (independent consultants and FAO Evaluation Office); and (v) continual oversight, monitoring and supervision missions (FAO).

At the initiation of implementation of the LDCF project, the PMTSU will set up a project progress monitoring system. Participatory mechanisms and methodologies for systematic data collection and recording will be developed in support of outcome and output indicator monitoring and evaluation.

The Project's Inception Phase begins upon FAO approval of the Project and signature of the GCP Agreement. During the three-month inception phase, specific Project M&E issues will be refined and subsequently discussed at the Inception Workshop (IW): (i) the Project's RF indicator targets and their means of verification, and assumptions and risks; (ii) the M&E indicators and their baseline; (iii) drafting the required clauses to include in consultants' ToRs to ensure they complete their M&E reporting functions (if relevant); and (iv) provision of a detailed overview of reporting, M&E requirements and the respective M&E tasks among the project's different stakeholders; (iv) based on the Project RF and the GEF Climate Change Adaptation Tracking Tool (CCA-TT), finalization of the first annual work plan; (v) financial

[44] Overall results-based Work plan of the Project is shown in Appendix-2.

reporting procedures and obligations, and arrangements for annual audit; (vi) schedule of PSC meetings. Roles and responsibilities of all project organization structures will be clarified and meetings planned.

The Inception Phase will conclude with the holding of an Inception Workshop (IW) organized by the PMTSU. The IW will: (a) assist all stakeholders to fully understand and take ownership of the Project; (b) review and confirm/finalize Project indicators and results framework with stakeholders; (c) Review the Project's first AWP with results-based annual budget; (d) discuss the roles, functions, and responsibilities within the Project's decision-making structures; (e) review a detailed M&E work plan and budget based on the M&E plan summary presented in Table 11 below. The first PSC meeting will be held within the two months of the IW.

The day-to-day monitoring of the Project implementation will be the responsibility of the PMTSU under the leadership of the NPC. One PMTSU staff member will be clearly mandated to be responsible for Project M&E. M&E is to be driven by the preparation and implementation of an AWPB followed up through six-monthly PPRs. The preparation of the AWPB and semi-annual PPRs will represent the product of a unified planning process between main project partners. As tools for results-based-management, the AWP/B will identify the actions proposed for the coming project year and provide the necessary details on output targets to be achieved, and the PPRs will report on the monitoring of the implementation of actions and the achievement of output targets.

4.7.2 Indicators and Information Sources

The project's RF indicators will be the main reference point for M&E of Project outcomes including adaptation benefits (see Annex 1: Results Framework). The RF's indicators and means of verification will be applied to monitor Project performance and impact. Data collected will be of sufficient detail to track outputs and outcomes and flag Project risks early on, using FAO's monitoring procedures and progress reporting formats. The PMTSU will link each AWPB to the RF indicators to ensure that Project implementation maintains a focus on achieving the impact indicators as defined. A key element to this will be the elaboration and monitoring of output target indicators in each AWP/B that cumulatively lead to outcome level results. Output targets will be monitored on a semi-annual basis and outcome target indicators will be monitored on an annual basis if possible or as part of the mid-term and final evaluations.

The main sources of information to support the M&E programme will be: (i) participatory progress monitoring and workshops with beneficiaries; (ii) on-site monitoring of the implementation of adaptation technology; (iii) PPRs prepared by the PMTSU; (iv) consultants' reports; (v) participants training tests and evaluations; (vi) mid-term and post project impact and evaluation studies completed by independent consultants; (vii) financial reports and budget revisions; (viii) PIR prepared by the LTO supported by the BH and the PMTSU; and (ix) FAO supervision mission reports.

4.7.3 Reports and their Schedule

The NPC with support from PD (DoF), PMTSU and FAO/GEF will be responsible for timely preparation and submission of specific reports that will be prepared under the M&E programme. The PMTSU would be responsible for preparation and submission of the following reports: (i) Inception Report (IR); (ii) Annual Work Plan and Budget (AWPB); (iii) Project Progress Reports (PPRs); (iv) Annual Project Implementation Review (PIR); (v)

Technical Reports (TRs); (vi) Financial Progress Reports (FRs); (vii) Co-financing reports (CoFRs) as necessary; (viii) Other Publications and Dissemination Activities and (ix) Project Completion Report. In addition, assessment of the GEF Climate Change Adaptation Tracking Tool (CCA-TT, Appendix-10) against the baseline (completed during project preparation) will be required at mid-term and final project evaluation.

Project Inception Report: The Inception Workshop (IW) is to be convened within 01-02 months after project start-up, PMTSU set-up and fielding of the NPC and PD. The Inception Report is to be prepared in consultation with the BH and the DoF. The Inception Report is a key reference document and must be prepared and shared with participants to formalize various agreements and plans decided during the IW. To insure smooth transition between project design and inception, the IW and work planning process will benefit from the extensive input of parties responsible for providing technical support to the original project design. The report will include:

a. detailed 04 years work plan for the duration of the project, and current year's Annual Work Plan and budget, Procurement plan and fine tuning of ToRs for project professionals, experts/ consultants;

b. project establishment and start-up activities, updated amendments to project activities/ approaches/ conditions, if any, that may affect project implementation;

c. a detailed first year AWPB, a detailed project monitoring plan based on the monitoring and evaluation plan;

d. ToRs/ LoAs/ MoUs for sub-contractual services, progress to date on project establishment; and

e. as part of the *Inception Report* the PMTSU will prepare a draft Reports List, detailing the technical reports that are expected to be prepared on key areas of activity during the course of the Project, and tentative submission dates.

The report will be submitted to the Chair of the PMTSU, all members, the LTO and the TCI-GEF and the PD for review and comments before its finalization, no later than 01 (one) month after the IW. The report should be cleared by the BH, LTO and the TCI-GEF and uploaded in Field Programme Management Information System (FPMIS) by the BH.

Annual Work Plan and Budget (AWPB): The draft of the first AWPB will be prepared by the PMTSU in consultation with the Project Technical Committee (PTC) and reviewed at the project IW. IW inputs will be incorporated and the PMTSU will submit a final draft AWPB within two weeks of the IW, get approval from the PSC and submit to the BH. For subsequent AWPB, the PMTSU will organize a project progress review and planning meeting for its review. Once comments have been incorporated, the BH will circulate the AWPB to the LTO and the TCI-GEF on a no-objection basis prior to uploading in FPMIS by the BH. The AWPB must be linked to the project's Results Framework indicators so that the project's work is contributing to the achievement of the indicators. The AWPB should include detailed activities to be implemented to achieve the project outputs and output targets and divided into monthly time frames and targets and milestone dates for output indicators to be achieved during the year. A detailed project budget for the activities to be implemented during the year should also be included together with all monitoring and supervision activities required during the year (See AWPB format in Execution Agreement).

Project Progress Reports (PPR): Progress Reports in prescribed format as per requirement of GEF (usually half-yearly and annual) will be prepared and be submitted to the GEF, FAO and

to the Executing Department and concerned Ministry of the GoB. PPRs will be prepared based on the systematic monitoring of output and outcome indicators identified in the project's RF (Annex 1). The purpose of the PPR is to identify constraints, problems or bottlenecks that impede timely implementation and to take appropriate remedial action. In consultation with the PSC, the PMTSU will prepare semi-annual PPRs and submit them to the BH in a timely manner. Each PPR will be submitted by the BH to the LTO and TCI-GEF for review on a no-objection basis. In the event of LTO/TCI-GEF comments, the PMTSU will incorporate them and the revised PPR is re-submitted to the LTO for final endorsement prior to final approval by the TCI-GEF, uploading in FPMIS and sharing with stakeholders. (See PPR format in Execution Agreement.

Annual Project Implementation Review (PIR): The PMTSU will prepare the annual PIR covering the period July (the previous year) through June (current year). The draft PIR will then be reviewed by the LTO and subsequently submitted by the BH to the TCI-GEF for review and approval no later than 10 September each year. The TCI-GEF will upload the final report on FPMIS and submit it to the GEF Secretariat and Evaluation Office as part of the Annual Monitoring Review report of the FAO-GEF portfolio. The TCI-GEF will provide the updated format when the first PIR is due.

Annual Financial and Operational Report. Financial Reports should be prepared by the PMTSU on a regular basis as per requirement of GEF, FAO and the Executing Department and concerned Ministry of the GoB. Inception Report should clearly finalize the submission schedule of the Financial Reports. The Government of Bangladesh requires the project to submit regular financial and operational reports as when needed.

Technical Reports: Technical reports will be prepared as part of Project outputs and to document and share project outcomes and lessons learned. Brief summary reports will be prepared by the National and International Consultants, and by those supported on Study Tours and Fellowships at the completion of their assignments for evaluation by the Executing Agency. Technical Reports are detailed documents covering specific areas of analysis or scientific specializations within the overall project, e.g. hydrology, flora, fauna, stakeholders and socio-economics, gender, fisheries and aquaculture, etc. Technical Reports may also be prepared by external consultants as Final Reports for their technical inputs, and should be comprehensive, specialized analyses of clearly-defined areas of work performed within the framework of the project and its sites.

The drafts of any technical reports must be submitted by the PMTSU to the BH who will share it with the LTO. The LTO will be responsible for ensuring appropriate technical review and clearance of the said report for uploading to FPMIS. Copies of the technical reports will be distributed to the Project partners as appropriate.

Co-financing Reports: The PMTSU will be responsible for collecting the required information and reporting on in-kind and cash co-financing as indicated in the project document/CEO Request. The PMTSU will submit the report to the BH in a timely manner on or before 31 July of every year covering the period July (the previous year) through June (current year). (See co-financing report format in Execution Agreement).

GEF Tracking Tools: Following the GEF policies and procedures, the tracking tool for Climate Change Adaptation will be submitted at three moments: (i) with the Project document at CEO endorsement; (ii) at the project's mid-term evaluation; and (iii) with the Project's terminal evaluation or terminal report. At Project mid-term and end, the tracking tools will be completed by the PMTSU in close consultation with the PD.

Other Publications and Dissemination Activities: In order to ensure international dissemination of project results, a high-quality publication of results are to be prepared, based upon the progress of the project activities (half-yearly newsletters, special issues in national dailies, booklets/flyers) Project Completion Report and previous project publications. Finally, it will be useful to hold at least one international workshop at which policy makers in neighboring countries can be made aware of Bangladesh's progress in achieving sustainable coastal and wetland biodiversity management. A web-link of the project with FAO-Dhaka web will be hosted containing various reports, newsletters, workshop/seminar reports, case-studies, fliers, posters, special issues, videos, etc. for wider dissemination of project achievements.

Project Completion/ Terminal Report: The Project Completion/ Terminal Report would be prepared and submitted at least 02 (two) month prior to the last day of the project life. This comprehensive report will summarize all Component and Subcomponent-wise activities, achievements, outputs and outcomes of the Project, lessons learned, objectives met, structures and systems implemented, including any deviations, financial statements, etc. and will be the definitive statement of the Project's activities over the 04 (four) year duration. It will also lay out recommendations for any follow-up, further steps that may need to be taken to ensure sustainability and replicability of the Project's activities. The main purpose of the Terminal Report is to give guidance at ministerial or senior government level on the policy decisions required for the follow-up of the project, and to provide the donor with information on how the funds were utilized. The Terminal Report is accordingly a concise account of the main products, results, conclusions and recommendations of the project, without unnecessary background, narrative or technical details. The target readership consists of persons who are not necessarily technical specialists but who need to understand the policy implications of technical findings and needs for insuring sustainability of project results. Work is assessed, lessons learned are summarized, and recommendations are expressed in terms of their application to Bangladesh's ongoing work to develop a climate resilient fisheries and aquaculture sub-sector. This report will specifically include the findings of the final evaluation. The PMTSU will submit a draft version of the Project Completion/ Terminal Report to the BH. A final Project review meeting should be held to discuss the draft Project Completion/ Terminal Report before it is finalized by the PMTSU and approved by the FAO LTO and the TCI-GEF. (See instructions for Terminal Report in Execution Agreement.

4.7.4 Monitoring and Evaluation Plan Summary

Table 11: Summary of the main M&E reports, responsible parties, timeframe and costs.

Type of M&E Activity	Responsible Parties	Time-frame	Budgeted costs
Inception Workshop (IW)	PMTSU, supported by the LTO, BH, and TCI-GEF	Within three months of project start up	USD 10 000
Project Inception Report	PMTSU, cleared by LTO, BH, and TCI-GEF	No later than one month post IW.	-
Field based impact monitoring	PMTSU, DoF and other relevant agencies to participate.	Periodically, to be determined at inception workshop.	USD 40 000
Supervision visits and rating of progress in PPRs and PIRs	PMTSU, BH, LTO, other participating units and TCI-GEF	Annual or as required	The visits of the LTO and the TCI-GEF will be paid by GEF agency fee. The visits of the PC will be paid from the project travel budget
Project Progress Reports	PMTSU, with inputs from PD, PSC and other partners	Semi-annual	USD 0 (as completed by PMTSU)
Project Implementation Review report	BH and LTO supported by PMTSU and cleared and submitted by the TCI-GEF to the GEF Secretariat	Annual	Paid by GEF agency fee
Co-financing Reports	PMTSU, PD	Annual	0 (as completed by International Team Leader and PMTSU)
Technical reports	PMTSU, LTO & Participating Units	As appropriate	-
Mid-term Evaluation	External Consultant, FAO Office for Evaluation in consultation with the project team including the TCI-GEF and other partners	At mid-point of project implementation	USD 45 000 for independent consultants and associated costs.
Final evaluation	External Consultant, FAO independent evaluation unit in consultation with the project team including the TCI-GEF and other partners	At the end of project implementation	USD 45 000 for external, independent consultants and associated costs.
Terminal Report	PMTSU, BH, LTO, TCSR Report Unit	At least two months before the end date of the Execution Agreement	USD 15 000 (including translation)
Total Budget			**USD 155 000**

4.8 PROVISION FOR EVALUATION

The project will be subject to Annual Review once every twelve months by representatives of the Bangladesh Government and FAO the executing agency and the first such meeting to be held within the first twelve months of the start of full implementation. The Project's PMTSU

and the PIU shall prepare an Annual Project Report (APR) and submit to each TPR meeting. Half-yearly progress reports will be produced to ensure that design and inception activities are closely monitored. Separate reviews of each site component to be conducted. Monitoring and Evaluation Indicators will be built into the project in consultation with FAO/GEF. An independent Mid-Term Evaluation (MTE) will be undertaken towards the middle of Project Year-2 to review progress and effectiveness of implementation in terms of achieving Project objective, outcomes and outputs. Findings and recommendations of this evaluation and review will be instrumental for bringing improvement in the overall project design and execution strategy for the remaining period of the project's term if necessary. FAO (the Office of Evaluation) will arrange for the MTE in consultation with project management. The evaluation will, *inter alia:*

i. review the effectiveness, efficiency and timeliness of project implementation;
ii. analyse effectiveness of partnership arrangements;
iii. identify issues requiring decisions and remedial actions;
iv. propose any mid-course corrections and/or adjustments to the implementation strategy as necessary; and
v. highlight technical achievements and lessons learned derived from project design, implementation and management.

A Project Terminal Report will be prepared for consideration at the terminal tripartite meeting. Draft report will be distributed sufficiently in advance to allow in-house review and technical clearance by the FAO and GEF prior to the terminal tripartite review. An independent Final Evaluation (FE) will be carried out three months prior to the terminal review meeting of the project partners. The FE would aim to identify the project impacts and the sustainability of project results and the degree of achievement of long-term results. This evaluation would also have the purpose of indicating future actions needed to expand on the existing project in subsequent phases, mainstream and up-scale its products and practices, and disseminate information to management authorities responsible for related issues to ensure replication and continuity of the processes initiated by the project.

4.9 COMMUNICATION AND VISIBILITY

The Project will enhance communication and visibility of fisheries and aquaculture adaptation technologies and approaches at two levels:

1. National level through support to dissemination of best practices and lessons learnt under Component 4 from this as well as baseline projects, supported by systematic data collection, development of the project's communication and awareness raising strategy, and provision of information with appropriate communication tools (e.g. a web portal, audio-visuals, project newsletters, etc.) on lessons learned and best practices from various CC resilient fisheries, aquaculture and livelihood technologies/approaches.
2. Field level through support under Component 3 to community-led and gender differentiated dissemination systems, involving establishing pilot backyard farms where women can use and exchange knowledge on better seed and feed to increase production, and the ICT-based information services to be set up under the project to help the small-holder fish/shrimp farmers from losses of fish/shrimp due to both rapid and slow onset of climate risks in both the hotspots, development of a follow-up monitoring system for the innovative technologies in collaboration with the target

communities, and development of manuals on climate resilient and gender differentiated fisheries and aquaculture and livelihoods technologies.

In summary, proposed tools for enhancing visibility include:

- **General aspects** – PMU will ensure that general aspects of project visibility are fulfilled, such as: (i) visual identity of project and partners; (ii) highlighting the project' partners in media interviews, press releases, etc.); (iii) supporting documents such as photos of logos in the field, photos of activities, copies of press released will be included in the progress and final reports.
- **Basic visibility at field level** – At this level visibility strategy will consider: (i) signboards, display panels and banners; (ii) operational publications and materials such as training manuals and posters; (iii) supplies and equipment.
- **Printed publications** – Brochures, leaflets, flyers, newsletters and other publications to project activities and results.
- **Website and webpage** – It will include: (i) partnerships and links; (ii) project information (objectives, activities, expected results, etc.).
- **Audiovisuals** – (i) Films for distribution by the media (mainly for television, campaigns and Internet); (ii) operational films (films to provide technical information and practices to local population, project partners and authorities).
- **Public events** – Many types of events are possible and attracting media interest will always be a key consideration in making the events cost-effective. Press release will be an integral part of the events.

5. SUSTAINABILITY OF RESULTS

5.1 SOCIAL SUSTAINABILITY

The LDCF-financed project was developed in consultation with a wide range of stakeholders, including: i. government representatives; ii. implementing agencies; iii. local communities; iv. national academic institution's representatives and v. NGOs. This participatory approach has created ownership of the project by all stakeholders. As a result, project interventions will be sustained beyond the project implementation period. A participatory approach will also be used during implementation of the project to further promote: i. stakeholder ownership; and ii. sustainability of project interventions beyond project life.

To promote sustainability, the LDCF-financed project will include: Firstly, the technical capacity of local and national institutions – such as DoF, BFRI, DoE – to plan and implement CCA and be strengthened through training. This training will provide national and local government members with the tools needed to access national funding for climate change from the National Climate Funds. To support the technical training provided to national and local government, training on the benefits of, and how to implement CCA in fisheries and aquaculture sector will be provided to local government and communities in these areas. Secondly, revisions to national policies, plans and strategies – including budget allocations will promote the upscaling and sustainability of CCA. Finally, the implementation of adaptation interventions – including habitat restoration and minor earth work that conserves water in fish habitats (ponds, ghers, beels, haors, wetlands) and reduces erosion will increase the evidence base for this approach. Strengthening the information base on CCA will in turn support similar initiatives that are implemented in the future.

The long-term sustainability of the adaptation interventions will be promoted by strengthening the capacity of targeted communities to maintain restored ecosystems and earth works for water conservation and reduce erosions. Additionally, CBOs/OGs will be further

mobilized into Farmer Field Schools (FFSs) and established at the selected intervention sites. These FFSs will coordinate management of restored ecosystem in the long term. Moreover, FFS will meet bi-monthly to share and exchange experiences and information. Sustainability of CCA will also be supported by the: i. CCA protocols that will be presented to the line ministries; and ii. training local government officials, FFSs and community members at intervention sites (and from surrounding communities) on this approach.

The impacts of climate change on aquaculture and inland capture fisheries incur immense costs to Bangladesh, resulting from lost income and products, damage to infrastructure and services such as roads and water storage and increased costs of water treatment, flood prevention, and reduced resilience to shocks and climate change. This Project will contribute to socio-economic benefits in the affected areas through demonstration activities at the five vulnerable sites, which will include:

- Sustained livelihoods for people dependent on fisheries and aquaculture: The project will pay special attention to assessing the impacts of CC on vulnerable groups, such as female headed households, and identifying gender sensitive interventions.
- The project will ensure that it works with a representative number of female-headed households at demonstration sites; that recommended CCA technologies and approaches are benefiting men and women equally;
- Improved food security in demonstration areas, with a particular focus on enhancing ecosystem resilience to climate change for sustained provision of ecosystem services necessary fisheries and aquaculture production.

5.2 ENVIRONMENTAL SUSTAINABILITY

The Project will reduce the vulnerability to impacts of climate change of people dependent on fisheries and aquaculture resources through demonstration and scaling up of climate resilient technologies and management practices. The ecosystem approach to fisheries and aquaculture will be applied to enhance the resilience of aquatic ecosystems to withstand increased frequency and severity of climate chocks, such as floods and droughts. Environmental sustainability will also be ensured through positive impacts of the introduced adaptation technologies and approaches on a range of ecosystem services at demonstration areas, and in the longer term on larger areas through upscaling of best practices. Ecosystem services that will be targeted include water regulation and sediment retention, conservation of habitats important for fisheries and aquaculture production and climate regulation through reduction of GHG emissions and enhanced carbon sequestration at selected sites.

5.3 FINANCIAL AND ECONOMIC SUSTAINABILITY

At the national level, financial sustainability of climate resilient fisheries and aquaculture technologies and approaches introduced by the Project will be ensured through mainstreaming of best practices into sectoral policies related to fisheries, agriculture, environment and DRR, and integration of adaptation priorities and frameworks into sector budgets. At the local level, adaptation technologies will be promoted that give local fishers and aquaculture communities financial and economic incentives to adopt them, i.e. adaptation technologies have to generate economic benefits to the communities in the short as well as longer term in order to be considered sustainable.

5.4 SUSTAINABILITY OF CAPACITIES DEVELOPED

At the national level, a capacity building strategy will be developed encompassing a wide range of stakeholders, such as DoF, other relevant GoB agencies, private sector and CBOs. The strategy will initially be implemented using Project funding, but will gradually be integrated into relevant sector budgets to ensure sustained support to capacity development in the sector. At the local level, the Project is designed to enhance the adaptive capacity of communities dependent on fisheries and aquaculture. These capacities will be sustained through establishment of an information platform and community-led dissemination systems of adaptation technologies using the latest ICT that will be embedded in the DoF structures and offices at district and sub-district level.

5.5 APPROPRIATENESS OF TECHNOLOGY INTRODUCED

The selection of the best fisheries and aquaculture technologies and management practices for demonstration and upscaling will be based on assessment of their environmental and socio-economic sustainability and appropriateness for different types of aquatic systems and socio-economic contexts. Moreover, the final selection of technologies will be undertaken in close consultation with local stakeholders, including local communities and individual fishers, CBOs, etc. depending on the type and nature of the technology, using well established decision support methods and tools.

5.6 INNOVATION, REPLICATION AND SCALING UP

The Project is innovative in the sense that it addresses climate change vulnerability and adaptation in fish and fish farming communities, a sector that has been underrepresented and often overlooked not only in Bangladesh but worldwide (reflected in detail in CEO Endorsement Request). The production and delivery of fish is fundamental for the food security and nutrition of millions of people in Bangladesh, of outmost importance for women and their provision of protein for their families and newly-born. On the other hand the aquatic systems and fishery is often an open access resource for the poorest of the poor, presenting a challenge for the conservation of biodiversity and ecosystem services and climate change can make the situation much worse if measures are not taken targeting the sector.

Improving adaptation in fisheries and aquaculture is also a win-win approach because increased resilience is often based on better management practices; therefore all the activities and outputs should drive and contribute to improved management of resources and improved food security and development.

The activities to enhance local adaptive capacity have a great potential for scaling up and replication if the other two components of the project are also well implemented. The approach proposed here can also be replicated in other countries and regions.

6. ANNEXES

Appendix-1: Results Framework

Appendix-2: Work Plan (results based)

Appendix-3: Results-budget

Appendix-4: Adaptation risks screening matrix.

Appendix-5: Procurement Plan

Appendix-6: Terms of Reference for Key Project Personnel

Appendix-7: Overall justification (Vulnerability assessment and matrix) of the selection of pilot sites.

Appendix-8: Relevant sectoral policies, strategies, action plans and multilateral agreements.

Appendix-9: Beneficiary selection criteria

Appendix-10: GEF-Climate Change Adaptation (CCA) Tracking Tool

Appendix 1: Results Framework

Objectives	Outcome/ impact indicators	Baseline[45]	Mid-project Target	End of Project Target	Means of Verification and Responsible Entity
Project Objective: Building climate change (CC) adaptive capacity of vulnerable fisheries and aquaculture communities in Bangladesh	• Area of Coastal and inland aquatic ecosystems under climate resilient plans and management practices.	• Coastal and inland aquatic ecosystems are not under exact climate resilient plans and management practices; sporadic attempts are focused on ecosystem approach to fisheries and aquaculture management.	• **T**argeted fisheries and aquaculture communities within 2,395 km^2 of coastal and inland aquatic ecosystems under climate resilient plans and management practices	• Fisheries and aquaculture communities within 4,790 km^2 of coastal and inland aquatic ecosystems (command area) under initial climate resilient plans and management practices	GEF CC-A Tracking Tool, PIR, Mid-term and Final Evaluations (DoF, FAO) District and sub-district (upazila) level fisheries and aquaculture management plans District and sub-district statistical reports
	• Number of people (disaggregated by gender) with reduced vulnerability to climate change	• Almost all fishers and fish farmers' communities are vulnerable to climate change implications.	• An estimated 160,000 people with reduced vulnerability to CC, about 40 %women	• An estimated 400,000 people (22% of total population of the project sites) with reduced vulnerability to CC, about 40% women	

Outcomes and outputs per component:

Results Chain	Indicators	Baseline[46]	Milestones				End of Project Target	Means of Verification & Responsible Entities	Assumptions
			Year 1	Year 2	Year 3	Year 4			
Project Objective/Impact									
Component 1: **Climate resilient fisheries sector through relevant national capacity development**									

[45] To be established during first phase of project when LUS training and mapping and final identification and definition of pilots have taken place

[46] Value in the case of quantitative indicators and description of situation in the case of qualitative indicators. Please insert the year of the baseline

Results Chain	Indicators	Baseline[46]	Milestones				End of Project Target	Means of Verification & Responsible Entities	Assumptions
			Year 1	Year 2	Year 3	Year 4			
Outcome 1: **Improved relevant national policies and strategies to facilitate climate resilient fisheries sector and development at all levels.**	• National policy and strategies for fisheries and aquaculture sector strengthened. • Capacities to address CC in the fisheries and aquaculture sector strengthened.	Fisheries and Aquaculture Policies and Strategies are old, need review and updating incorporating gender, CC considerations and possible adaptation actions; base year late 2015. National capacities on CC adaptation approaches are minimal.	National fishery policy revised to include CC. Inland fisheries and aquaculture strategies revised to include CC.	- Enhanced capacity and knowledge of at least 170 people including GoB and partners personnel, community leader/ people (40% female), and private entrepreneurs on climate resilient inland capture fisheries and aquaculture.			-Revised national fisheries policy (1) and fisheries and aquaculture strategies (2). -Enhanced capacity and knowledge of GoB and partners personnel (100), community leader/ people (24) (40% female), and private entrepreneurs (14) on climate resilient inland capture fisheries and aquaculture.	Policy documents, minutes from meetings - amendments to policy and strategy areas; DoF and MoFL. Training manuals. Targeted capacity assessment surveys of fisheries and aquaculture stakeholders.	Policy reform processes in support of climate resilient fisheries and aquaculture continue to receive government support at the highest level.
Output 1.1: Climate induced risks and vulnerability of fisheries and aquaculture. sub-sectors at national level assessed with special focus	• National assessment of climate vulnerability and CC risks to fisheries and aquaculture. sub-sectors. • Number of	Climate induced risks and vulnerability of fisheries & aquaculture subsector have not been comprehensively assessed. No CC	Confirmation of Fisheries CC sensitive areas. Assessment of climate induced risks and vulnerability of fisheries & aquaculture subsector with due	0	0	0	Confirmation of fisheries CC sensitive areas 1 Report on Assessment of climate induced risks and vulnerability of fisheries and aquaculture with due	Assessment report; DoF & MoFL	DoF and other relevant GoB agencies have the capacity to assess risk and vulnerability of fisheries &

Results Chain	Indicators	Baseline[46]	Milestones				End of Project Target	Means of Verification & Responsible Entities	Assumptions
			Year 1	Year 2	Year 3	Year 4			
on gender and climate sensitive areas.	fishery sector climate sensitive areas identified	fisheries-sensitive areas are formally identified	consideration to gender and with focus on climate sensitive areas targeted by the project.				consideration to gender and with focus on climate sensitive areas targeted by the project.		aquaculture subsector with consideration of gender and focus on climate sensitive areas
Output 1.2: Relevant national policies and strategies reviewed (gaps analysed) and revised by incorporating fisheries and aquaculture adaptation to CC.	• Number of revised policies and strategies incorporating fisheries and aquaculture. adaptation to CC.	Fisheries and Aquaculture Policies and Strategies are old, need reviewing and updating incorporating CC considerations (gender sensitive) and possible adaptation actions; base year late 2015.	Updated review (report) of relevant fisheries policy and strategies. 01 revised fisheries policy and 02 revised strategies (inland capture and aquaculture) incorporating gender differentiated CC adaptation considerations and forecast budget allocations to adaption actions in revised	0	0	0	Revised and updated review report of fishery sector policy (1) Revised and updated inland capture fishery and aquaculture strategies (2)	Fisheries Policy and Strategy Review Report, revised policy and strategy documents; DoF and MoFL Including specific indications regarding DRM and EWS for fisheries and aquaculture.	Policy reform processes in support of climate resilient fisheries and aquaculture continue to receive government support of DoF, BFRI and other GoB agencies.

Results Chain	Indicators	Baseline[46]	Milestones				End of Project Target	Means of Verification & Responsible Entities	Assumptions
			Year 1	Year 2	Year 3	Year 4			
			strategies.						
***Output 1.3*:** Capacity building including a capacity building-strategy for DoF, other relevant GoB agencies, private sector and community-based organizations developed to facilitate climate resilient fisheries sector.	• Capacity needs assessment of DoF, BFRI and other related GoB agencies and capacity building strategy for DoF, other relevant GoB agencies and the private sector with subject areas. • Training manual on *Climate forecast application, DRM, CC mitigation & adaptation*	Low capacity of DoF, BFRI and other related GoB agencies to facilitate climate resilient fisheries sector development. No such Training module exists. Country lacks skilled personnel on Crab hatchery techniques and management. GoB personnel, private entrepreneurs and community lacks skill on climate change implications to fisheries sector and appropriate	1 Detailed Report on capacity needs assessment of DoF, BFRI & other related GoB agencies and Design of a capacity building strategy to strengthen them. 01 DoF & 1 BFRI personnel to be trained on mud crab hatchery techniques in Indonesia for 3-4 months. 25 DoF, BFRI and other GoB personnel to be trained on climate resilient adaptation and	30 GoB (DoF and other partner organization's personnel to be trained [47]) on climate resilient adaptation and management approaches for the fisheries and aquaculture sector in neighbouring countries/ overseas. 25 DoF, BFRI and other GoB personnel to be trained on climate resilient adaptation and management approaches for the fisheries and aquaculture sector in-country.	25 DoF, BFRI & other GoB personnel to be trained on climate resilient adaptation and management approaches for the fisheries and aquaculture sector in-country. 14 Private entrepreneurs to be trained[3] on climate resilient adaptation and management approaches for the fisheries and aquaculture sector in-country.	25 DoF, BFRI & other GoB personnel to be trained (as per preliminary training need assessment in PPG phase) on climate resilient adaptation and management approaches for the fisheries and aquaculture sector in-country.	1 Capacity need assessment (training needs assessment) report for DoF, BFRI and other related GoB agencies, private sector and community. 1 training manual on *Climate forecast application, DDR management and adaptation, mitigation options, and EWS in fisheries and aquaculture.* 1 DoF and 1 BFRI personnel trained on *Crab hatchery techniques* in Indonesia for 3-4 months.	Report of capacity need assessment of DoF, BFRI & other related GoB agencies. 1 Training manual on *Climate forecast application, DDR management and adaptation, mitigation options, and EWS in fisheries and aquaculture.* Reports of all training events (in-country and overseas) and attendance sheets.	Relevant training and capacity building of government staff and other stakeholders delivered in a timely manner leading to enhanced skills/capacity to handle and plan CC implications in fisheries sector. Capacity of the Forest Department to establish a mud crab hatchery to conserve mud crabs' biodiversity.

[47] All training will be based on the initial needs assessment done during the PPG phase (e.g. capacity building on an identified climate smart farming technique such as Mud-Crab) and as informed by the in-depth needs assessment during the year 1.

Results Chain	Indicators	Baseline[46]	Milestones				End of Project Target	Means of Verification & Responsible Entities	Assumptions
			Year 1	Year 2	Year 3	Year 4			
	and EWS in fisheries & aquaculture for local communities. • Number of stakeholder groups trained (e.g. DoF & BFRI, other partner organisations, private sector, and communities) on CC resilient fisheries and aquaculture.	resilient adaptation options.	management approaches for the fisheries and aquaculture sector in-country.	24 advanced community leader/people (40% female) and partner GoB personnel to be trained overseas in 2 batches on EAF and EAA as climate resilient management approaches and each batch lead by 01 GoB official. 1 Training manual.			30 GoB (DoF & other partner organization's) personnel trained on climate resilience approaches for the fisheries and aquaculture sector in neighbouring countries. 100 DoF, BFRI and other GoB personnel trained in-country. 24 advanced community leader/people (40% female) and partner GoB personnel trained in regional trainings (Asia) in 2 batches on EAF and EAA and each batch lead by 01 GoB official. 14 Private entrepreneurs trained in-		

Results Chain	Indicators	Baseline[46]	Milestones				End of Project Target	Means of Verification & Responsible Entities	Assumptions
			Year 1	Year 2	Year 3	Year 4			
							country.		
Component 2: **Strengthening knowledge and awareness of fisheries/aquaculture dependent communities facing the adverse impacts of climate change**									
Outcome 2: **Local community organizations have institutionalized disaster risk management (DRM) in their local development plans and programmes, thus improving local CC related governance.**	• Number of local communities adopting development plans/ programmes including DRM considerations. • Collaborative Early Warning System (EWS) in place.	Poor governance of CC in fisheries and aquaculture. Local development plans do not adequately integrate DRM for fisheries and aquaculture.		15 local development plans integrated DRM considerations by 70 communities.	At least 30 communities adopt DRM and EWS.	Collaborative Early Warning System (EWS) in place and appropriately connected to the local environmental monitoring in at least 50 communities of the SW coastal and NE haor area.	70 communities in 9 upazilas adopt 15 local development plans and integrate DRM considerations. EWS in place in at least 50 communities.	Climate resilient local development plans. EWS reports. Revised local development plans	Local governments and local communities, including women, willing to participate.
Output 2.1. Risks and vulnerability of fisheries, aquaculture. & livelihoods to the adverse impacts of CC, including knowledge gaps,	• Risk and vulnerability assessments conducted and updated at project sites.	Climate induced risks and vulnerability of fisheries & aquaculture subsector assessment not available.	Risk and vulnerability assessment completed among communities (CBOs/occupational groups) in 5 upazilas.	Risk and vulnerability assessment completed among communities (CBOs/occupational groups) in remaining 4 upazilas (i.e. risks and vulnerability assessment	30 communities' (CBOs) adopt 7 local development plans and integrate DRM and EWS considerations.		Risk and vulnerability assessment completed among 70 communities in 9 upazilas. 70 communities adopt 15 local development plans and integrate DRM	Risk and vulnerability assessment reports from 9 upazilas.	Sub-district technical officers trained and able to conduct risk and vulnerability assessment

Results Chain	Indicators	Baseline[46]	Milestones				End of Project Target	Means of Verification & Responsible Entities	Assumptions
			Year 1	Year 2	Year 3	Year 4			
assessed with the participation of relevant stakeholders & DoF field officials at project sites.				completed among 70 communities in 9 upazilas). 40 communities' (CBOs) adopt 7 local development plans and integrate DRM and EWS considerations.			and EWS considerations.		
***Output 2.2*:** Communities' , awareness and capacity enhanced to understand, assess, plan and implement fisheries, aquaculture and livelihood adaptations to climate change risks	Number of fishers and fish farmer's communities with DRM and EWS mechanisms in place in SW and NE climate sensitive areas. Number of communities aware of climatic variability and climate	Low awareness and capacity of local communities to adapt to fisheries and aquaculture practices to climate change due to limited access to knowledge and information. There are no local DRM systems in place for fisheries and	Local authorities, DoF, and leaders of 70 communities trained in country on the implementation of DRM and EWS [48] mechanisms and plans focused on fisheries and aquaculture in SW and NE climate sensitive areas.	40 communities' (CBOs) have initiated implementation of local DRM and EWS plans and integrate DRM considerations in the fisheries and aquaculture management systems. 2,000 HHs (40% female) to be trained on climate	At least 30 communities' (CBOs) adopt local DRM and EWS plans and integrate DRM considerations in the fisheries and aquaculture management systems. 2,880 HHs (40% female) to be trained on climate variability and CC risks general climate	Collaborative Early Warning System (EWS) in place and appropriately connected to the local environmental monitoring [Community radio, Mobile SMS gateway & Training manuals/ mass awareness materials, etc.] in at least 50 communities of the SW coastal and NE haor areas. At least 5,880	Collaborative Early Warning System (EWS) and DRM in place [Community radio, Mobile SMS gateway & Training manuals/mass awareness materials, etc.] in at least 50 communities of the SW coastal and NE haor areas.	Records and attendance of training sessions & their understanding; DoF and MoFL. EWS reports, broadcasting in mass media, hotlines, etc. Assessment of functioning DRM and EWS in the communities by DoF and MoFL.	Local communities, especially women and the very poor, willing to participate in trainings and in EWS. Continued interest and support of communities to have a EWS in place.

[48] EWS to be linked and also fed by the local environmental monitoring systems (see output 3.3).

Results Chain	Indicators	Baseline[46]	Milestones				End of Project Target	Means of Verification & Responsible Entities	Assumptions
			Year 1	Year 2	Year 3	Year 4			
	change risks and main adaptation approaches and options.	aquaculture communities.	1,000 (HHs) households (40% female) trained on climate variability and CC risks and on general climate resilient adaptation and management approaches.	variability and CC risks general climate resilient adaptation and management approaches.	resilient adaptation and management approaches.	areas.	HHs trained on climate variability and CC risks general climate resilient adaptation and management approaches for the fisheries and aquaculture sector in country.		
Component 3: **Enhancing local adaptive capacity to support climate resilient fisheries and aquaculture management and alternative livelihoods in the face of climate change**									

Results Chain	Indicators	Baseline[46]	Milestones				End of Project Target	Means of Verification & Responsible Entities	Assumptions
			Year 1	Year 2	Year 3	Year 4			
Outcome 3: **Communities with strengthened adaptive capacity, maximize their incomes and access to nutrition through adoption of CC resilient fisheries, aquaculture and livelihood technologies/ approaches in targeted areas.**	• Number of targeted groups adopting CC adaptation technologies. • Number of communities (that have adopted new technologies and approaches) with improved income, food security and nutrition.	Adoption of climate resilient practices in the fisheries and aquaculture communities is very low due to lack of knowledge, awareness and availability of potential technologies and approaches.	Site selection, community mobilization and initiate climate resilient smart technologies demonstration with communities. Initial Farmers Field School establishment.	30 communities (CBOs/occupational groups/) adopt climate smart technologies. 10 Farmers Field School established.	40 (CBOs/occupational groups/) communities adopt climate smart technologies. All 25 Farmer Field Schools established.	Improved income and nutrition in 70 fishers and fish farmers' communities.	Improved income, food security and nutrition in 70 communities: • Around 15% increase in fisheries and aquaculture productivity in targeted HHs. • Around 15% increase in income generation in targeted beneficiaries under existing and projected climate changes. • Around 70% of targeted households adopting climate resilient livelihoods under existing and projected climate changes.	GEF CC-A Tracking Tool, PIR Midterm and Final Evaluations. Sub-district statistics and technical reports.	Local communities have incentives to adopt adaptation technologies through improvement in incomes and/or improved food security and nutrition.

Results Chain	Indicators	Baseline[46]	Milestones				End of Project Target	Means of Verification & Responsible Entities	Assumptions
			Year 1	Year 2	Year 3	Year 4			
***Output 3.1*:** Site specific climate resilient and gender differentiated fisheries, and aquaculture technologies (e.g. fisheries information platform, innovative aquaculture systems, brood banks and satellite hatcheries, salt tolerant fish strains etc.) developed and adopted by the targeted communities.	• Number of communities adopting X number of adaptation technologies/approaches, disaggregated by gender. • Feasibility report of mud crab (*Scylla serrata*) hatchery establishment • Golda hatcheries' efficiency improvement report. • Establishment of PL/fingerling markets in Bagerhat-Dacope area.	The availability and adoption of climate resilient practices and technologies in the fisheries and aquaculture sector is inadequate. Feasibility report regarding mud crab hatchery establishment is non-existent. Golda farming is suffering from needed seed supply due to inefficient golda hatcheries. PL/fingerling market is non-existent in Bagerhat-Dacope area.	Innovative technologies and approaches are clearly identified/ communicated and accepted by each target community/ groups.	At least 30 communities (CBOs etc.) initiate adoption of at least 10 climate smart technologies. Feasibility survey and report of mud crab (*Scylla serrata*) hatchery establishment. Golda hatcheries' efficiency improvement report.	At least 40 (CBOs/ communities) adopt at least 10 climate smart technologies. Establishment of 01 PL/ fingerling market in Bagerhat-Dacope area.	At least 40% of the communities adopt 15 climate smart initiatives.	At least 70% of the targeted at least 50 communities (40% women) adopt 15 climate smart initiatives. 15 adaptation technologies adopted including gender differentiated technologies (homestead pond fish culture, mud crab fattening, etc.). Feasibility survey and report of mud crab (*Scylla serrata*) hatchery establishment. Golda hatcheries' efficiency improvement report. PL/fingerling market established in	GEF CC-A Tracking Tool, PIR Mid-term and Final Evaluations. Sub-district statistics and technical reports. Mud crab hatchery establishment feasibility report and golda hatchery efficiency improvement report.	Local communities have incentives to adopt new/ improved technologies and diversify their livelihoods.

Results Chain	Indicators	Baseline[46]	Milestones				End of Project Target	Means of Verification & Responsible Entities	Assumptions
			Year 1	Year 2	Year 3	Year 4			
							Bagerhat-Dacope area.		
Output 3.2: Community-led and gender differentiated dissemination systems of adaptation technologies	• Community led gender differentiated dissemination systems developed and	Some dissemination systems that could be adapted to the objectives of this project in place but inadequately		Gender differentiated ICT-based dissemination systems in place in 9 upazilas and used by 60% communities.	12 Farmers Field School established. 5 types of user-friendly dissemination materials produced and	13 Farmers Field School established. 2 types of user-friendly dissemination materials produced and	Gender differentiated ICT-based dissemination systems in place in 9 upazilas and used by 60% of communities.	Broadcast recordings, films, videos. FFS reports and meeting minutes, posters, fact sheets.	Communities are willing to become involved in dissemination of adaptation technologies for fisheries

Results Chain	Indicators	Baseline[46]	Milestones				End of Project Target	Means of Verification & Responsible Entities	Assumptions
			Year 1	Year 2	Year 3	Year 4			
developed and adopted.	adopted, including information communication technology (ICT) systems, • Farmers Field Schools (FFSs) on fisheries and aquaculture. and pilot farms established. • Types of user-friendly dissemination materials produced and distributed.	addresses gender.		Initiate Farmers Field School establishment. 3 types of user-friendly dissemination materials produced and distributed.	distributed.	distributed.	25 FFS established of which at least 75% is functional for diversification of livelihoods in 9 upazilas. Around 10 types of user-friendly dissemination materials produced and distributed among community and stakeholders.		and aquaculture. Women are motivated and interested in participating in targeted activities.
Output 3.3: Innovative local environmental monitoring	• # communities trained on the	Communities are totally dependent on the DoF officials and	Training of 20 DoF/community trainers on implementing local	50 CBOs (1,250 persons of which 40% are women) taught/trained	Implementation of functioning local environmental monitoring	9 location-specific fishery habitat maps prepared.	At least 100 communities (2,500 persons, 40% female) trained on	Physical verification of supplied environmental monitoring	Communities understanding and skills sufficient to use

Results Chain	Indicators	Baseline[46]	Milestones				End of Project Target	Means of Verification & Responsible Entities	Assumptions
			Year 1	Year 2	Year 3	Year 4			
systems and information tools for the communities to obtain and exchange information to improve resiliency and increase production in the fisheries and aquaculture. systems developed and implemented.	implementation of local environmental monitoring systems • Small equipment/ tools distributed to X number of CBOs for environmental (fish/shrimp habitats) monitoring. • Number of communities adopting the community-led monitoring systems connected to EWY and DRM. • Number of location-specific fishery habitat	Govt. extension agents for monitoring of environmental parameters and are not able to react to CC environmentally related emergencies. Location-specific fishery habitat maps do not exist.	environmental monitoring systems (linked to the community EWS and DRM) 50 CBOs (about 1,000 people of which 40% women) taught/trained on implementing local environmental monitoring systems.	in using small equipment for monitoring environmental parameters (shrimp/fish habitats) .	systems (well connected to EWS and DRM) in at least 50 (70%) communities.		implementing local environmental monitoring systems. Environmental monitoring systems (well connected to the EWS and DRM) in place in 70 (70%) of the communities. 100 CBOs have access to small equipment for monitoring environmental condition of shrimp/fish habitat; 9 location-specific fishery habitat maps produced.	equipments to 100, DoF and MoFL. Assessments of the functioning environmental monitoring systems by DoF and MoFL Available fishery habitat maps.	environmental monitoring equipment, and interpreting results into best actions. CBOs have sufficient capacity to use new and introduced technologies.

Results Chain	Indicators	Baseline[46]	Milestones				End of Project Target	Means of Verification & Responsible Entities	Assumptions
			Year 1	Year 2	Year 3	Year 4			
	maps produced as a key information tool to improve management and increase resiliency of the fishery.								
Output 3.4: Manuals on climate resilient & gender differentiated fisheries, aquaculture and livelihood technologies/ approaches developed & adopted by the communities, DoF and other relevant government & NGO entities.	• Number of manuals developed on different topics. • Number of users of the manuals, including number of communities and government & NGO entities.	Existing Manuals are scattered, needs updating and consolidation with inclusion of best fisheries and aquaculture technologies, lessons learned, conservation-management and climate forecast applications, disaster risk management and adaptation, mitigation options.	0	1 Training Manual produced on: *Fisheries Habitat Conservation-Management.*	1Training Manual produced on *Community management and women empowerment in fisheries and aquaculture activities.*	1Training Manual produced on: *Fisheries and Aquaculture Resources and Climate Resilient Best Practices.*	03 training Manuals produced/in place and distributed to beneficiaries and all stakeholders.	Printed Training Manuals of 03 types; DoF and MoFL. User survey (of the manuals) of selected communities, DoF and other relevant GoB entities and NGOs.	Communities' understanding, awareness and capacity sufficiently developed for using the manuals. DoF, other GoB entities and NGOs willing to adopt and use the manuals.
Component 4: **Dissemination of best practices and lessons learned, monitoring and evaluation**									
Outcome 4: **Project**	• Knowledge base of	Inadequate knowledge	M&E system in place.	Adaptive results-based	Adaptive results-based	Adaptive results-based M&E.	Strengthened project	GEF CC-A Tracking Tool,	DoF and other

Results Chain	Indicators	Baseline[46]	Milestones				End of Project Target	Means of Verification & Responsible Entities	Assumptions
			Year 1	Year 2	Year 3	Year 4			
implementation based on results based management and application of project findings and lessons learned in future operations facilitated.	adaptation technologies to support adaptive results-based management and monitoring of upscaling resulting from the project.	base on fisheries and aquaculture adaptation & M&E system.		M&E.	M&E.		knowledge base on climate resilient fisheries and aquaculture technologies, and livelihoods. Communication and dissemination materials produced and distributed to beneficiaries and other stakeholders. Adaptive results-based M&E.	PIR, Midterm and Final Evaluations (PMU, DoF, FAO).	stakeholders support M&E processes, and are committed to continuous learning and exchange of knowledge on adaptation technologies.
***Output 4.1*:** Lessons learned & best practices from the use of different CC resilient fisheries, aquaculture and livelihood technologies/ approaches documented &	• Project website. • number of project newsletters with lessons learnt (in English and Bangla). • Awareness/ outreach events organized for local communitie	• Limited cc adaptation documents, extension materials. • No website currently exists.	Project website fully up to date with project results and linked to DoF and FAOBD portal. Half-yearly Newsletters produced and distributed. Communication and dissemination materials	Project website fully up to date with all project results. Half-yearly Newsletters produced and distributed. Communication and dissemination materials produced and distributed.	Project website fully up to date with all project results. Half-yearly Newsletters produced and distributed. Communication and dissemination materials produced and distributed.	PMU Awareness/ outreach events convened & materials in place. Statistics of website visitors. Half-yearly Newsletters produced and distributed.	Half-yearly Newsletters regularly published & circulated nationally; total 8 Newsletters produced. Project website functioning, with links to DoF, FAOBD and related webs. Communication	Project Website and statistics of no. of visits. Project Newsletters. Communication and dissemination materials (flyers/ booklets/ leaflets/ posters/ fact sheets; videos, news on web;	PMU functioning and adequate financial resources allocated to project website, outreach events, newsletters, special newspaper issues, etc.

Results Chain	Indicators	Baseline[46]	Milestones				End of Project Target	Means of Verification & Responsible Entities	Assumptions
			Year 1	Year 2	Year 3	Year 4			
communicated to relevant stakeholders & a wider audience.	s using audio visual materials. Types/ kinds • Numbers of Communication and dissemination materials. (flyers/ booklets/ leaflets/ posters/ fact sheets; videos, news on web; promotional materials, desk calendar, note book, year planner, caps, National Day special newspaper issues, etc.) produced and distributed.		produced and distributed.	Support to developing special National day's Newspaper Issues (Fish week, World Food day, etc.).	Support to developing special National day's Newspaper Issues (Fish week, World Food day, etc.).	Communication and dissemination materials produced and distributed. Support to developing special National day's Newspaper Issues (Fish week, World Food day, etc.).	and dissemination materials (flyers/ booklets/ leaflets/ posters/ fact sheets; videos, news on web; promotional materials (desk calendar, note book, year planner, caps, etc.) produced and distributed. Total no. of issues of special National day's Newspaper Issues (Fish week, World Food day, etc.).	promotional materials (desk calendar, note book, year planner, caps, etc.) . Verified lists of events supported Participants' lists from outreach events.	

Results Chain	Indicators	Baseline[46]	Milestones				End of Project Target	Means of Verification & Responsible Entities	Assumptions
			Year 1	Year 2	Year 3	Year 4			
***Output 4.2*:** Project monitoring system operating providing systematic information on progress in meeting project outcome &output targets.	•Baseline and targets for project indicators . •Annual project implementation review (PIR) reports submitted to GEF Secretariat. •Six monthly project progress reports.	0 0	System in place for annual M&E of indicators.	PIR, Annual monitoring report.	PIR, Annual monitoring report.	PIR, Annual monitoring report.	3 PIRs and monitoring reports (as per GEF-FAO guideline).	CC-A Tracking Tool, PIR, Midterm &Final Evaluations (PMU, DoF, FAO).	PMU functioning and adequate funding allocated to M&E.
***Output 4.3*:** Mid-term & terminal evaluations conducted.	• Mid-term & final evaluation reports.	No evaluations exist at present.		Mid-project evaluation recommendations implemented.	Evaluation recommendations included in lessons learned.	Terminal evaluation with recommendations.	Project's mid- and terminal evaluation Reports with recommendations and way forward.	Evaluation reports (FAO evaluation office).	PMU functioning & adequate funding for M&E.

Appendix 2: Work Plan (Results Based)

Component/Year			Year 1				Year 2				Year 3				Year 4			
Quarters			Q_1	Q_2	Q_3	Q_4	Q_1	Q_2	Q_3	Q_4	Q_1	Q_2	Q_3	Q_4	Q_1	Q_2	Q_3	Q_4
Component 1: ***Climate resilient fisheries sector and relevant national capacity development***																		
Project Management																		
Start up, set up committees & offices	Set up Project Steering Committee (PSC) and Project Implementation Committee (PIC)	PIU, DoF & MTSU, FAO																
	Set-up Project Management and Technical Support Unit (PMTSU) at FAO, and Project Implementation Unit (PIU)at DoF	PIU, DoF & MTSU, FAO																
	Set-up Field Office at Sunamganj District Fisheries Office for the NE haor region	PIU, DoF and MTSU, FAO; DoF, South Sunamganj																
	Set-up Field Office at District Fishery Office, Khulna for the SW coastal area	PIU, DoF and MTSU, FAO; DoF, Khulna																
Fielding of Project personnel	Fielding of PD, NPC and all project key personnel (both National & International) as per need	PIU, DoF & MTSU, FAO																
Inception Workshop	Launching of the project (Inception Workshop)	PIU, DoF & MTSU, FAO																
Procurement	Office equipment & motor bikes (for Field Facilitators)	PIU, DoF & MTSU, FAO																
Output 1.1: *Climate induced risks & vulnerability of fisheries & aquaculture sub-sectors at national level assessed with special focus on climate sensitive areas.*	Assessment of climate induced risks and vulnerability of fisheries & aquaculture subsector with due consideration to gender and with focus on climate sensitive areas targeted by the project.	Project team and WorldFish or IUCN or CEGIS under a LoA/MoU																
Output 1.2: *Relevant national policies & strategies reviewed, gaps analysed & revised by incorporating fisheries & aquaculture adaptation to climate*	Relevant national policies & strategies reviewed, gaps analysed & revised by incorporating fisheries & aquaculture adaptation to CC needs	Project team and Consultant																

Component/Year			Year 1				Year 2				Year 3				Year 4			
change.																		
Output 1.3: *Capacity building strategy for DoF, other relevant GoB agencies, private sector & community-based organizations developed to facilitate climate resilient fisheries sector.*	Detailed capacity needs assessment of DoF, BFRI & other related GoB agencies and Design of a capacity building strategy to strengthen them	PIU, DoF & MTSU, FAO																
	Capacity development of the DoF & other GoB officials and private entrepreneur through targeted trainings	PIU, DoF & MTSU, FAO & Project team																
	Capacity development of Community people and leader (fishers/ fish farmers including women) through targeted trainings	PIU, DoF & MTSU, FAO & Project team																
	Production of CC training manual on, **i.** *Climate forecast application, DDR management and adaptation, mitigation options, and EWS in fisheries and aquaculture* for local communities	PIU, DoF & MTSU, FAO & Project team																
Component 2: ***Strengthening knowledge and awareness of fisheries/aquaculture dependent communities facing the adverse impacts of climate change***																		
Output 2.1: *Community perceptions, risks & vulnerability of fisheries, aquaculture & livelihoods to the adverse impacts of CC including knowledge gaps assessed with participation of relevant stakeholders & DoF field officials in project sites.*	Risk and vulnerability assessment in 70 communities in 9 upazilas	PIU, DoF & MTSU, FAO																
	Production of Reports on risks and vulnerability assessment in 9 upazilas in SW and NE	PIU, DoF & MTSU, FAO & Project team																
Output 2.2: *Communities' awareness & capacity enhanced to assess, plan & implement fisheries, aquaculture & livelihood adaptations to CC risks.*	Awareness development / capacity enhancement training of Community people (fishers/ fish farmers including women) on perceptions, risks & vulnerability of fisheries, aquaculture & livelihoods to the adverse impacts of CC	PIU, DoF & MTSU, FAO & Project team																
	Collaborative Early Warning System (EWS) and DRRM formulation and establishment																	

Component/Year			Year 1				Year 2				Year 3				Year 4			
Component 3: ***Enhancing local adaptive capacity to support climate resilient fisheries and aquaculture management and alternative livelihoods in the face of climate change***																		
Output 3.1: *Site specific climate resilient & gender differentiated fisheries & aquaculture technologies (e.g. fisheries information platform, innovative aquaculture systems, brood banks and satellite hatcheries, salt tolerant fish strains etc.) developed & adopted by the targeted communities.*	***SW coastal area*** *Bagda* monoculture (semi-intensive/intensive) 2 crops/yr, and *mud crab fattening* in suitable high saline regime areas of Dacope (2), Bagerhat Sadar, Kachua and Shyamnagar (2)	PIU, DoF & PMTSU, FAO & Project team																
	Alternate *bagda* Semi-intensive (SI) monoculture (high salinity time, winter) and *Integrated and concurrent paddy-cum-FW prawn+ white fish* farming (in monsoon FW time) in the same *gher* with options of dyke vegetable farming in areas of Dacope (2), Bagerhat Sadar, Kachua and Shyamnagar (2)	PIU, DoF & PMTSU, FAO & Project team																
	Mixed SI culture of *bagda-golda-tilapia-pangas* in the same *gher* with options of dyke vegetable farming in areas of Dacope (2), Bagerhat Sadar, Kachua and Shyamnagar (2)	PIU, DoF & PMTSU, FAO & Project team																
	Alternate *bagda-golda-tilapia, mugils, seabass, nona tengra, pershe* SI culture (high salinity time, winter) and *Integrated and concurrent paddy-cum-FW prawn (golda)+ white fish* farming (in monsoon FW time) in the same *gher* with options of dyke vegetable farming in areas of Dumuria, Bagerhat Sadar, Kachua, South Sunamganj, Jagannathpur & Nasirnagar	PIU, DoF & PMTSU, FAO & Project team																
	Mud crab fattening alone in Dacope, Khulna and Munshiganj, Shyamnagar	PIU, DoF & PMTSU, FAO & Project team																
	Concurrent *mud crab fattening* with *mugils, seabass, nona tengra, pershe* (high salinity time, winter) and alternate mixed culture of *tilapia, pangas, mugils, seabass, nona tengra, pershe* (in monsoon) in the same *gher* in Dacope, Khulna and Munshiganj, Shyamnagar	PIU, DoF & PMTSU, FAO & Project team																
	Improved pond fish culture in Dumuria, Dacope, Bagerhat sadar, Kachua, Shyamnagar, South Sunamganj, Jagannathpur and Nasirnagar	PIU, DoF & PMTSU, FAO & Project team																

Component/Year			Year 1				Year 2				Year 3				Year 4			
	Pen culture in Dumuria-Dacope (1), Bagerhat sadar-Kachua (1), Shyamnagar, South Sunamganj, Jagannathpur and Nasirnagar	PIU, DoF & PMTSU, FAO & Project team																
	Cage culture of fish in Kachua, Shyamnagar, South Sunamganj, Jagannathpur, Nasirnagar	PIU, DoF & PMTSU, FAO & Project team																
	Kua fish culture in South Sunamganj (2), Jagannathpur (2) and Nasirnagar (1)	PIU, DoF & PMTSU, FAO & Project team																
	Provide technical/technological support (by a short term Inter. Consultant) for feasibility study, designing and producing an operational manual for a mud crab (*Scylla serrata*) hatchery establishment in Munshiganj	PIU, DoF & PMTSU, FAO & Project team																
	Mud crab (Scylla serrata) hatchery technology & establishment Report	PIU, DoF & PMTSU, FAO & Project team																
	Fielding of Golda hatchery Expert/ Specialist (International)	PIU, DoF & PMTSU, FAO & Project team																
	Provide technical support (by a short term Inter. Consultant) for proper functioning of all existing govt. and private Golda hatcheries to make them fully operational and efficient in Khulna-Bagerhat-Satkhir	PIU, DoF & PMTSU, FAO & Project team																
	Golda hatchery performance improvement Report	PIU, DoF & PMTSU, FAO & Project team																
	Establishment of PL/fingerling markets in Bagerhat and Dacope	PIU, DoF & PMTSU, FAO & Project team																
	Satellite Fish Seed Multiplication Farms (*FSMFs)* improvement and brood bank establishment in and around Dumuria, Dacope, Bagerhat, Kachua and Shyamnagar	PIU, DoF & PMTSU, FAO & Project team																
	Establishment of Fish sanctuary, in Bagerhat sadar - Kachua (1). Shyamnagar (1), South Sunamganj (1), Jagannathpur (1), Nasirnagar (1) & Agdar beel of Hakaluki haor (DoE managed fish sanctuary), Juri.	PIU, DoF & PMTSU, FAO & Project team																
	Habitat restoration- collaboration with other agencies (base line co-funding) for excavation of	PIU, DoF & PMTSU, FAO &																

Component/Year			Year 1				Year 2				Year 3				Year 4			
	ghers & linking river & khals for enhancing water exchange facilities and for reestablishment/ reopening of fish migration and dispersal routes so far lost/ degraded in Bagerhat sadar -Kachua (1). Shyamnagar (1), South Sunamganj (1), Jagannathpur (1), Nasirnagar (1) & Agdar beel of Hakaluki haor (DoE managed fish sanctuary), Juri.	Project team																
	Duckery in South Sunamgonj, Jagannathpur & Nasirnagar	PIU, DoF & PMTSU, FAO & Project team																
	Net, Trap making in Dumuria (1),Dacope (1), Bagerhat Sadar (1), Kachua (1), Shyamnagar (1), South Sunamgonj (1), Jagannathpur (1) & Nasirnagar (1)																	
	Open water supplemental stocking through *beel nursery management* in Bagerhat sadar -Kachua (1). Shyamnagar (1), South Sunamganj (1), Jagannathpur (1), Nasirnagar (1) & Agdar beel of Hakaluki haor (DoE managed fish sanctuary), Juri	PIU, DoF & PMTSU, FAO & Project team																
	Satellite Fish Seed Multiplication Farms (*FSMFs)* improvement and *brood bank established* Dumuria-Dacope (1), Bagerhat-Kachua-Shyamnagar (1), South Sunamganj-Jagannathpur (1) & Nasirnagar (1)	PIU, DoF & PMTSU, FAO & Project team																
	Establishment of Fish sanctuary in Bagerhat sadar -Kachua (1). Shyamnagar (1), South Sunamganj (1), Jagannathpur (1), Nasirnagar (1) & Agdar beel of Hakaluki haor (DoE managed fish sanctuary), Juri	PIU, DoF & PMTSU, FAO & Project team																
	Collaboration with other agencies (base line co-funding) for excavation of haor linking river & khal (important/ dead sections) for reestablishment/ reopening of fish migration and dispersal routes so far lost/ degraded and enhancing water exchange facilities and	PIU, DoF & PMTSU, FAO & Project team																

Component/Year			Year 1				Year 2				Year 3				Year 4			
Output 3.2: *Community-led & gender differentiated dissemination systems (e.g. pilot farms, training manuals) of adaptation technologies developed and adopted.*	Development of gender differentiated dissemination systems using ICT Establishment of FFS, including backyard and pilot farms	PIU, DoF & PMTSU, FAO & Project team																
Output 3.3: *Innovative environmental monitoring and information tools for the communities to obtain and exchange information to improve resiliency and increase production in the fisheries and aquaculture systems developed and implemented.*	Procurement and delivery and training of environment (fish habitats) monitoring small equipment (alcohol thermometer, secchi disk, pH dye/meter, oxygen meter, salinity meter) to CBOs/ clusters in the *SW coastal* areas for water quality monitoring and rental services to others.	PIU, DoF & PMTSU, FAO & Project team																
	Procurement and delivery and training of small equipment (alcohol thermometer, secchi disk, pH dye/meter, oxygen meter) to CBOs/ clusters in the *NE haor* basin for water quality monitoring and rental services to others.	PIU, DoF & PMTSU, FAO & Project team																
Output 3.4: *Manuals on climate resilient & gender differentiated fisheries, aquaculture and livelihoods technologies developed and adopted by the communities, DoF and other relevant GO and NGO entities.*	Production of Training modules/ manuals on **ii.** *Fisheries and Aquaculture Resources and Best Practices*	PIU, DoF & PMTSU, FAO & Project team																
	Production of Training modules/ manuals on **iii.** *Fisheries Habitat Conservation-Management*	PIU, DoF & PMTSU, FAO & Project team																
	Production of Training modules/ manuals on **iv.** *Community management and women empowerment in fisheries and allied aquaculture activities.*																	
Component 4: ***Dissemination of best practices and lessons learned, monitoring and evaluation***.																		
Output 4.1: *Lessons learned & best practices from the use of different CC resilient fisheries aquaculture and*	Workshops, Consultation meetings, Seminars, Briefing meetings, etc. Newspaper Ads, Special issues, etc.	PIU, DoF & PMTSU, FAO & Project team																
	Communication and dissemination of lesson learned and results/ documents to wider stakeholders through	PIU, DoF & PMTSU, FAO & Project team																

Component/Year			Year 1				Year 2				Year 3				Year 4			
livelihood technologies/ approaches documented & communicated to relevant wider stakeholders.	hard copies ; soft copies, videos on web; promotional materials; and financial support to special National day's Newspaper Issues, etc.																	
	News Letters, half-yearly, 8 issues; Half-yearly and Annual Reports	PIU, DoF & PMTSU, FAO & Project team																
	Project completion/ Final report	PIU, DoF & PMTSU, FAO & Project team																
Output 4.2: *Project monitoring system operating providing systematic information on progress in meeting project outcome & output targets.*	Project monitoring progress report	PIU, DoF & PMTSU, FAO & Project team																
Output 4.3: *Mid-term & final evaluation conducted.*	Mid-term and Final evaluation Reports	PIU, DoF & PMTSU, FAO & Project team																
	Submission of Project Completion Report	PIU, DoF & PMTSU, FAO & Project team																

Appendix 3: Results Budget

BGD055LDF_Budget_
Final20151119.xls

Appendix 4: Adaptation Risks Screening Matrix

Northeast Haor basin

Climate change threats	**Erratic rain/ precipitation,** abnormal rainfall, **Drought,** prolonged dry periods, drying up of water bodies, siltation Rapid rise and ebb of water in the beels (floodplain) over a season or a significant part of year **Flash Flood,** flooding

1.1. Farming systems approach (FSA)

Screens/Adaptation options	**1. Establishment/ improvement of fish sanctuaries**	**2. Improvement of fish habitat, beel nursery management & openwater stocking**	**3. Excavation of linking khals** for restoring migratory routes of fish	**4. Establishment of fish brood banks** and **improvement of climate proof satellite fish hatcheries**.
How will this adaptation address the climate change threat	Conserve fish breeding grounds during drought, temperature increment, sedimentation, erratic rainfall, & flood events; Improvement of deteriorated native fish stocks due to climate and anthropogenic changes; enhance survival, reproduction by creating fish shelter and sanctuaries.	More resiliency to droughts and flash flood; Improved fish habitats (excavation, plantation of wetland trees & hydrophytes), fish stock recovery through beel nursery management i.e. release of native fish species to allow population to recovery and breed in the next season	Reduce impact of flashflood, water logging, facilitate water flow acting as outlets of beels and floodplains, strengthening haor/ beel dykes, increase water holding in beels, minimize wave action; Restored link canals would ensure smooth feeding & breeding migration of fish, enhance natural fish production.	Availability of quality & suited traits of fish seeds that would be resilient to floods, droughts; enhance & ensure desired yield in aquaculture in the face of CC threats; an alternate livelihood; Efficiency of Govt. & Private fish hatcheries improved, can meet local demand of quality & suited traits of fish seeds for aquaculture.
Linkage with other ongoing projects and programmes	Ongoing projects and programmes of IFAD (HILI & CALIP), DoF (Wetland biodiversity rehabilitation Project of DoF-GIZ., Aquaculture and Fisheries Management Project in Haor Areas), MoEF-IUCN (Community Based Sustainable Management of Tanguar Haor Programme), and other GOs and NGOs.	Works of IFAD on excavation (HILIP/ CALIP project); Seed and feed production and management Project of FAO (TCP/BGD/3501); Aquaculture and fisheries management & Establishment of beel nursery and stocking of fingerlings in open water Projects in Haor area of DoF and Afforestation project of GIZ-FD.	Base line funding of HILIP/ CALIP of IFAD projects; Aquaculture & Fisheries Management Project in Haor areas of DoF & Wetland biodiversity rehabilitation project of DoF-GIZ.	DoF and WorldFish project on fish brood bank and development of village level breeding nucleus.
Support from Project	Sanctuary establishment & management be supported, detailed risks & vulnerability	Support will be given for planting Hijol, Koroch, Nol, Khagra trees and other hydrophytes; beel	Small-scale excavation be supported by the project through community mobilization &	Would support minor hatchery improvement (infrastructure), hormone

	assessment, mapping of early warning system done. Training of communities & local agency personnel in monitoring, surveillance & dissemination of probable (time and place) occurrence of flash floods & sanctuary management be supported.	nursery management and raising of native fish spawns, fingerlings and release them in the beel; stocking of bigger-sized native fish species; everything would be done through community mobilization & labor.	labor.	brood/ spawn procurement, hatchery management, artificial breeding, nursing & transport (in polythene bags, oxygen) of spawn/fingerlings; training of hatchery personnel.
Biological feasibility	Sanctuaries would enhance stocks of indigenous species' and wild catch; improved livelihood of fishers.	Excavation would enhance fishes' habitat depth & restore fish migration/ dispersal paths; wetland trees & hydrophytes plantation (locally available) would meet ecological nieche for stock recovery; only native species will be stocked & managed/ conserved; being practiced in haors, other areas & beels for improvement enhancement of fish stocks.	Biologically feasible; blocked migratory routes of fish will be reopened; fish can move back & forth for breeding, feeding & nursing from beels/ haors to rivers; increased subsistence & commercial fish prodn. from beels/ haors.	Would enhance availability of quality seeds for improved aquaculture & increased fish yield/ open water stock enhancement; expertise is available in the country.
Technical feasibility	Need technical assistance from DoF/ BFRI and labor inputs from communities (CBOs); these are available. *Highly feasible;* expertise is available.	Large-scale excavation & plantation is not possible by this project; excavation through co-funding (IFAD projects, FD projects) is recommended in the PIF. Small-scale excavation work to be done by community labor & siltation of haor/ beel linking canal will be managed by community management actions. Need technical assistance from DoF/ BFRI and labor inputs from communities (CBOs); *Highly feasible;* expertise is available; DoF & NGOs are practicing this for many years with promising results.	Project cannot support large-scale excavation; excavation through co-funding of IFAD needs to be ensured; *Feasible*; expertise is available; only small-scale excavation can be borne by this project.	Seeds of the desired species, quality and size can be assured under the FAO seed and feed project; expertise is available; *Highly feasible.*
Economic viability	No recurring investment other than the initial cost; will need	Funding from this project and programmes of IFAD, DoF etc. will	Excavation would need recurring investment to sustain the project	Funding from this project would mainstream & upscale

	strong CBOs to maintain and protect sanctuaries; economic return of such linking works would outweigh by increased fish production.	be utilized to improve deteriorated fish stocks due to CC. Earth work, plantation and beel nursery operation would need recurring investment to sustain the project achievements; Govt. normal allocation would sustain this; economic return of such linking works would outweigh by increased fish production.	achievements; Govt. normal allocation would sustain this; economic return of such linking works would outweigh by increased fish production.	ongoing activities of DoF/ private hatcheries; economic return of such investment would outweigh by increased fish production in the area.
Social and Environmental acceptability	Widely acceptable; encourages organized and collective actions; environmentally and ecologically beneficial; a desirable resource management approach.	Widely acceptable; encourages organized and collective actions; environmentally and ecologically beneficial; a desirable resource management approach.	Socially and environmentally acceptable as the measure would help increase fish production and surface irrigation facility.	Environmentally & socially acceptable as this will be done through proper trait management of different species; great care would be taken against inadvertent spillage of exotic species to open water system.
Women involvement	Women (at least 30% of the CBO members) would be involved in works of improvement/ establishment of sanctuaries. No risks to women.	Women (at least 30% of the CBO members) would be involved in works of improvement/ establishment of sanctuaries (plantation, beel nursery management, native species stocking & management works). No risks to women.	Women can be involved with the males in small-scale excavation through community mobilization. No risks to women.	Women can be involved in fish handling, fish feeding & management, packing of spawn/fingerlings for transportation. No risks to women.

Screens/Adaptation options	**5. Promote climate smart pond fish culture**	**6. Pen/kua fish culture/ Cage fish culture or Net and trap making or Duck farming**	**7. Supply of small equipments & early warning system devl.**
How will this adaptation address the climate change threat	Improvement of pond condition; increased depth (deepening), dyke strength and height are very important adaptation to risks of flood and drought and extreme hot season at certain magnitude; Improvement of pond bottom condition is also important in maintaining good	Conserve indigenous fish even during downpour, flashfloods and dry periods and also for home consumption and sale through Pen/ kua culture of carps, barbs etc., increased livelihood and involvement of women in aquaculture; women friendly production systemswould comprise	Aware community to understand implications of environmental parameters for taking timely actions and reduce loss; Changes in farmers management practices for water & feeding management and water quality control etc.; very important interventions in reducing risks related to warming, prolonged hot

	water quality when facing high temperature and drought. Ponds that are properly and suitably built to provide a better growing environment for fish (i.e. attenuates water temperature fluctuations) can reduce production risks from climate variability. These would use less water, improve land use, can be stocked at a higher density, have a more controllable environment including recirculation of water, are less polluting, and can be more resistant to disasters.	a purposely designed net pen in flood situation. Cage culture of mono-sex tilapia can be a resilient adaptation with the rise and fall of the water level during downpour or drought spell during monsoon. If these are not possible, duck farming or Nets-traps making would be piloted with the involvement of women for enhancing livelihood during periods of prolonged drought, flash flood or other CC threats.	season, drought, etc.; Supply of small equipment to CBOs for water quality monitoring; small capacity feed mixing & pelleting machine (50-100 kg/ day) for improved feeding management; insulated fish box for delaying post-harvest quality loss & easy fish marketing.
Linking with other ongoing projects and programmes	To be coordinated with the regular fish culture promotion programmes of the DoF. Excavation (through IFAD activity) & afforestation (FD activity) is recommended through co-funding/ base line funding in the PIF.	Ongoing projects of DoF & DLS in scaling up and diffusing the system.	STDF project of FAO, Quality assurance project of BSFF and DoFs Quality control programmes.
Support from Project	Project can support small-scale excavation & minor repair of dikes through community labor, water intake, pond preparation, fish seed & feed procurement & management; All management activities & be done by the community; Large-scale excavation may be attempted through works of co-funding agencies, viz. IFAD project.	Pen/ cage/ kua establishment, piloting (construction and running a suitable cage/pen, fish fingerling, feeding & management) and training & would be supported; community would engage their labor. In case of duckery, costs of ducklings, feeds, medicines, management, etc. would be borne.	Project would bear the costs of small equipments and supplied to the CBOs for their own use in the pilot fields and rental to others.
Biological feasibility	Enhanced income from HH activity, more women	Flooded haors and adjacent rivers/ khals provide a suitable cage/ pen	Understanding of prevailing environment of fish culture system

	involvement; nutrition security deeper water and resulting cooler temperature will reduce fish disease; dyke can be used to grow vegetables & fruit trees.	culture areas, while kua culture is done during drought lean season; Species are already cultured in the region. Duck rearing is also practiced there since long time.	would enable the community to take right steps in case of extreme climatic events.
Technical feasibility	Would protect stocked fish/prawns from floods and droughts. *Highly feasible;* all inputs are available in the area, technology is known, best practice can be replicated through community mobilization.	Appropriate design and management technology of cage, pen, and kua are available. *Highly feasible;* local entrepreneurs/ experts can be of assistance. Beneficiaries would be taught cage/pen/kua fish cultures/ duck rearing through on-farm piloting activities with their involvement; all are proven livelihood options for haor areas.	All equipments are easy to handle, once community people practice their use, they can handle them easily.
Economic viability	CBO members will share their physical labor, learn fish culture by doing & training; increased HH income & nutrition security; economic return of such investment would be outweighed by increased fish production; recurring investment would be needed, Govt. normal allocation should sustain this.	Economically feasible and needs little input cost; economic return of such investment would be outweighed by increased fish production.	Equipments are not expensive and available in the market.
Social and Environmental acceptability	Though multi-ownership of ponds may limit equitable shared labor and commitment for fish culture; this could be overcome through counseling community mobilization.	Widely acceptable; encourages organized and collective actions; environmentally and ecologically beneficial; Fish production, HH income and nutrition would enhance; No exotic species other than tilapia and only for cage/pen culture, in kua native species will be stocked; locally farmed ducklings will be farmed.	No social problem is seen, though CBO leader may show individual ownerships, conflicts of individual/ single leadership and taking upper hand may arise; but it would be resolved by strong supervision & counseling.
Women involvement	Women can be easily involved in more umbers, trained and	Women will be able to handle cages/ pens/kua for fish culture or	Women will be included in the training of demonstration of these

	motivated to take care of the fish pond, fish feeding, growing vegetables and fruits on the pond dyke (without extra effort) for their livelihood improvement. No risks to women.	duckery almost effortlessly; would enable women to play crucial role in family farming and income enhancement. No risks to women.	equipments. They can involve themselves in more and more aquaculture activities (side by side their male counterpart) like water quality monitoring, feed making and mixing and sorting and conserving harvested fish for marketing. No risks to women.

1.2. Sustainable Livelihoods Approach (SLA)

State of ability to access and to manage livelihood assets or capitals in order to fully benefit from the proposed interventions.

Screens/Adaptation options	**1. Establishment/ improvement of fish sanctuaries**	**2. Improvement of fish habitat, beel nursery management & openwater stocking**	**3. Excavation of linking khals** for restoring migratory routes of fish	**4. Establishment of fish brood banks** and **improvement of climate proof satellite fish hatcheries**.
1. Do the beneficiaries have access to the required livelihood assets (are these available)?	Sanctuaries are sites that have to be earmarked as no fishing zone and subject to no fishing round the year; fishing would be allowed at a prefixed area outside & far from the sanctuary; increased open water catch by the community from outside the sanctuaries.	Project would bear costs of hijal, korach and other wetland hydrophytes plantation; plants are available there; community/ CBOs would share labor inputs; increased open water catch by the community from outside the sanctuaries.	Community/CBOs would share labor inputs for small-scale excavation, but large-scale cost to be mobilized from co-funding; increased open water catch by the community from outside the sanctuaries.	Increased availability of quality fish seeds by the community for aquaculture & open water stocking; efficiency improvement of Govt. & private fish hatcheries & skill development of personnel.
2. Do they have the capacity to access livelihood assets?	Project would support to improve the sanctuary. A sanctuary is not privately owned, established on Govt./ khas land will need government legal order in favor of CBOs for protection and maintenance by CBOs; increased open water catch by the community from outside the sanctuaries.	Project would support to improve the fish habitats, community can fish outside the earmarked sanctuary area; management & harvest sharing would be prescribed through FGDs/FFS by the project management; increased open water catch by the community from outside the sanctuaries.	Project would support to improve the fish habitats, community can fish outside the earmarked sanctuary area; management & harvest sharing would be prescribed through FGDs by the project management; increased open water catch by the community from outside the sanctuaries.	More livelihood opportunities as fish seed trading/ marketing; efficiency improvement of Govt. & private fish hatcheries & skill development of personnel.

3. Do they have the capacity to productively use the livelihood assets?	They sanctuaries and nurseries will need government legal order in favor of CBOs for protection and maintenance by CBOs; increased open water catch by the community from outside the sanctuaries.	Strong coordination, management and leadership of the project management along with community mobilization & participation would allow productively use the livelihood assets; increased open water catch by the community from outside the sanctuaries.	Strong coordination, management and leadership of the project management along with community mobilization & participation would allow productively use the livelihood assets; increased open water catch by the community from outside the sanctuaries.	Increased availability of quality fish seeds to the community and neighboring area; efficiency improvement of Govt. & private fish hatcheries & skill development of personnel.
4. Do they have the capacity to manage sustainably the livelihood assets?	Legal protection along with community's' united action will sustain the sanctuary; increased open water catch by the community from outside the sanctuaries.	Govt. policy decision will be needed for sustenance and management of the improved haor fish habits by the CBOs after project life; increased open water catch by the community from outside the sanctuaries.	Govt. policy decision will be needed for sustenance and management of the improved haor fish habits by the CBOs after project life; increased open water catch by the community from outside the sanctuaries.	Efficiency improvement of Govt. & private fish hatcheries & skill development of personnel.

Screens/Adaptation options	**5. Promote climate smart pond fish culture**	**6. Pen/kua fish culture/ Cage fish culture or Net and trap making or Duck farming**	**7. Supply of small equipments & early warning system devl.**
1. Do the beneficiaries have access to the required livelihood assets (are these available)?	Adapt against droughts and flood situation of fish culture; they have livelihood assets.	Adapt against droughts and flood situation of fish culture; they have livelihood assets.	Yes these are available in the country, project would supply those to the community and make them familiar how to use those
2. Do they have the capacity to access livelihood assets?	Land is available and farmers have legal access to it.	Water body for cage/pen/kua fish culture or duck farming is available; legal access individually or communally can be assisted.	They do not have the capacity to access those equipment.
3. Do they have the capacity to productively use the livelihood assets?	Farmers have been doing pond fish culture; training in good management practice will improve performance	Cage/pen fish culture and duck farming would be new to some farmers; training and demonstration will be needed.	Project would supply those to the community and make them familiar how to use those.

4. Do they have the capacity to manage sustainably the livelihood assets?	They are capable, but project's capacity building and on-farm piloting would upscale their skills.	They are capable, but project's capacity building and on-farm piloting would upscale their skills.	Project would make them familiar how to use and maintain those equipment and how to spell environmental data to need-based actions.

1.3. Risk Assessment Approach (RAA)

Screens/Adaptation options	**1. Establishment/ improvement of fish sanctuaries**	**2. Improvement of fish habitat, beel nursery management & openwater stocking**	**3. Excavation of linking khals** for restoring migratory routes of fish	**4. Establishment of fish brood banks and improvement of climate proof satellite fish hatcheries**.
1. Which risks to the beneficiaries does the activity mitigate? How?	Depletion of indigenous fish & vegetation due to climate change; reduction in wild catch which are major livelihoods (subsistence) to the community.	Recover biodiversity loss; enhance community's sustained use of the wild resources; resilient climate protocols.	Restore back and forth movement & migration of fishes from beels to rivers; restore/improve biodiversity lost due to CC.	Increased availability of quality fish seeds for aquaculture & open water stocking. Stock/race improvement deteriorated so far due to increased used of close siblings in the hatchery as wild spawns are lost due to CC impacts.
• natural/ biological	Indigenous fish & vegetation species conserved; Indigenous species are well adapted to the ecosystem and resilient to CC risks; indigenous fish species would rejuvenate in the next year; hence quick stock enhancement; no risks of disease epidemic.	Habitat conserved for maximum sustenance & be resilient.	Habitat conserved for maximum sustenance & be resilient.	Suitable trait maintenance both in the hatchery & the wild.
• environmental/ ecological	Sanctuary and nursery enhances fish & vegetation habitats, keeps ecosystem & its resources undisturbed & be resilient.	Environment & ecosystem enhancement.	Environment & ecosystem enhancement.	Ecosystem approach to fisheries management (EAFM).

• economic/ financial	Indigenous fish, vegetable species and aquatic fruits are preferred have a good market price.	Improved yield/ production of common property natural resources and support to livelihood of the community.	Enhanced wild catch of fish, vegetables, enhanced livelihood of the community.	Enhanced yield from aquaculture & wild.
• social risks	Maintenance of sites through a CBO strengthens social harmony and reduces conflicts.	Risks of opposition from local politically motivated beneficiaries; would need govt. legal circular supporting community-based management.	Risks of opposition from local politically motivated beneficiaries; would need govt. legal circular supporting community-based management.	No social risks at all, rather efficiency improvement of hatcheries, availability of quality seeds & skill development of technicians.
2. How does the activity improve resilience of beneficiaries	Management of sanctuaries and nurseries provides continuing source of wild fish, herbs, food and fuel wood.	Understand wetland habitats & adopt how to exploit the resources on a sustainable way.	Understand wetland habitats & adopt how to exploit the resources on a sustainable way.	Enhanced wild catch from beels, enhanced yields from aquaculture; understand resilience to CC impacts.
3. How does it improve their capacity for adaptation to the impacts of risks?	Organized management of the sanctuaries and natural nurseries enables group learning and decision making on management measures for the resource and other livelihood assets to sustain, make ecosystem more resilient.	Organized management of the wetlands & nurseries; enables group learning and decision making on management measures for the resource and other livelihood assets, make ecosystem more resilient.	Organized management of the wetlands & its natural resources enable group learning and decision making on management measures for the resource and other livelihood assets, make ecosystem more resilient.	Organized management of the wetlands & its natural resources enable group learning and decision making on management measures for the resource and other livelihood assets, make ecosystem more resilient.

Screens/Adaptation options	**5. Promote climate smart pond fish culture**	**6. Pen/kua fish culture/ Cage fish culture or Net and trap making or Duck farming**	**17. Supply of small equipments & early warning system devl.**
1. Which risks to the beneficiaries does the activity mitigate? How?	Improved & restored pond aquaculture that lost due to CC risks (drought, floods);	Adapt against droughts and floods; alternate livelihoods to possible climate migrants (otherwise leave profession & migrate to urban areas)	Better understanding of environmental parameters & their consequences, need-based actions taken (adoption of EWS) to ensure resilient farming.

• natural/ biological	Improved pond environment & ecosystem for improved fish yield. Proposed species are available, community have some idea about farming, need upscaling; those species are preferred by all and fetch good market price.	Pen or kua fish culture exists there, needs upscaling. Again cage fish culture or Nets, Traps making or Duckery are as well practiced there; all need upscaling as an alternate livelihood options for them to be climate migrants.	Conducive to environmental & ecological conditions.
• environmental/ ecological	All species are suited to environment & ecological conditions; better adapted to CC. Enhanced water depth & water holding capacity would increase fish yield and ease freshwater availability for household purposes.	Pen/Kua/Cage fish culture or Duckery are environmentally & ecologically suited for the area.	Conducive to environmental & ecological conditions.
• economic/ financial	Improved goods & services (yield of fishes) from the ponds to the community; would outweigh investment	Any of those options are suitable for the community, they don't have to leave the area & profession due to CC; options would outweigh investment cost.	Would ensure resilient farming; increased livelihood
• social risks	Multiple ownership of ponds may hinder common consensus for excavation/ re-excavation, fish culture; again equal labor sharing by all owners in excavation may pose threat; poaching of cultured fish would be an additional risk. This is easily resolvable through counseling & motivation	Poaching loss may be a threat; would need better management & vigilance, project management would take every care if any social issue arises.	No social risks.
2. How does the activity improve resilience of	Improved availability of livelihood assets & better livelihood.	Income generating options lost otherwise due to loss of habitats resources (due to CC	Better understanding of environmental parameters & their consequences, need-

beneficiaries		and anthropogenic changes).	based actions taken (adoption of EWS) to ensure resilient farming.
3. How does it improve their capacity for adaptation to the impacts of risks?	Organized management (piloting trials and trainings) of pond aquaculture enables group learning and decision making on management measures for the resource and other livelihood assets available.	Organized management (piloting trials and trainings) would enable group learning, cooperative ideas and improved decision making on management measures.	Organized management enables group learning and decision making on management measures for the resource and other livelihood assets available.

Southwest Coastal Area

Climate change threats	**Erratic rainfall,** delayed monsoon, dry spell within monsoon **Prolonged drought**, high evaporation and drying up of water bodies, siltation **Abnormal rain**/ precipitation, flooding, Flash floods **Salinity** intrusion, salinity increase, sea level rise **Extreme events**, tornadoes, storm surge

2.1. Farming systems approach (FSA)

Screens/Adaptation options	**1. Excavation of linking canals/ rivers to ease water exchange; Excavate ghers/ ponds to maintain at least 1 m depth**	**2. Improve efficiency of golda *(Macrobrachium rosenbergii*) hatcheries of govt. and private sector**	**3. Improve techniques of extensive & semi-intensive farming systems (BW shrimp monoculture; FW prawn/salty fish+BW shrimp culture; integrated concurrent rice-FW prawn+fish culture, alternate rice+prawn+fish & BW shrimp culture)**	**4. Mud crab fattening for hard & soft shell crab production; feasibility study for a crab hatchery establishment**
How will this adaptation address the climate change threat	Reduce impact of flashflood, water logging, facilitate water flow acting as outlets of beels and floodplains, strengthening gher/ beel dykes, increase water holding in ghers/beels, minimize wave action; Restored link canals would ensure smooth feeding & breeding migration of fish, enhance natural fish production.	Golda is more resilient to changes in temperature, water salinities & more sturdy in general compared to other species; reduce/ limit effects of unpredictable temperature, draught & water salinity.	Address effects of drought, evaporation, rainfall & temperature, slainity rise (reduce/ limit); ensure desired yield; golda & salty fishes are more resilient to changes in temperature, water salinities & more sturdy in general	Address threats of salinity intrusion/ increase, the species is more resilient to changes in temperature, water salinities & more sturdy in general; Resilient adaptation, Ensuring farm income from high salinity conditions.
Linkage with other ongoing projects/ programmes	STDF project of DoF-FAO.	None	STDF project of DoF-FAO; on-going projects of DoF-WorldFish	On-going project of FD-GIZ.
Support from the Project	Small-scale excavation be supported by the project through community	Regional/International expertise be deployed to identify the causes of limitations & ways of	Upscaling of best practices & lesson learned through piloting of Improved techniques of	Upscaling of existing practice & lesson learned elsewhere; ensure better yield from unit farm area;

	mobilization & labor. Large-scale excavation is not possible through the project activities.	improving efficiency so that existing hatcheries can meet local farming demand; small renovation and capacity building of technical personnel would be supported.	extensive & semi-intensive farming systems; ensure better yield from unit farm area; better resilience to CC threats and livelihood options.	better resilience to CC conditions and livelihood options. Complementary support to BFRI for the hatchery project (Expertise, information, training)
Biological feasibility	Proposed actions will minimize effects of evaporation and temp. increase by optimum depth, hold more water and facilitate water exchange, maintain conducive conditions.	Golda is traditionally farmed in the region as a forex earning commodity. Would meet golda PL/juvenile demand for aquaculture in the area.	Biologically feasible; BW shrimps and FW prawns are traditionally farmed in different ways in the region; proposed upscaling actions would ensure farm income despite CC threats. Saline tolerant fish species would ensure good farm income against salinity intrusion/ increase; seed production of *parse* and *nona-tengr* in captivity is available, need technology for seed production of seabass in captivity; Saline tolerant rice strains are available for integration with fish/prawn during monsoon;	Fattening practiced in traditional way in the area; needs upscaling, popularization; exists good market linkage & demand. Would ensure better farm income in increased salinity conditions. The Sundarban coast is a suitable area where mud crab is a naturally available, use mangrove as their breeding and feeding ground. No crab hatchery in the area, need to establish one, would protect wild crablets harvesting.
Technical feasibility	Small-scale excavation be supported by the project through community mobilization & labor; excavation to increase depth and strengthening levee; pond/ gher digging may require foregoing a crop; Technology is available.	Hatchery technology is well known; needs improvement & upscaling in technological skills;supported for minor improvement & skill development.	Community mobilization & piloting of best practices would improve community skills & ensure farm yield & income; Integrated systems are practiced in limited scale; needs popularization.	Technology is available; needs popularization & upscaling; can easily be adapted; exists good market linkage & demand. BFRI has recently succeeded in producing crablets in captivity on 11 February, 2015. (http://www.newshour.com.bd/2015/02/12/mud-crab-breeding-will-help-increase-aquaculture-productivity/). Technically feasible, would need separate project funding

				for establishment of a crab hatchery, can be through public-private partnership (PPP).
Economic viability	Government investment/ co-funding by other stakes needed for large-scale excavation; community needs to give labor and may have to forego a crop; increased yield would outweigh efforts of minor excavation.	Demand for FW prawn PL/ juvenile is around 220 million, supply is around only 4.5 million. If hatchery efficiency improved, can meet PL/ juvenile demand, farming & yield would increase; improve livelihood.	Through piloting community would learn profitability; needs community mobilization, minor excavation, timely supply of inputs; increased yield would outweigh efforts exerted.	Crab is a high value export item; local community are doing in small-scale; needs extension & upscaling; prevails good marketing opportunity & demand; needs quality assurance; economically profitable. Hatchery establishment would meet timely supply of juveniles.
Social and Environmental acceptability	No negative social & environmental impact, Excavation would improve water exchange & proper depth for aquaculture & strengthened levee against flooding.	No negative social & environmental impact, would increase hatchery efficiency, farming area, produce more exportable prawns & job opportunities.	Social & environment friendly initiatives; poaching of farmed shrimp, prawn, fish may be of least concern; system would be environmentally benign as no mangroves are cleared.	Poaching may be a problem, but very rarely; system is environmentally benign as no mangrove is cleared.
Women involvement	Women (at least 30-40% of the CBO members) would be involved in every works. No risks to women.	No involvement of women as an expert would identify the problems and suggest remedial measures; efforts will be exerted, if possible, to involve women in golda juvenile production & sales. No risks to women.	Women (at least 30-40% of the CBO members) would be involved in every work. No risks to women.	Already in practice in the area with women involvement; good opportunity for more involvement of women. No risks to women.

Screens/Adaptation options	**5. Promote climate smart pond fish culture**	**6. Pen/kua fish culture/ Cage fish culture or Net & trap making or Duck farming**	**7. Establishment/ improvement of fish sanctuaries, fish habitat, beel nursery management & openwater stocking**	**8. Establishment of fish brood banks and improvement of climate proof satellite fish hatcheries**.

How will this adaptation address the climate change threat	Improvement of pond condition; increased depth (deepening), dyke strength and height are very important adaptation to risks of flood and drought and extreme hot season at certain magnitude; Improvement of pond bottom condition is also important in maintaining good water quality when facing high temperature and drought. Ponds that are properly and suitably built to provide a better growing environment for fish (i.e. attenuates water temperature fluctuations) can reduce production risks from climate variability. These would use less water, improve land use, can be stocked at a higher density, have a more controllable environment including recirculation of water, are less polluting, and can be more resistant to disasters.	Conserve indigenous fish even during downpour, flashfloods and dry periods and also for home consumption and sale through Pen/ kua culture of carps, barbs etc., increased livelihood and involvement of women in aquaculture; women friendly production systems would comprise a purposely designed net pen in flood situation. Cage culture of mono-sex tilapia can be a resilient adaptation with the rise and fall of the water level during downpour or drought spell during monsoon. If these are not possible, duck farming or Nets-traps making would be piloted with the involvement of women for enhancing livelihood during periods of prolonged drought, flash flood or other CC threats.	Conserve fish breeding grounds during drought, temperature increment, sedimentation, erratic rainfall, & flood events; Improvement of deteriorated native fish stocks due to climate and anthropogenic changes; enhance survival, reproduction by creating fish shelter and sanctuaries. More resiliency to droughts and flash flood; Improved fish habitats (excavation, plantation of wetland trees & hydrophytes), fish stock recovery through beel nursery management i.e. release of native fish species to allow population to recovery and breed in the next season.	Availability of quality & suited traits of fish seeds that would be resilient to floods, droughts; enhance & ensure desired yield in aquaculture in the face of CC threats; an alternate livelihood; Efficiency of Govt. & Private fish hatcheries improved, can meet local demand of quality & suited traits of fish seeds for aquaculture.
Linking with other ongoing projects and programmes	To be coordinated with the regular fish culture promotion programmes of the DoF. Excavation (through IFAD activity) & afforestation (FD activity) is recommended through co-funding/ base line funding in the PIF.	Ongoing projects of DoF & DLS in scaling up and diffusing the system.	Ongoing projects and programmes of DoF-WorldFish, Afforestation project of GIZ-FD & other NGOs.	DoF and WorldFish project on fish brood bank and development of village level breeding nucleus.

Support from Project	Project can support small-scale excavation & minor repair of dikes through community labor, water intake, pond preparation, fish seed & feed procurement & management; All management activities & be done by the community; Large-scale excavation may be attempted through works of co-funding agencies, viz. IFAD project.	Pen/ cage/ kua establishment, piloting (construction and running a suitable cage/pen, fish fingerling, feeding & management) and training & would be supported; community would engage their labor. In case of duckery, costs of ducklings, feeds, medicines, management, etc. would be borne.	Sanctuary establishment, hydrophytes plantation & management, beel nursery management, raising of native fish spawns/fingerlings and release them in the open water; stocking of bigger-sized native fish species would be supported & done through community mobilization & labor. Would support detailed risks and vulnerability assessment and mapping and of early warning system be done. Training of communities and local agency personnel in monitoring, surveillance and dissemination of the probable (time and place) occurrence of flash floods and sanctuary management would be supported.	Would support minor hatchery improvement (infrastructure), hormone brood/ spawn procurement, hatchery management, artificial breeding, nursing & transport (in polythene bags, oxygen) of spawn/fingerlings; training of hatchery personnel.
Biological feasibility	Enhanced income from HH activity, more women involvement; nutrition security deeper water and resulting cooler temperature will reduce fish disease; dyke can be used to grow vegetables & fruit trees.	Flooded haors and adjacent rivers/ khals provide a suitable cage/ pen culture areas, while kua culture is done during drought lean season; Species are already cultured in the region. Duck rearing is also practiced there since long time.	Sanctuaries would enhance stocks of indigenous species' and wild catch; improved livelihood of fishers; Excavation would enhance fishes' habitat depth and restore fish migration/ dispersal paths; wetland trees & hydrophytes plantation (locally available) would meet ecological niche for stock recovery; only native species will be stocked , managed & conserved.	Would enhance availability of quality seeds for improved aquaculture & increased fish yield/ open water stock enhancement; expertise is available in the country.

Technical feasibility	Would protect stocked fish/prawns from floods and droughts. *Highly feasible;* all inputs are available in the area, technology is known, best practice can be replicated through community mobilization.	Appropriate design and management technology of cage, pen, and kua are available. *Highly feasible;* local entrepreneurs/ experts can be of assistance. Beneficiaries would be taught cage/pen/kua fish cultures/ duck rearing through on-farm piloting activities with their involvement; all are proven livelihood options for haor areas.	Need technical assistance from DoF/ BFRI and labor inputs from communities (CBOs); these are available. *Highly feasible;* expertise is available. Large-scale excavation & plantation is not possible by this project; excavation through co-funding arrangements. Small-scale excavation work to be done by community labor & siltation of linking canal will be managed by community management actions.	Seeds of the desired species, quality and size can be assured under the FAO seed and feed project; expertise is available; *Highly feasible.*
Economic viability	CBO members will share their physical labor, learn fish culture by doing & training; increased HH income & nutrition security; economic return of such investment would be outweighed by increased fish production; recurring investment would be needed, Govt. normal allocation should sustain this.	Economically feasible and needs little input cost; economic return of such investment would be outweighed by increased fish production.	No recurring investment other than the initial cost; will need strong CBOs to maintain and protect sanctuaries; economic return of such linking works would outweigh by increased fish production. Earth work, plantation and beel nursery operation would need recurring investment to sustain achievements; Govt.'s normal allocation would sustain this in future. Increased fish production would outweigh economic return of such interventions.	Funding from this project would mainstream & upscale ongoing activities of DoF/ private hatcheries; economic return of such investment would outweigh by increased fish production in the area.
Social and Environmental acceptability	Though multi-ownership of ponds may limit equitable shared labor and commitment for fish culture; this could be overcome through counseling community mobilization.	Widely acceptable; encourages organized and collective actions; environmentally and ecologically beneficial; Fish production, HH income and nutrition would enhance; No exotic species other than tilapia	Widely acceptable; encourages organized and collective actions; environmentally and ecologically beneficial; a desirable resource management approach.	Environmentally & socially acceptable as this will be done through proper trait management of different species; great care would be taken against inadvertent spillage of exotic species to open water system.

		and only for cage/pen culture, in kua native species will be stocked; locally farmed ducklings will be farmed.		
Women involvement	Women can be easily involved in more umbers, trained and motivated to take care of the fish pond, fish feeding, growing vegetables and fruits on the pond dyke (without extra effort) for their livelihood improvement. No risks to women.	Women will be able to handle cages/ pens/kua for fish culture or duckery almost effortlessly; would enable women to play crucial role in family farming and income enhancement. No risks to women.	Women (at least 30% of the CBO members) would be involved in works of improvement/ establishment of sanctuaries. No risks to women.	Women can be involved in fish handling, fish feeding & management, packing of spawn/fingerlings for transportation. No risks to women.

Screens/Adaptation options	**9. Establish a PL market**	**10. Supply of small equipments & early warning system devl.**
How will this adaptation address the climate change threat	PL market at the door step (Barakpur of Bagerhat) of the community, no such fish/shrimp/prawn juvenile market nearby. Lessen mortality shrimp & prawn PL and fish fry/juveniles due to environmental factors during transport & marketing.	Aware community to understand implications of environmental parameters for taking timely actions and reduce loss; Changes in farmers management practices for water & feeding management and water quality control etc.; very important interventions in reducing risks related to warming, prolonged hot season, drought, etc.; Supply of small equipment to CBOs for water quality monitoring; small capacity feed mixing & pelleting machine (50-100 kg/ day) for improved feeding management; insulated fish box for delaying post-harvest quality loss & easy fish marketing.
Linking with other ongoing projects and programmes	DoF and WorldFish project on fish brood bank and development of village level breeding nucleus.	STDF project of DoF-FAO, Quality assurance project of BSFF and DoFs Quality control programmes.
Support from Project	Initial financial support to CBOs for buying & selling shrimp & prawn PL and fish	Project would bear the costs of small equipments and supplied to the CBOs for

	fry/juveniles in the new market.	their own use in the pilot fields and rental to others.
Biological feasibility	Would be established to extend aquaculture in the adjoining area; would create alternate livelihood opportunities.	Understanding of prevailing environment of fish culture system would enable the community to take right steps in case of extreme climatic events.
Technical feasibility	Feasible; would need dialogue with the local administration and elected representative to have a suitable space in the local market; would need initial financial support to start marketing of PLs/ juveniles.	All equipments are easy to handle, once community people practice their use, they can handle them easily.
Economic viability	Feasible; would create alternative livelihood opportunities.	Equipments are not expensive and available in the market.
Social and Environmental acceptability	Feasible; would create alternative livelihood opportunities.	No social problem is seen, though CBO leader may show individual ownerships, conflicts of individual/ single leadership and taking upper hand may arise; but it would be resolved by strong supervision & counseling.
Women involvement	Men counterpart can lead buying shrimp/prawn PLs fish spawns from far areas; women can manage the nursery operations (shrimp/ prawn/ fish) near their homesteads and raise juveniles; also women can have a sitting place and sell those in the market. No risks to women.	Women will be included in the training of demonstration of these equipments. They can involve themselves in more and more aquaculture activities (side by side their male counterpart) like water quality monitoring, feed making and mixing and sorting and conserving harvested fish for marketing. No risks to women.

2.2. Sustainable Livelihoods Approach (SLA)

State of ability to access and to manage livelihood assets or capitals in order to fully benefit from the proposed interventions.

Screens/Adaptation options	**1. Excavation of linking canals/ rivers to ease water exchange; Excavate ghers/ ponds to maintain at least 1 m depth**	**2. Improve efficiency of golda *(Macrobrachium rosenbergii*) hatcheries of govt. and private sector**	**3. Improve techniques of extensive & semi-intensive farming systems (BW shrimp monoculture; FW prawn/salty fish+BW shrimp culture; integrated concurrent rice-FW prawn+fish culture, alternate rice+prawn+fish & BW shrimp culture)**	**4. Mud crab fattening for hard & soft shell crab production; feasibility study for a crab hatchery establishment**
1. Do the beneficiaries have access to the required livelihood assets (are these available)?	Beneficiaries have ghers and ponds; Canals and ghers are part of the production systems; ponds/ghers are owned or leased. Heavy machinery needs to be either provided as a project input or cofounding arrangement; farmers' may not bear cost.	Beneficiaries have ghers and ponds; increased efficiency of golda hatchery would boost culture, production of golda and eventually livelihood and export.	Beneficiaries have ghers and ponds; piloting of different climate smart aquaculture technologies would boost culture, production of fish/ shrimps/ prawns and eventually livelihood and export.	Beneficiaries have ghers; piloting of crab fattening would boost culture, production of crabs and eventually livelihood and export; market linkages already exist. Easy availability of hatchery produced crablets would boost culture, reduce wild crablet harvest.
2. Do they have the capacity to access livelihood assets?	Same as above	Same as above	Same as above	Yes; project activities would further enhance their overall capacity.
3. Do they have the capacity to productively use the livelihood assets?	A more reliable water supply system and deeper ponds will not require additional or new skills or resources (other than the equipment for excavation and capacity to use them or being made available for the work)	Yes	Yes	Same as above

4. Do they have the capacity to manage sustainably the livelihood assets?	Same as above	Same as above	Same as above	Same as above

Screens/Adaptation options	**5. Promote climate smart pond fish culture**	**6. Pen/kua fish culture/ Cage fish culture or Net & trap making or Duck farming**	**7. Establishment/ improvement of fish sanctuaries, fish habitat, beel nursery management & openwater stocking**	**8. Establishment of fish brood banks** and **improvement of climate proof satellite fish hatcheries**.
1. Do the beneficiaries have access to the required livelihood assets (are these available)?	Beneficiaries have ponds; Adapt against droughts, flood situation and temperature rise of fish culture; they have got livelihood assets.	Beneficiaries have access; Adapt against droughts, flood situation and temperature rise of fish culture; they have got livelihood assets.	Project would bear costs wetland hydrophytes plantation; plants are available there; community/ CBOs would share labor inputs; Sanctuaries have to be earmarked as no fishing zone and subject to no fishing round the year; fishing would be allowed at a prefixed area outside & far from the sanctuary; increased open water catch by the community from outside the sanctuaries.	Beneficiaries have access; Increased availability of quality fish seeds by the community for aquaculture & open water stocking; efficiency improvement of Govt. & private fish hatcheries & skill development of personnel.
2. Do they have the capacity to access livelihood assets?	Land is available and farmers have legal access to it.	Water body for cage/pen/kua fish culture or duck farming is available; legal access individually or communally can be assisted.	Project would support to improve the sanctuary. A sanctuary is established on Govt./ khas land will need government legal order in favor of CBOs for protection and maintenance by CBOs; harvest sharing would be prescribed through FGDs/FFS by the project management.	More livelihood opportunities as fish seed trading/ marketing; efficiency improvement of Govt. & private fish hatcheries & skill development of personnel.
3. Do they have the capacity to	Farmers have been doing pond fish culture; training in good	Cage/pen fish culture and duck farming would be new to some	They sanctuaries and nurseries will need government legal order	Increased availability of quality fish seeds to the

productively use the livelihood assets?	management practice will improve performance	farmers; training and demonstration will be needed.	in favor of CBOs for protection and maintenance by CBOs; increased open water catch by the community from outside the sanctuaries. Strong coordination, management and leadership of the project management along with community mobilization & participation would allow productive use of livelihood assets.	community and neighboring area; efficiency improvement of Govt. & private fish hatcheries & skill dev. of personnel.
4. Do they have the capacity to manage sustainably the livelihood assets?	They are capable, but project's capacity building and on-farm piloting would upscale their skills; women can involve themselves & build their skills.	They are capable, but project's capacity building and on-farm piloting would upscale their skills. Fishers & Women can involve themselves in Nets, Traps making & Duckery.	Legal protection along with community's' united action will sustain the sanctuary; Govt. policy decision will be needed for sustenance and management of the improved fish habits by the CBOs after project life; increased open water catch by the community from outside the sanctuaries.	Efficiency improvement of Govt. & private fish hatcheries & skill development of personnel. Women can involve themselves in nursery operations of shrimp/prawn/fish and sell juveniles to market/prospective buyer.

Screens/Adaptation options	**9. Establish a PL market**	**10. Supply of small equipments & early warning system devl.**
1. Do the beneficiaries have access to the required livelihood assets (are these available)?	Beneficiaries got access to livelihood assets.	Have access to livelihood assets; these handy & portable equipments are available in the country, project would supply those to the community and make them familiar how to use those for monitoring water quality parameters & rental services; Ownership would remain with the CBOs; no personal conflict foreseen.
2. Do they have the capacity to access livelihood assets?	Same as above	They do not have the capacity to access those equipment.

3. Do they have the capacity to productively use the livelihood assets?	Same as above	Project would supply those to the community and make them familiar how to use those; learning is easy.
4. Do they have the capacity to manage sustainably the livelihood assets?	Same as above. Women can involve themselves in nursery operations of shrimp/prawn/fish as part of HH works and sell juveniles to market/prospective buyer.	Project would make them familiar how to use and maintain those equipment and how to spell environmental data to need-based actions.

2.3. Risk Assessment Approach (RAA)

Screens/Adaptation options	**1. Excavation of linking canals/ rivers to ease water exchange; Excavate ghers/ ponds to maintain at least 1 m depth**	**2. Improve efficiency of golda *(Macrobrachium rosenbergii*) hatcheries of govt. and private sector**	**3. Improve techniques of extensive & semi-intensive farming systems (BW shrimp monoculture; FW prawn/salt tolerant fish+BW shrimp culture; integrated concurrent rice-FW prawn+fish culture, alternate rice+prawn+salt tolerant fish & BW shrimp culture)**	**4. Mud crab fattening for hard & soft shell crab production; feasibility study for a crab hatchery establishment**
1.Which risks to the beneficiaries does the activity mitigate? How?	Pond/ gher productivity is ensured against drought, flood, temperature increase, by a more reliable supply system of water and a rehabilitated pond depth.	Less dependency on wild PLs, help mitigate increased PL production in the face of unpredictable temp. rise, salinity, drought, rainfall, etc. and biodiversity loss; ensure timely availability of PLs for aquaculture; Saves money – hatchery PLs are cheaper that wild ones & conserve biodiversity.	Mitigate all climate threat risks of unpredictable temp. rise, salinity, drought, rainfall, etc.; Ensure better yield against investment & efforts; gain skills in resilient CC mitigation & ensure better livelihood.	Use slainity intrusion opportunity in a positive way by adopting crab fattening operations; unique way of CC risks mitigation. A way of livelihood in high saline areas, where rice or vegetables can't be grown and other opportunities are limited.
• natural/ biological	Deeper pond/gher more favorable to shrimp/prawn/fish	Improved efficiency of golda hatchery would meet the	Better adaptation to CC, better yield, production of fisheries &	Mud crab is a traditional species in the area; been practiced in many

	survival and growth	culture demand, more production, more export, improved livelihood.	improved livelihood.	other countries. No natural or biological risks; technology is available & technically feasible.
• environmental/ ecological	Well maintained water supply would reduce risks of drought & temp. rise, pollution and erosion	Less dependency on wild PLs, help conserve wild stocks/ recruitments.	Better adaptation to CC, better yield, production of fisheries & improved livelihood.	Fattening technology available; needs popularization; can be adapted with good management; good opportunity for women involvement. Hatchery establishment in future would ensure ecological balance for wild mud crab biodiversity.
• economic/ financial	Better fish growth and performance and higher stocking density enabled; minor excavation to be done through community mobilization and labor.	Better yields, higher productivity and higher returns from good water supply and rehabilitated ponds /ghers; improves financial capital of farmers	Better yields, higher productivity and likely higher returns from a good water supply and rehabilitated ponds improves financial capital of farmers	Crab is a high value export item; prevails good marketing opportunity; needs quality assurance.
• social risks	None; mitigates fierce and probably harmful competition for water	No social risks.	No social risks.	No social & environmental risks; would need hatchery establishment to expand seed production.
2. How does the activity improve resilience of beneficiaries	Better yields, higher productivity and likely higher returns from a good water supply and rehabilitated gher/ponds; improves financial capital of farmers	Ensure timely availability of PLs for aquaculture; ensures more culture area coverage, more production, more export, improved livelihood of beneficiaries.	More culture area coverage, more production, more export, improved livelihood.	A way of livelihood in high saline areas, where growing non-saline rice, vegetables, fish/prawn is limited or can't be grown. Would ensure more involvement of women & their income.
3. How does it improve their capacity for adaptation to the impacts of risks?	Rehabilitating the water supply system can encourage group action and could lead to the formation of farmer clusters for community based management of the water supply system and other community assets.	Same as above	Same as above.	Same as above.

Screens/Adaptation options	**5. Promote climate smart pond fish culture**	**6. Pen/kua fish culture/ Cage fish culture or Net & trap making or Duck farming**	**7. Establishment/ improvement of fish sanctuaries, fish habitat, beel nursery management & openwater stocking**	**8. Establishment of fish brood banks** and **improvement of climate proof satellite fish hatcheries**.
1.Which risks to the beneficiaries does the activity mitigate? How?	Improved & restored pond aquaculture that lost due to CC risks (drought, floods, increased temp., disease);	Adapt against unpredictable climate events (droughts, floods, temp. rise); alternate livelihoods to possible climate migrants (otherwise leave profession as livelihood lost & migrate to urban areas)	Depletion of indigenous fish & vegetation due to climate change; reduction in wild catch which are major livelihoods (subsistence) to the community. Recover biodiversity loss; enhance community's sustained use of the wild resources; resilient climate protocols.	Stock/race improvement deteriorated so far due to increased used of close siblings in the hatchery as wild spawns are lost due to CC impacts. Increased availability of quality fish seeds for aquaculture & open water stocking.
• natural/ biological	Improved pond environment & ecosystem for improved fish yield. Proposed species are available, community have some idea about farming, need upscaling; those species are preferred by all and fetch good market price.	Pen or kua fish culture exists there, needs upscaling. Again cage fish culture or Nets, Traps making or Duckery are as well practiced there; all need upsacaling as an alternate livelihood options for the to be climate migrants. Fishers & women can get involved in more numbers.	Indigenous fish & vegetation species conserved; Habitat conserved for maximum sustenance & be resilient.	Suitable trait maintenance both in the hatchery & the wild.
• environmental/ ecological	All species are suited to environment & ecological conditions; better adapted to CC. Enhanced water depth & water holding capacity would increase fish yield and ease freshwater availability for household purposes.	Pen/Kua/Cage fish culture or Duckery are environmentally & ecologically safe.	Sanctuary and nursery enhances fish & vegetation habitats, keeps ecosystem & its resources undisturbed & resilient. Improved yield/ production of common property natural resources	Ecosystem approach to fisheries management (EAFM).

• economic/ financial	Improved goods & services (yield of fishes) from the ponds to the community; would outweigh investment	Any of those options are suitable for the community, they don't have to leave the area & profession due to CC; options would outweigh investment cost.	Indigenous fish, vegetable species and aquatic fruits are preferred, have a good market price. Improved support to livelihood of the community.	Enhanced yield from aquaculture & wild.
• social risks	Multiple ownership of ponds may hinder common consensus for excavation/ re-excavation, fish culture; again equal labor sharing by all owners in excavation may pose threat; poaching of cultured fish would be an additional risk. This is easily resolvable through counseling & motivation	Poaching loss may be a threat; would need better management & vigilance, project management would take every care if any social issue arises.	Risks of opposition from local politically motivated beneficiaries may arise; would need govt. legal circular supporting community-based management Maintenance of sites through CBOs strengthen social harmony and reduces conflicts.	No social risks at all, rather efficiency improvement of hatcheries, availability of quality seeds & skill development of technicians.
2. How does the activity improve resilience of beneficiaries	Improved availability of livelihood assets & better livelihood.	Ensure income generating options otherwise lost due to loss of habitats resources (due to CC and anthropogenic changes).	Understand fish habitats & adopt how to exploit the resources on a sustainable way. Management of sanctuaries and nurseries provides continuing source of wild fish, herbs, food and fuel wood.	Enhanced wild catch from openwater, enhanced yields from aquaculture; understand resilience to CC impacts.
3. How does it improve their capacity for adaptation to the impacts of risks?	Organized management (piloting trials and trainings) of pond aquaculture enables group learning and decision making on management measures for the resource and other livelihood assets available.	Organized management (piloting trials and trainings) would enable group learning, cooperative ideas and improved decision making on management measures.	Organized management of the sanctuaries and natural nurseries enables group learning and decision making on management measures for the resource and other livelihood assets to sustain, make ecosystem more resilient.	Organized management of the wetlands & its natural resources enable group learning and decision making on management measures for the resource and other livelihood assets, make ecosystem more resilient.

Screens/Adaptation options	**9. Establish a PL market**	**10. Supply of small equipments & early warning system devl.**

1.Which risks to the beneficiaries does the activity mitigate? How?	Risks of temp. increase & mortality during long distance transportation; timely availability of PLs/ juveniles near their farm areas would reduce risks of temp. increase.	Better understanding of environmental parameters & their consequences, need-based actions taken (adoption of EWS) to ensure resilient farming.
• natural/ biological	Feasible.	Conducive to environmental & ecological conditions.
• environmental/ ecological	Feasible.	Conducive to environmental & ecological conditions.
• economic/ financial	Feasible.	Would ensure resilient farming; increased livelihood
• social risks	need dialogue with local administer. and elected representative to have a suitable space in the local market; need initial financial support to start marketing of PLs/ juveniles.	No social risks.
2. How does the activity improve resilience of beneficiaries	Alternate livelihood option.	Better understanding of environmental parameters & their consequences, need-based actions taken (adoption of EWS) to ensure resilient farming.
3. How does it improve their capacity for adaptation to the impacts of risks?	Alternate livelihood option.	Organized management enables group learning and decision making on management measures for the resource and other livelihood assets available.

Appendix 5: Procurement Plan

Appendix-5 Proc Plan-20151116.xls

Appendix 6: Terms of Reference (ToRs) for Key Project Personnel

GOVERNMENT APPOINTED POSITIONS

1. Project Director, PD (01 position, DoF)

Duration: 48 man months, full project period
Duty Station: Matshya Bhaban, DoF, Dhaka (Field visits to project areas required)

The Project Director (PD) will be the dedicated national professional to project and will serve as the Focal Person (FP) over the years for project activities for the coordination of projects with other Government agencies, FAO and outside implementing agencies.

Key tasks

- PD will assume general oversight, develop and maintain close liaison with the sectoral government ministries/agencies, FAO-GEF, NGOs, civil society, international organizations, stakeholders and implementing partners of the project;
- Undertake the necessary administrative and managerial responsibility and timely initiative to implement the project in maximal ways;
- Supervise and lead the project team in discharging their duties at optimum level ensuring resources are employed efficiently and effectively;
- Review and provide input to annual work plans and budgets in consultation/collaboration with the FAO representation.
- Actively participate and coordinate (reflect DoFs need and suggest best choices) in the selection and recruitment of consultants, project personnel and staffs.
- Recommend and coordinate preparation of proper specifications for all procurements and reflect DoFs need and suggest best choices in all procurement of the project.
- Implement the decisions of the Project Steering Committee and seek for the best issues for further development of the project;
- Undertake any other responsibility entrusted upon him/her as may be assigned by the PSC or by government authority.

Key competencies/qualifications

- PD will be B.Sc. Fisheries (Hons.) or preferably higher degree.
- Should have proven experience in Coastal and Wetland Resources management; experience in handling donor management project under UN systems is preferred.
- Should have proven experience in writing, compiling and evaluating technical reports.
- Should have proven experience in computer literacy.

FAO-GEF Appointed positions

International Experts/ Consultants

1. International Team Leader (01 position) (FAO-GEF)
Duration: 08 (eight) man months [04 mm in 1st year; 02 mm in 2nd year and 02 mm in 4th year]
Duty Station: Project Management and Technical Support Unit (PMTSU), FAO-Dhaka (Extensive Field visits required)

Key tasks
Under the overall administrative supervision of the FAO Representative in Bangladesh, the Technical Supervision of the Lead Technical Unit (LTU) and the Lead Technical Officer (LTO) from FAO-RAP, and in close collaboration with other relevant Divisions and services in FAO and in consultation with relevant local authorities the International Team Leader will have the responsibility for launching of the project setting up and start activities. Specifically S/he will:

- Liaise and work closely with the FAO, Dhaka and the DoF, Dhaka and the national project personnel in setting up project activities;
- Provide technical support and guide NPC & PD and other appropriate personnel in FAO and DoF for setting up field sites and initiate project activities;
- Provide technical support to PMTSU & PIU, DoF in organizing and facilitating the Inception Workshop and produce Inception Workshop Report;
- Provide technical support to FAO & DoF in reviewing & finalizing detail ToRs specifying what tasks are to accomplished, identify the profile and qualifications of the candidates, and participate in the process of selecting & fielding national/international full-time and short-term Experts/Consultants to work on the programme;
- Participate in the briefing and debriefing of all consultants specifying what tasks are to be performed by them
- Assist and guide in the preparation of Annual Work Plans in support of the project's Components and sub-components; clear them with FAO and the donor and in obtaining PSC approval of them;
- Assist in finalizing lists of equipment, their proper specifications to be procured under each component of the programme.
- Guide National Capacity Building and Training Expert in identifying training needs of DoF, BFRI and the involved communities in the implementation of capacity and awareness building process; Develop overall plans for training/ capacity building to be performed under each component of the programme.
- Review and finalize project's total Results-based Work plan;
- Provide technical guidance and supervision to International and National M&E specialist in preparing and updating the GEF-TT for meeting the mid-term and final evaluation requirement and follow the M&E framework; supervise/coordinate all activities of the GoB/FAO/GEF to face the mid-term & final evaluation based on the project activities, achievements, periodical reports, reviewing, up-scaling and mainstreaming the major lessons learned that evaluate the project's performance over the years.

Key competencies/qualifications
The Team Leader must have the following skills/qualifications:

- Advanced university degree relating to fisheries, environment & climate change or related disciplines.

- At least 5 years of demonstrated working experience on programme management related to impact mitigation/ adaptation, natural resources management, capacity building and gender equity with Governments in developing country situations;
- Demonstrated competency with specialization in researching, planning, managing and executing complex programmes in the technical aspects of natural resource related project management;
- High level managerial, supervisory, analytical and negotiating skills with demonstrated ability to lead a team of professionals and exercise sound judgement with proven skills in advocacy, tact and versatility and a high degree of discretion and integrity;
- Ability to work under pressure in an independent manner within an inter-disciplinary team of personnel with different educational backgrounds and cultural orientations; and demonstrated skills in managing and working with people at all levels;
- Proven ability to communicate in a credible and effective manner and to represent FAO in dealings with Government, UN agencies, bilateral and multilateral agencies and non-government organizations and establish working relationships with government and non-government representatives;
- Excellent oral and written communication skills in English and computer literate.

2. Mud Crab (*Scylla serrata/olivacea*) hatchery Expert (International) (01 position) (FAO-GEF)

Duration: 02 two) man months; 1st or 2nd year
Duty Station: PMTSU, FAO-Dhaka (Extensive Field visits required)

Under the overall administrative supervision of the FAO Representative in Bangladesh, the Technical Supervision of the Lead Technical Unit (LTU) and the Lead Technical Officer (LTO) from FAO-RAP, and in close collaboration with other relevant Divisions and services in FAO and in consultation with relevant local authorities the Mud Crab Hatchery Expert (International) will play a vital role to study the feasibility and submit a report to the PMTSU, FAO for establishing a mud crab hatchery in the high saline zone of Shyamnagar (or any suitable area) of the SW coastal area. The feasibility report should have detailed review of soil, water quality, infrastructure, machinery/equipment needed, hatchery layout plan, broods, hatchery and nursery management techniques. S/he will report to FAO R, Bangladesh and to PSC and work under close consultation with the PD, NPC and project team.

Key tasks
His/her main tasks will be in the following areas but other related works may be assigned by the project management.

- Study the feasibility and submit a detailed report for establishing a mud crab hatchery in the high saline zone of Shyamnagar (or any suitable area) of the SW coastal area.
- The feasibility report should have detailed review of soil, water quality, quantity and facility of water exchange needed; and infrastructure, machinery/equipment needed with ideas of costing; hatchery design and facility (lay out plan including brood and nursery ponds, saline reservoir, water filtration and oxygenation systems, surface water pumps and shallow/deep tube wells; oxygen and water plumbing and electrical connections), hatchery techniques (chemicals/ hormones/ probiotics/ antibiotics, etc. needed); crablet production cycles, peak seasons; nursery management techniques (feeding and disease control, etc.) with ideas of total costing.
- Provide technical guidance and assistance to Brackishwater Station, Paikgacha/ Marine Fisheries & Technology Station, Cox's Bazar of BFRI for using their existing fish/prawn hatchery for mud crablet production with needed renovation or FD (GIZ project), WorldFish-CREL (USAID) Project for establishing a mud crab hatchery.
- Support PMTSU in developing plans & identifying country for training/ capacity building of GoB and private entrepreneurs on Mud crab brood management & hatchery techniques.

- Submit a Report comprising all aspects as mentioned above at the end of the assignment.

Key competencies/qualifications

- Advanced academic and technical qualifications (preferably Ph.D.) related to mass juvenile production and management of Mud Crab/ crustaceans.
- Should possess exhaustive practical and technical experience of producing crablets in captivity.
- Experience in working in developing countries, particularly in SE Asia preferably within GEF/FAO is preferred.
- Ability to work in multicultural and multidisciplinary team and willing to undertake extensive field visits in the coastal project sites.
- Resourceful with initiative and maturity of judgment; proven negotiation skills and experiences is essential.
- Excellent written and oral communication skills in English and computer literate.

3. Freshwater Giant Prawn (*Macrobrachium rosenbergii*)/ Golda hatchery Expert (International) (01 position) (FAO-GEF)

Duration: 02 (two) man months; 1st or 2nd year
Duty Station: PMTSU, FAO-Dhaka (Extensive Field visits required)

Under the overall administrative supervision of the FAO Representative in Bangladesh, the Technical Supervision of the Lead Technical Unit (LTU) and the Lead Technical Officer (LTO) from FAO-RAP, and in close collaboration with other relevant Divisions and services in FAO and in consultation with relevant local authorities the Freshwater Giant Prawn (*Macrobrachium rosenbergii*)/ Golda hatchery Expert (International) will play a vital role to study the operational problems with the existing Govt. and private golda hatcheries in Jessore, Khulna, Bagerhat and Satkhira districts and submit a comprehensive and technical report for their performance improvement to the PMTSU, FAO. The report should have detail review of soil, water quality, infrastructure, machinery/equipments, hatchery and nursery management techniques being followed and where the problems are, why the hatcheries cannot produce enough PL/ juveniles to meet the culture demand of the area.
S/he will report to FAO Representative in Bangladesh and PSC; and work under close consultation with the PD, NPC and project team.

Key tasks

His/her main tasks will be in the following areas but other jobs may be assigned by the project management

- Lead the survey and review the current status, operational problems with the existing Govt. and private golda hatcheries in Jessore, Khulna, Bagerhat and Satkhira districts and submit a comprehensive and technical report for their performance improvement.
- The report should have detailed review of soil, water quality, water exchange and bio-filter facility, air temperature, water temperature, water quality (chemistry) to be maintained during PL production; infrastructure, machinery, hatchery facility and nursery management techniques being followed and where the problems are; why the hatcheries cannot produce enough PL/ juveniles to meet the culture demand of the area; what corrections/ modifications, strategy to upgrade and improve the facilities to facilitate proper water and hatchery conditions, brood management, water bio-filtration systems, feed and feeding regime, health management and disease control are needed to run those golda hatcheries in their full capacity.
- Provide up-gradation plan and the better hatchery management practice guide, on-hand technical guidance and assistance to the Govt. and private golda hatcheries in the said areas through visits with the project team for their performance efficiency.
- Support PMU in developing plans & identifying country for training/ capacity building of GoB and private entrepreneurs on Golda brood management & hatchery techniques.

- Submit a Report comprising all aspects as mentioned above at the end of the assignment.
- The report would be of exceptional quality and should act as a guide line for performance improvement of golda hatchery and nursery management of all the golda hatcheries (replicable to other areas) in the country.

Key competencies/qualifications

- Advanced academic and technical qualifications (preferably Ph.D.) related to Freshwater Giant Prawn (*Macrobrachium rosenbergii*) juvenile production and management with minimum of 10 years' experience;
- Should possess exhaustive practical and technical experience of producing giant freshwater prawn PLs in captivity.
- Experience in working in developing countries, particularly in SE Asia preferably within GEF/FAO is preferred.
- Ability to work in multicultural and multidisciplinary team and willing to undertake extensive field visits in the coastal project sites.
- Resourceful with initiative and maturity of judgment; proven negotiation skills and experiences is essential.
- Excellent written and oral communication skills in English and computer literate.

4. Climate Change Adaptation Expert (International) (01 position) (FAO-GEF)

Duration: 03 (three) man months (1st year/ 2nd year)
Duty Station: PMTSU, FAO-Dhaka (Frequent Field visits required)

Under the overall administrative supervision of the FAO Representative in Bangladesh, the Technical Supervision of the Lead Technical Unit (LTU) and the Lead Technical Officer (LTO) from FAO-RAP, and in close collaboration with other relevant Divisions and services in FAO and in consultation with relevant local authorities the Climate Change Adaptation Expert (International) will be mainly responsible for the delivery of Components 1, 2 and 3 of the Project. His/her main tasks will be:

Key Tasks

- Provide technical support to PMTSU, FAO on climate change and climate risk management issues and provide input on resilient and sustainable livelihood approaches and adaptation options in general;
- Review currently available climate change impact data and compile quantitative details about impact of climate change on aquatic ecosystems, fisheries and aquaculture and broader agro-ecosystems thus contributing to climate resilient adaptation options
- Lead and coordinate analytical frameworks, methodological approaches and tools for assessment of vulnerability and climate impacts and establish most relevant approaches to be followed in the project in close coordination with the national team and fisheries and aquaculture (F&A) expert
- Support and lead the detailed assessment of climate induced risks and vulnerabilities of fisheries and aquaculture to define the most climate sensitive areas for F&A where the project will focus;
- Prepare a strategy and methodology to identify climate related information gaps, to access climate data at national and local level related to F&A. This must include discussions with the relevant national institutions to improve assessments of climate related risks in the sector.
- Prepare a strategy to address climate risk mapping and early warning systems for F&A in the areas;
- Support the project in conducting stocktaking and prioritizing of traditional and tested adaptation practices in the F&A sectors and compile suitable climate resilient adaptation practices for implementation through the project;
- Assist and support the PMTSU, FAO in designing methodologies and approach to the implementation of integrated monitoring and early warning systems for F&A;

- Submit a Report comprising all aspects as mentioned above at the end of the assignment to the PMTSU, FAO.

Key competencies/qualifications

- Post graduate degree in Environmental Science/ Fisheries/ Natural resources management from a recognized university with proven expertise on climate change impacts and adaptation/ mitigation in the natural resource management sector;
- Solid and demonstrated understanding of the technical aspects of climate change and its implications on the biodiversity, broader agriculture sector and sustainable adaptation and mitigation options;
- Have a track record of publications on climate change implications, impacts on environment and natural resources (agriculture, fisheries, biodiversity); proven records reflecting compiling, reasoning and writing skills;
- Must be familiar with knowledge management systems, methods and tools related to natural resources management (ecosystem, biodiversity, fisheries, aquaculture, etc.);
- Strong interpersonal, communication, analytical, reporting and presentation skills is essential;
- Proven capacity to work with and establish working relationships with government, non-government representatives and international experts;
- Good analytical skills; resourceful with initiative, maturity of judgment.
- Adaptable to multicultural and multidisciplinary team of experts and willing to undertake intensive field works in the coastal and wetland areas of Bangladesh.
- Ability to work under pressure and to deadlines; coordinate and monitor effectively while organizing occasional project events.
- Excellent written and verbal communication skills in English and well computer literate.

5. Gender and Socio-economic expert (International) (01 position) (FAO-GEF)

Duration: 05 (five) man months (1st year/ 2nd year) during the project period
Duty Station: PMTSU, FAO-Dhaka (Frequent Field visits required)

Under the overall administrative supervision of the FAO Representative in Bangladesh, the Technical Supervision of the Lead Technical Unit (LTU) and the Lead Technical Officer (LTO) from FAO-RAP, and in close collaboration with the PMTSU, PIU and the National team at the FAO, s/he will be responsible for leading the national team to ensure that gender considerations are well integrated into all project approaches, strategies, activities, inputs and outputs. The assignment will also be responsible for advising PIU, DoF and PMTSU, FAO on gender issues. In addition, the Socio-economist expert will be responsible mostly for the preparatory activities leading to the development of components 1, 2 and 3 of the project.
His/her main tasks will be:

Key tasks

- Suggest PMU and the National Team on gender issues; Assess and analyze the project from a gender perspective; Identify key gender issues in the project and key gender entry points.
- Assess socio-economic aspects, gender analysis and evaluation; provide feedback to the project management to strengthen project implementation.
- Develop a list of indicators to be used to monitor socio economic parameters extent to gender mainstreaming ensuring that focus is maintained on PRA/RRA activities while the project activities are carried out.
- Design project activities relating to socio-economic monitoring and evaluation of socio-economic income options for the target beneficiaries.
- Identify vulnerable communities and groups exposed to climate changes and natural hazards;

- Identify constraints for socio-economic development in biodiversity management of the project areas, women empowerment in fisheries and aquaculture resiliencies and suggest activities/interventions to overcome them.
- Assess to what extent rural livelihoods/ profession are based on coastal and haor wetland resources exploitations and survey (by administering a written survey and/or PRA/RRA) the socio-economic conditions/ situations in and around the project sites and who are engaged in socio-economic development.
- Identify awareness and training needs regarding gender; Prepare a practical strategy for integrating gender into the project, including a training programme and a gender monitoring framework.
- Work with the PMTSU to (i) integrate gender into all project work plans and activities, (ii) integrate gender into all project ToRs (iii) review all outputs from a gender perspective; suggest monitoring mechanisms to monitor the effectiveness of the project with regards to addressing gender issues.
- Collect and compile baseline data and information on social and economic situation of fisheries and aquaculture in the selected project areas with due consideration to gender issues.
- Support the project Team in conducting stocktaking and prioritizing of traditional and tested adaptation practices in the fisheries and aquaculture sectors and recommend suitable climate-resilient adaptation practices for greater women participation and implementation through the project.
- Gender and Socio economic rapid assessment of proposed adaptation techniques/approaches.
- Design methodology and approach to strengthen community level capacity to understand risks and vulnerability assessment together with CC expert.
- Review impact evaluations of similar projects and document lessons learned so as to strengthen the project document.
- Work closely with the national team members to achieve project objectives of women empowerment, capacity improvement and reducing women's vulnerability to climate changes through smart adaptation and mitigations.
- Submit a Report comprising all aspects as mentioned above at the end of the assignment.

Key competencies/qualifications

- Advanced university degree in Development studies/ Development economics/ Agricultural economics/ Socio-economic studies, or other related field; Ph. D. or equivalent degree preferred from a recognized university/ institution.
- Have track record of publications on mainstreaming gender and gender equity. Additional areas of experience may include poverty reduction; economics, business administration or management.
- Minimum of 10 years of relevant practical field experience in Socio-economic and/or household economy assessments; gender issues in rural Bangladesh, risks and vulnerability assessments, Capacity and vulnerability building of women.
- Demonstrated experience of successfully working with international/national partners on gender and rural livelihoods.
- Demonstrated ability to interact effectively with a range of stakeholders – national and local government and rural women.
- Knowledge about latest development in the livelihoods sector, particularly in the fields of fisheries, aquaculture, agriculture/rural development and vocational training.
- Demonstrated experience in conducting assessments for planning and/or evaluation purposes, as well as familiarity with community-based and participatory approaches.
- Experience in working effectively with international and national NGOs, and with government authorities at national level.
- Adaptable to multicultural and multidisciplinary team of experts and willing to undertake intensive field works in the coastal and haor wetland areas of Bangladesh.
- Excellent written and verbal communication skills in English and well computer literate.

6. Monitoring and Evaluation Expert (International) (01 position) (FAO-GEF)

Duration: 01 (one) man month (mid of 2nd year) during the project period
Duty Station: PMTSU, FAO-Dhaka (Frequent Field visits required)

Under the overall administrative supervision of the FAO Representative in Bangladesh, the Technical Supervision of the Lead Technical Unit (LTU) and the Lead Technical Officer (LTO) from FAO-RAP, coordination of the PMTSU and in close collaboration with the Ministry of Agriculture and Livestock and Fisheries Department the expert will be mainly responsible for the delivery of Component 4 of the Project. His/her main tasks will be:

Key tasks

- The International M&E Expert should assess the extent to which the project has met project objectives as stated in the ProDoc and produced cost-effective deliverables; and also rate capacities developed under the project;
- Identify and establish specific aspects of monitoring and evaluation (M&E) system incorporating performance indicators based on the project document and agreed with the PMTSU and project authority.
- Coordinate, facilitate, and review the strategic, scientific and technical inputs which are relevant for project monitoring and evaluation activities and supervise the implementation partners of the project.
- Develop, refine and update data base of information relevant for all aspects of the project activities and prepare a M&E framework.
- Monitor the progress of implementation and effectiveness of approved activities at all levels.
- Support PMTSU for preparation of mid-term evaluation of the project activities and achievements.
- Conduct review of the project activities, achievements, periodical report that evaluates the project's performance over the years and upscale and mainstream the major lessons learned from the project, based on those update the GEF-TT for addressing the mid-term evaluation requirement, train the national counterpart in updating the GEF-TT for meeting the final evaluation requirement, and assist/support the GoB/FAO/GEF to face the mid-term evaluation and follow the M&E framework.
- Assist in disseminating the findings of the project to GoB, research/academic institutions, NGOs/CBOs, and the private sector; and document the implementation process, results, impacts, lessons learnt and case studies for publication.
- Submit a Report comprising all aspects as mentioned above at the end of the assignment.

Key competencies/qualifications

- The successful candidate should have/ Post graduate degree in Business Administration (MIS)/ Environmental Science/ Development Economics/ Management / Social Sciences or any related discipline (preferably a Ph. D).
- 10 years professional experience of which 5 years as a M&E Specialist.
- Experience in designing capacity building activities, IGA and natural resources management trainings.
- Demonstration ability to deliver and establish M&E protocol in the project activities and management, interact with users to work effectively and with government officials and diverse range of counterparts and stakeholders.
- Adaptable to multicultural and multidisciplinary team of experts and willing to undertake intensive field works in the coastal/wetland haor areas of Bangladesh.
- Excellent written and verbal communication skills in English and well computer literate.

National Experts/ Consultants

7. National Project Coordinator, NPC (Fisheries Technical Expert) (01 position) (FAO-GEF)

Duration: 48 (forty-eight) man months (Full time during project duration)
Duty Station: PMTSU, FAO-Dhaka (Frequent Field visits required)

Under the overall administrative supervision of the FAO Representative in Bangladesh, National Operations Officer (NOO) and in close collaboration with the FAO-MoFL-DoF, the NPC will be responsible for leading the national team and overall coordination and preparatory activities leading to the implementation of the project activities. Design and lead a coordination mechanism including a multi-stakeholders working group with focal points from different institutions for the implementation of the project activities. Design a consultation and dissemination process for the full project phase. S/he will be responsible to the Project Steering Committee and will also: Develop and maintain close liaison with the sectoral government ministries/agencies, FAO-GEF, NGOs, civil society, international organizations, stakeholders and implementing partners of the project; Lead the organization in stakeholder consultations and interactions; Undertake the necessary administrative and managerial responsibility and in time initiative to implement the project in maximal ways; Supervise and lead the project team in discharging their duties at optimum level ensuring resources are employed efficiently and effectively; Support the international experts, Socio-economic and Gender expert in achieving their scheduled tasks including monitoring and evaluation aspects. Implement the decisions of the Project Steering Committee (PSC) and seek for the best issues for further development of the project; Undertake any other responsibility entrusted upon him/her as may be assigned by the PSC or by government authority.

Key tasks

- Advice the FAOR and support International Team Leader to ensure the implementation progress of the programme;
- The NPC will assume general oversight and management responsibilities for the implementation of the Project as well as lead the PMTSU at FAO; ensure all PMTSU staff and all consultants fully understand their role and their tasks, and support them in their work;
- Liaison with the PIU at DoF, MoFL and other stakes at different levels with the aim to maximize Government engagement and ownership in all programme related issues and activities to ensure fast programme delivery, and sustainability of programme outputs;
- Initiate and coordinate hiring and appointments of project personnel and consultants; prepare Annual Work Plan in consultation with the PD and national team, participate in the PSC meetings and articulate programme issues and progress, get approval of AWP through consultation and PSC; identify consultants to undertake national level assignments in accordance with the approved AWP.
- Assist in finalizing ToRs for all national/international experts, identify profiles and qualifications of the candidates, participate in the process of selecting & fielding international and national consultants to work on the programme;
- Oversee day-to-day implementation of the project in line with the work plans; assure quality of project activities and project outputs; monitor and supervise the work of the consultants as far as possible, ensure timely and responsive delivery of contracted outputs;
- Provide assistance and support, to international staffs/ consultants/ missions visiting or engaged in assignments of the project, including preparing itineraries, appointments and assisting with travel and other logistical arrangements;
- In consultation with the FAO management, DoF and other stakes determine dates, agendas, budgets and participation of Monthly meetings, workshops/ Seminars/ Consultation Meetings, etc., and upon approval organize and facilitate those;
- Organize regular planning and communication events, starting with inception mission and inception workshop;

- Act as key person to get all Reports prepared by the respective consultants/persons; edit progress reports and all monitoring, technical, and implementation reports.
- Act as the Chief Editor of the Training Manual formulation & publication Committee;
- Responsible for convening meetings, drafting agendas, compiling minutes and assembling and preparing materials for consideration by the PMU;
- Assist in developing overall plans for training/ capacity building to be performed under each component of the programme and reviewing and finalization of project's total Results-based Work plan;
- Ensure adequate communication of national activities to all stakeholders, including government, private sector and NGOs; invite and encourage the participation of non-co-financing stakeholders, particularly local groups, in national activities and consultations when appropriate.
- Represent the project in relevant meetings and conferences seeking to facilitate coordination and integration where appropriate beneficial to the achievement of the Project's objectives;
- Establish working relations with appropriate national and regional agencies and groups to ensure effective implementation of project supported activities under his/her responsibility at the national and regional level;
- Oversee preparation and implementation of M&E framework; oversee preparation and implementation of Project communication and knowledge management frameworks;
- Liaise with government agencies and regularly advocate on behalf of the Project; Coordinate project interventions with other ongoing activities, especially those of co-financers and other GEF projects; Regularly promote the project and its outputs and findings on a national, and where appropriate, regional stage.

Key competencies/qualifications

- Preferably a Ph. D. or equivalent in Fisheries Science; having 20 (twenty) years of experience in the Bangladesh fisheries sector with wide ideas of inland and coastal/marine fisheries, aquaculture, fisheries and environment related policies, strategies and acts, international/regional conventions, plan of actions and strategies; having a blend of experience on fisheries, environment and plant science will be preferred;
- Have a track record of publications on fisheries, wetlands, climate change, and environment and impacts which reflects compiling, reasoning and writing skills;
- Solid and demonstrated understanding of the technical aspects of the field of fisheries
- Demonstrated ability to adopt new ideas and commitment to participatory and bottom-up approaches; Demonstrated ability to communicate, including advocating to government agencies and ability to manage, including project management, office management;
- Adaptable to multicultural and multidisciplinary team of experts and willing to undertake intensive field works in the coastal/wetland areas of Bangladesh.
- Proven capacity as a team leader and capacity to work with and establish working relationships with medium to high-level government and non-government representatives;
- Proven capacity in preparing project technical and financial reports;
- Ability to work under pressure and to assist the project team with any urgent services.
- Excellent written and verbal communication skills in English and well computer literate.

8. Capacity Building and Training Expert (National) (01 position) (FAO-GEF)

Duration: 48(forty-eight) man months (Full time during project duration)
Duty Station: PMTSU, FAO-Dhaka (Frequent Field visits required)

Under the overall managerial, administrative and technical supervision of FAOR, NOO and coordination of the PMTSU & PIU, the incumbent will be responsible for the delivery of Components 1, 2 and 3 of the Project. His/her main tasks will be:

Key Tasks

- Participate in inception and/or stakeholders' workshops organized by the project and contribute to the preparation of capacity development implementation plan and strategy;
- In collaboration with the PMTSU, FAO & PIU, DoF assess and complete the skill set, training needs (TNA) of the DoF, other Gov. agencies, private agencies and community; also in collaboration with the PMTSU, PIU, FS, FFs identify areas, subjects and Govt., private personnel & community for awareness and capacity building trainings as per the ProDoc/approved AWP;
- Assist/coordinate with National Fisheries Policy and Strategy Analyst in finalizing HR development strategy of the DoF, BFRI and the communities involved;
- Identify & prioritize good practices and a high quality training curricula and materials for the training courses;
- Play a key role in facilitating the training of trainers (ToTs);
- Serve as resource person in the training courses/FGDs/FFSs, also identify best resource persons from broader fisheries, agriculture, poultry, disaster management, alternate income generations & livelihoods, primary health & family care, e-governance, etc. for the training programmes;
- Participate in organizing, facilitating and conducting all training programmes of the Project; compile and prepare quarterly reports of all activities, as well as technical articles on fisheries, agriculture, poultry, disaster management, alternate income generations & livelihoods, primary health & family care, etc. (based on handouts received from the resource persons) to fit in the Training Manuals;
- Review the handouts received from various resource persons, prepare and compile it and finalize the training Manuals; Support and assist NPC to get all Reports prepared by the respective consultants/persons and in editing all progress reports and all monitoring, technical, and implementation reports.
- Formulate and prepare flyers/ booklets/ posters (public awareness and extension materials) based on lessons learned from implementation of the pilot activities of the project; provide technical review assistance to the PMTSU;
- Act as an editorial board member of the Training Manual formulation & publication Committee;
- Carry out other activities as instructed by the PMTSU /or the FAOR

Key competencies/qualifications

- Preferably a Ph. D. or equivalent in Fisheries; having 15 (fifteen) years of experience in capacity building/ trainings of fisheries personnel and community people;
- Have a blend of experience on fisheries, environment, climate change;
- Have a track record of producing, preparing Training modules, manuals, booklets, leaflets, flyers, posters on fisheries, wetlands, climate change, and environment and impacts which reflects compiling, reasoning and writing skills;
- Solid and demonstrated understanding of the technical aspects of the field of fisheries and fisheries extension;
- Adaptable to multicultural and multidisciplinary team of experts and willing to undertake intensive field works in the coastal/wetland areas of Bangladesh.
- Proven capacity in preparing project technical and financial reports;
- Ability to work under pressure and to assist the project team with any urgent services.
- Excellent written and verbal communication skills in English and well computer literate.

9. National Income Generation Expert (01 position) (FAO-GEF)

Duration: 48(forty-eight) man months (Full time during project duration)
Duty Station: PMTSU, FAO-Dhaka (Frequent Field visits required)

Under the overall managerial, administrative and technical supervision of FAOR, NOO and coordination of the NPC, the incumbent will be responsible for the delivery of Components 1, 2 and 3 of the Project. His/her main tasks will be:

Key Tasks

- Participate in inception and/or stakeholders' workshops organized by the project and contribute to the preparation of capacity development implementation plan and strategy;
- In collaboration with the PMTSU, PIU, FS, FFs assess and complete the skill set, training needs (TNA) of the DoF, other fisheries related Gov. agencies, private agencies and community; also identify areas, subjects and Govt., private personnel & community for awareness and capacity building trainings and AIGAs as per the ProDoc/approved AWPB;
- Assist/coordinate with National Fisheries Policy and Strategy Analyst and the National Capacity Building and Training Expert in finalizing HR development strategy of the DoF, BFRI and the communities involved;
- Review and assess the relevance of past and on-going development/research projects in fishery sector, existing local disaster preparedness and adaptation practices for developing AIGAs, disaster preparedness and climate change adaptations in fisheries and aquaculture sector;
- Play a key role in facilitating all training programmes;
- Serve as resource person in the training courses/FGDs/FFSs, also identify best resource persons from broader fisheries, agriculture, poultry, disaster management, alternate income generations & livelihoods, primary health & family care, e-governance, etc. for the training programmes;
- Provide technical advice and backstopping on the process and contents of pilot testing of CC risks and AIG options at the local level;
- Assist and support National Capacity Building and Training Expert in organizing, facilitating and conducting all training programmes of the Project on climate risk analysis and livelihood; in compiling and preparing quarterly reports of all activities, as well as technical articles on fisheries, agriculture, poultry, disaster management, alternate income generations & livelihoods, primary health & family care, etc. (based on handouts received from the resource persons) to fit in the Training Manuals;
- Assist and advise the PMU in transforming adaptation options into farmer friendly extension tools and messages for dissemination at the pilot sites;
- Assist and develop demonstration strategy or methodologies for uptake of identified livelihood adaptation practices for implementing adaptation practices in fishery sector;
- Develop training modules on climate risk analysis & livelihood adaptations assessment in fisheries sector;
- In collaboration with the Capacity Building & Training Expert develop training materials on the translation of climate forecast and CC information into fisheries sector impacts;
- Support the Capacity Building and Training Expert in formulating and preparing flyers/ booklets/ posters (public awareness and extension materials) based on lessons learned from implementation of the pilot activities of the project; provide technical review assistance to the PMU;
- In collaboration with the Capacity Building & Training Expert review the handouts received from various resource persons, prepare and compile it and finalize the training Manuals; Support and assist NPC to get all Reports prepared by the respective consultants/persons and in editing all progress reports and all monitoring, technical, and implementation reports.
- In collaboration with the Capacity Building & Training Expert formulate and prepare flyers/ booklets/ posters (public awareness and extension materials) based on lessons learned from implementation of the pilot activities of the project; provide technical review assistance to the PMU;

- Carry out other activities as instructed by the PMU/or the FAOR

Key competencies/qualifications

- Preferably a Ph. D. or equivalent in Fisheries having 15 (fifteen) years of experience in capacity building/ trainings on AIGAs of fisheries personnel and community people;
- Have a blend of experience on fisheries, environment, climate change and livelihood/AIGA options with track record of publications (reports, manuals, etc.);
- Solid and demonstrated understanding of the technical aspects of the field of fisheries and fisheries extension, alternate income generating activities, livelihood and familiarity with climate risks management principles and practices;
- Proven experience in assessing farmers' livelihood systems for identifying and transferring relevant CC adaptation AIG options;
- Proven experience on CC impact analysis and local adaptation in fisheries & aquaculture;
- Experience in socio-economic and institutional assessment studies and experience in international cooperation projects would be preferred;
- Adaptable to multicultural and multidisciplinary team of experts and willing to undertake intensive field works in the coastal/wetland areas of Bangladesh.
- Proven capacity in preparing project technical and financial reports;
- Ability to work under pressure and to assist the project team with any urgent services.
- Excellent written and verbal communication skills in English and well computer literate.

10. National Community Management Expert (Fishery & Livelihood) (02 position) (FAO-GEF)

Duration: 48(forty-eight) man months (Full time during project duration)
Duty Station: PMTSU, FAO-Dhaka (Frequent Field visits required)

Under the overall managerial, administrative and technical supervision of FAOR, NOO and coordination of the NPC, the incumbent will be responsible for the delivery of Components 1, 2 and 3 of the Project. His/her main tasks will be:

Key Tasks

- Participate in inception and/or stakeholders' workshops organized by the project and contribute to the community mobilization and implementation plan and strategy of the project;
- In collaboration with the PMTSU, PIU, FS, FFs assess and complete the skill set, training needs (TNA) of the DoF, other fisheries related Gov. agencies, private agencies and community people; also identify areas, subjects and Govt., private personnel & community for awareness and capacity building trainings and livelihood options as per the ProDoc/approved AWPB;
- Assist/coordinate with National Fisheries Policy and Strategy Analyst and the National Capacity Building and Training Expert in finalizing community/occupational/common interest groups and HR development strategy of the DoF, BFRI and the communities involved;
- Review and assess the relevance of past and on-going development/research projects in fishery sector, existing local disaster preparedness and adaptation practices for developing livelihood options, disaster preparedness and climate change adaptations in fisheries and aquaculture sector;
- Play a key role in facilitating all community training programmes;
- Serve as resource person in the training courses/FGDs/FFSs, also identify best resource persons from broader fisheries, agriculture, poultry, disaster management, alternate income generations & livelihoods, primary health & family care, e-governance, etc. for the training programmes;
- Provide technical advice and backstopping on the process and contents of pilot testing of CC risks and livelihood adaptation options at the local level;

- Assist and support National Capacity Building and Training Expert in organizing, facilitating and conducting all training programmes of the Project on climate risk analysis and livelihood; in compiling and preparing quarterly reports of all activities, as well as technical articles on fisheries, agriculture, poultry, disaster management, alternate income generations & livelihoods, primary health & family care, etc. (based on handouts received from the resource persons) to fit in the Training Manuals;
- Assist and advise the PMTSU in transforming adaptation options into farmer friendly extension tools and messages for dissemination at the pilot sites;
- Assist and develop demonstration strategy or methodologies for uptake of identified livelihood adaptation practices for implementing adaptation practices in fishery sector;
- Develop training modules on climate risk analysis & livelihood adaptation assessment in fisheries sector;
- Develop training materials on the translation of climate forecast and CC information into fisheries sector impacts;
- Support the Capacity Building and Training Expert in formulating and preparing flyers/ booklets/ posters (public awareness and extension materials) based on lessons learned from implementation of the pilot activities of the project; provide technical review assistance to the PMU;
- Carry out other activities as instructed by the PMU/or the FAOR

Key competencies/qualifications

- Preferably a Ph. D. or equivalent in Fisheries having 15 (fifteen) years of experience in community mobilization and capacity building/ trainings of fisheries personnel and community people;
- Have a blend of experience on fisheries, environment, climate change and livelihood options with a track record of publications (technical reports, manuals, proceeding reports, popular articles, etc.) in the relevant field;
- Solid and demonstrated understanding of the technical aspects of the field of fisheries and fisheries extension, livelihood activities and familiarity with climate risks management principles and practices;
- Proven experience in community mobilization, community management, assessing farmers' livelihood systems for identifying and transferring relevant CC adaptation options;
- Proven experience on CC impact analysis and local adaptation in fisheries & aquaculture;
- Experience in socio-economic and institutional assessment studies and experience in international cooperation projects would be preferred;
- Adaptable to multicultural and multidisciplinary team of experts and willing to undertake intensive field works in the coastal/wetland areas of Bangladesh.
- Proven capacity in preparing project technical and financial reports;
- Ability to work under pressure and to assist the project team with any urgent services.
- Excellent written and verbal communication skills in English and well computer literate.

11. National Gender and Socio-economic Analyst (01 position) (FAO-GEF)

Duration: 48(forty-eight) man months (Full time during project duration)
Duty Station: PMTSU, FAO-Dhaka (Frequent Field visits required)

Under the overall managerial, administrative and technical supervision of FAOR, NOO and coordination of the NPC, the incumbent will be responsible for leading all project activities to ensure that gender and socio-economic livelihood considerations are integrated into all project approaches, strategies, activities, inputs and outputs. The assignment will also be responsible for advising PIU, DoF and PMTSU on gender issues. In addition, the Gender and Socio-economist Analyst will be responsible for the preparatory activities leading to the achievements of components 1, 2 and 3 of the project. His/her main tasks will be:

Key tasks

- Suggest PMTSU and the National Team on gender issues; Assess and analyze the project from a gender perspective; Identify key gender issues in the project and key gender entry points.
- Assess socio-economic aspects, perform gender analysis and evaluation, provide feedback to the project management to strengthen project implementation.
- Develop a list of indicators to be used to monitor socio economic parameters extent to gender mainstreaming ensuring that focus is maintained on PRA/RRA activities while the project activities are carried out.
- Design the project activities relating to socio-economic monitoring and evaluation of socio-economic income options (livelihood) for the target beneficiaries.
- Support innovations for mainstreaming, paying close attention to socio-economic and gender equity implications;
- Identify vulnerable communities and groups exposed to climate changes and natural hazards;
- Identify constraints for socio-economic development in biodiversity management of the project areas and women empowerment in fisheries and aquaculture resiliencies suggest activities/interventions to overcome them.
- Assess to what extent rural livelihoods/ profession are based on coastal and haor wetland resources exploitations and survey (by administering a written survey and/or PRA/RRA) the socio-economic conditions/ situations in and around the project sites and who are engaged in socio-economic development.
- Identify awareness and training needs regarding gender; prepare a practical strategy for integrating gender into the project, including a training programme and a gender monitoring framework.
- Work with the PMTSU to (i) integrate gender into all project work plans (ii) integrate gender into all project ToR (iii) review all outputs from a gender perspective; suggest monitoring mechanisms to monitor the effectiveness of the project with regards to addressing gender issues.
- Collect and compile baseline data and information on social and economic situation of fisheries and aquaculture in the selected sensitive areas with due consideration to gender issues.
- Support the project Team in conducting stocktaking and prioritizing of traditional and tested adaptation practices in the fisheries and aquaculture sectors and recommend suitable climate-resilient adaptation practices for greater women participation and implementation through the project.
- Gender and Socio economic rapid assessment of proposed adaptation techniques/approaches.
- Design methodology and approach to strengthen community level capacity to understand risks and vulnerability assessment together with CC expert.
- Review impact evaluations of similar projects and document lessons learned so as to strengthen the project document.
- Work closely with the national team members to achieve project objectives of women empowerment, capacity improvement and reducing women's vulnerability to climate changes through smart adaptation and mitigations.

Key competencies/qualifications

- Advanced university degree in Development studies/ Development economics/ Agricultural economics/ Socio-economic studies, or other related field; Ph. D. or equivalent degree preferred from a recognized university/ institution.
- Have track record of publications on mainstreaming gender and gender equity (book chapter, book, reports, proceeding reports, etc.). Additional areas of experience may include poverty reduction; economics, business administration or management.
- Minimum of 15 years of relevant practical field experience within one or more of the following areas: Socio-economic and/or household economy assessments; gender issues in rural Bangladesh, risks and vulnerability assessments, Capacity and vulnerability building of women.

- Demonstrated experience of successfully working with international partners on gender and rural livelihoods.
- Demonstrated ability to interact effectively with a range of stakeholders – national and local government and rural women.
- Knowledge about latest development in the livelihoods sector, particularly in the fields of fisheries, aquaculture, agriculture/rural development and vocational training.
- Demonstrated experience in conducting assessments for planning and/or evaluation purposes, as well as familiarity with community-based and participatory approaches.
- Experience in working effectively with international and national NGOs, and with government authorities at national level.
- Adaptable to multicultural and multidisciplinary team of experts and willing to undertake intensive field works in the coastal and haor wetland areas of Bangladesh.
- Fluency in Bengali, good command of English is desirable with computer literacy.
- Ability to work under pressure and to assist the project team with any urgent services.

12. National Climate Change and Risk Management Expert (01 position) (FAO-GEF)

Duration: 48(forty-eight) man months (Full time during project duration)
Duty Station: PMTSU, FAO-Dhaka (Frequent Field visits required)

Under the overall managerial, administrative and technical supervision of FAOR, NOO and coordination of the NPC, the incumbent will be responsible for the delivery of Components 1, 2 and 3 of the Project. His/her main tasks will be:

Key Tasks

- Participate and provide technical support to the inception and validation workshops;
- Provide technical support on climate change and climate risk management issues and provide input on sustainable livelihood approaches and adaptation options in general;
- Review currently available climate change impact data and compile quantitative details about impact of climate change on aquatic ecosystems, fisheries and aquaculture and broader agro-ecosystems thus contributing to identify the most climate sensitive areas
- Lead and coordinate analytical frameworks, methodological approaches and tools for assessment of vulnerability and climate impacts and establish most relevant approaches to be followed in the project in close coordination with the national team and F&A expert
- Support and lead the detailed assessment of climate induced risks and vulnerabilities of fisheries and aquaculture to define the most climate sensitive areas for F&A where the project will focus;
- Prepare a strategy and methodology to identify climate related information gaps, to access climate data at national and local level related to F&A. This must include discussions with the relevant national institutions to improve assessments of climate related risks in the sector.
- Prepare a strategy to address climate risk mapping and early warning systems for F&A in the most climate sensitive areas
- Support the project national coordinator in conducting stocktaking and prioritizing of traditional and tested adaptation practices in the F&A sectors and compile suitable climate-resilient adaptation practices for implementation through the project
- Design methodologies and approach to the implementation of integrated monitoring and early warning systems for F&A
- Contribute to the preparation of the all Project Reports.
- Adaptable to multicultural and multidisciplinary team of experts and willing to undertake intensive field works in the coastal/wetland areas of Bangladesh.
- Ability to work under pressure and to assist the project team with any urgent services.

Key competencies/qualifications

- Preferably a Ph. D./doctoral degree or equivalent in Fisheries science/ Natural resources management/ Environmental Science from a reputed local/foreign university with proven expertise on climate change impacts and adaptation/ mitigation in natural resource management sector;
- Have at least 25 (twenty five) years of experience in the Bangladesh fisheries sector with wide ideas of inland and coastal/marine fisheries, aquaculture, fisheries and environment related policies, strategies and acts, international/regional conventions, plan of actions and strategies; having a blend of experience on fisheries, environment and plant science will be preferred;
- Solid and demonstrated understanding of the technical aspects of climate change and its implications on the biodiversity, broader agriculture sector and sustainable adaptation and mitigation options;
- Have a track record of publications (peer-reviewed scientific papers, book/ book chapter, technical reports, proceeding reports, popular articles, etc.) on climate change implications, impacts on environment and natural resources (agriculture, fisheries, biodiversity, wetland management) with proven records reflecting compiling, reasoning and writing skills;
- Must have solid and demonstrated understanding of the technical aspects of the field of fisheries and knowledge management systems, methods and tools related to natural resources management (ecosystem, biodiversity, fisheries, aquaculture, wetland, etc.);
- Proven experience in assessing farmers' livelihood systems for identifying and transferring relevant CC adaptation options;
- Proven experience on CC impact analysis and local adaptation in fisheries & aquaculture;
- Have demonstrated ability to adopt new ideas and commitment to participatory and bottom-up approaches and demonstrated ability to communicate, including advocating to government agencies;
- Proven experience in obtaining, establishment, operationalization and institutionalization of predicted climate information of different time scales for translation, interpretation and application system than connects climate information providers and end users to facilitate information flow with feedback mechanism from national to community levels;
- Strong interpersonal, communication, analytical, reporting and presentation skills is essential;
- Proven capacity to work with and establish working relationships with government, non-government representatives and international experts;
- Proven capacity as a leader and capacity to work with and establish working relationships with medium to high-level government and non-government representatives;
- Good analytical skills; resourceful with initiative, maturity of judgment.
- Adaptable to multicultural and multidisciplinary team of experts and willing to undertake intensive field works in the coastal/wetland areas of Bangladesh as when needed.
- Ability to work under pressure and to deadlines to assist the project team with any urgent services; coordinate and monitor effectively while organizing occasional project events.
- Excellent written and verbal inter personal communication skills in English/Bangla and well computer literate.

13. Field Supervisors (02 positions) (FAO-GEF)

Duration: 48 man months each (Full time for project duration)

Duty Station: 01 in NE haor area, stationed at Sunamganj District Fisheries/South Sunamganj Upazila Fisheries Office; another in SW Coastal area stationed at Bagerhat or Khulna District Fisheries Office

The Field Supervisors would guide and supervise all project activities being implemented along with day to day supervision and monitoring of Field Facilitators work; provide and channel active support, to local piloting at demonstration sites and training activities through community participation, under the guidance of the respective field DoF officials, Fisheries Consultant, DoFs field officials and the PD and NPC of PMTSU. His/her main tasks will be:

Key tasks

- Under the guidance and collaboration of the PD, NPC, national team and concerned DoFs field officials would carry out all scheduled project activities within the scheduled milestones.
- Coordinate site selection, motivating, mobilizing, and involving community, implementation of various climate resilient fisheries and aquaculture piloting activities, management and monitoring maintaining liaison with the PMTSU and the local DoF officials and for resolving unseen conflicts that may arise during project activity implementation.
- Also support implementation activities of eco-friendly pisciculture, fish diseases identification and solution, coastal and wetland fisheries sanctuary, management, integrated rice-fish culture, assessing EIA, and suited rice variety and vegetable farming using IPM technology within the community.
- Guide Field Facilitators, community mobilization, site selection, communication, over see and manage day to day activity of his/her concerned area. Ensure active participation of all local communities/CBOs/NGOs in related project activities.
- Organize, arrange (make programmes, identify trainees, resource persons, arrange logistics, maintain communication) and facilitate all Awareness and capacity building trainings/ Focus Group Discussions (FGDs)/ Consultation Meetings/ Workshops/ Farmers Field Schools (FFSs) for the community people in coordination and liaison with the PMTSU, DoFs/DAEs field officials and local UP chairman.
- Participate in the survey of the fish/prawn seed multiplication farms, review of the current status of brood stock, and assist in the development of technical implementation guidelines for brood bank programme, selective breeding programme, standard hatchery upgradation plan, and better management practice guide;
- Act as a trainer for all training courses related to the brood bank and selective breeding programme;
- Compile data, analyze and produce field activity reports, conduct scientific literature surveys, gray literature searches, etc. as per PMTSUs requirement.
- Coordinate, assist and support all works during field studies of local and international consultants.
- Maintain day to day liaison with the PMTSU and the concerned DoFs field officials and also with other stakes working in the area for project's activity's efficient implementation.

Key competencies/qualifications

- B. Sc. Fisheries (Hons.)/ M. Sc. in Fisheries/ Zoology/ Natural resources management or related discipline, preferably Ph. D. from a recognized university/ institution.
- Five years of professional experience in research/ development projects in freshwater fisheries biodiversity conservation/aquaculture/ environmental issues for sustainable development, coastal and wetland biodiversity management; track record of publication would be preferred.
- Working experience with IUCN/WorldFish or any other international organization would be preferred.
- Self-motivated, initiative, capable of working independently and in a team for accomplishing particular responsibilities in a time-bound schedule including planning, monitoring, evaluation and reporting.
- Demonstrated ability to organize and facilitate training sessions and interact with local government/ community and diverse range of counterparts and stakeholders.
- Adaptable to multicultural and multidisciplinary team of experts and willing to undertake intensive field works. Demonstrated ability to deliver training, organizing workshops and to interact with local government and diverse range of counterparts and stakeholders.
- Excellent analytical and communication skills (written and spoken) in English and Bangla and computer literate (MS Office, Excel, PowerPoint, internet search engines).
- Adaptable to multicultural and multidisciplinary team of experts and willing to undertake intensive field works in the coastal/wetland areas of Bangladesh.
- Ability to work under pressure and to assist the project team with any urgent services.
- Have valid motor cycle driving license.

14. Field Facilitators (08 positions) (FAO-GEF))

Duration: 48 man months each (Full time for project duration)

Duty Station: 01 for South Sunamganj, 01 for Jagannathpur (s/he has to also cover activities of Agdar beel fish sanctuary, Juri upazila, Moulvibazar) and 01 for Nasirnagar in the NE haor basin; 01 for Dacope, 01 for Dumuria, 01 for Bagerhat sadar, 01 for Kachua, and 01 for Shyamnagarof the SW coastal area; all to be stationed at respective areas.

The Field Facilitators would provide and channel active support, to local piloting at demonstration sites and training activities through community participation, under the guidance of the Fisheries Consultant, DoFs field officials and the PD and NPC. His/her main tasks will be:

Key Tasks

- Mobilize CBOs and select their leaders, select sites for various climate smart fisheries, aquaculture and agricultural technologies to be piloted under the project activities in coordination and guidance of the concerned DFO, SUFOs and consultants.
- Support and assist concerned consultants in implementing all project activities.
- Lead, manage, coordinate and implement all activities of the project; Lead field-based M&E, together with local communities, of project environmental and socio-economic impacts
- Oversee the preparation of participatory adaptation plans, and their implementation at Project demonstration sites; Ensure active participation of all local communities/CBOs/NGOs in related project activities.
- Participate in the survey of the fish/prawn seed multiplication farms, review of the current status of brood stock, and assist in the development of technical implementation guidelines for brood bank programme, selective breeding programme, standard hatchery upgradation plan, and better management practice guide;
- Organize, facilitate and provide awareness raising fisheries and aquaculture capacity building trainings for the community.
- Liaise regularly with districts/sub-districts and with PMU.
- Provide regular feedback and advance warning on conflicts, and assist with conflict resolution.

Key competencies/qualifications

- B. Sc. (Hons.) in fisheries/ M. Sc (Fisheries/ Zoology) having 3-5 years experience on environment and biodiversity issues; track record of publication would be preferred.
- Demonstrated experience in fisheries and aquaculture management at the local level;
- Have basic idea about fisheries & environment sectors of Bangladesh; inland, coastal fish, prawn, crustaceans, other aquatic animal, waterfowl and plants;
- Excellent communication skills, with local government, national and international experts and local communities;
- Demonstrated ability to open up to new approaches and new practices;
- Well adapted to work and integrate with rural people and their livelihood issues;
- Fluent in Bangla and English with basic computer literacy;
- Adaptable to multicultural and multidisciplinary team of experts and willing to undertake intensive field works in the coastal/wetland areas of Bangladesh.
- Ability to work under pressure and to assist the project team with any urgent services.
- Have valid motor cycle driving license and know swimming.

15. National Monitoring and Evaluation Specialist (01 position) (FAO-GEF)

Duration: 36 (thirty six) man months (09 man months every year)

Duty Station: PMTSU, FAO-Dhaka (Frequent Field visits required)

Under the overall managerial, administrative and technical supervision of FAOR, NOO and coordination of the NPC, the incumbent will be responsible and play a key role for the delivery of Component 4 of the Project. His/her main tasks will be:

Key tasks

- Identify and establish specific aspects of monitoring and evaluation (M&E) system incorporating performance indicators based on the project document and agreed with the PMTSU and project authority.
- Coordinate, facilitate, and review the strategic, scientific and technical inputs which are relevant for project monitoring and evaluation activities and supervise the implementation partners of the project.
- Develop, refine and update data base of information relevant for all aspects of the project activities and prepare a M&E framework.
- Monitor the progress of implementation and effectiveness of approved activities at all levels.
- The M&E Expert should assess the extent to which the project has met project objectives as stated in the ProDoc and produced cost-effective deliverables; and also rate capacities developed under the project;
- Support and coordinate all activities of PMTSU for preparation of mid-term evaluation of the project activities and achievements.
- Conduct review of the project activities, achievements, periodical report that evaluates the project's performance over the years and upscale and mainstream the major lessons learned from the project, based on those update the GEF-TT for meeting the mid-term and final evaluation requirement, and assist/support/coordinate all activities of the GoB/FAO/GEF to face the mid-term & final evaluation and follow the M&E framework.
- Assist in disseminating the findings of the project to GoB, research/academic institutions, NGOs/CBOs, and the private sector; and document the implementation process, results, impacts, lessons learnt and case studies for publication.
- Submit a Report comprising all aspects as mentioned above at the end of the assignment.

Key competencies/qualifications

- The successful candidate should have/be Post graduate degree in Business Administration (MIS)/ Environmental Science/ Development Economics/ Management / Social Sciences Fisheries/ or any related discipline (preferably a Ph .D).
- 10 years professional experience of which 5 years as a MIS/GIS Specialist in a network environment in the design, installation and operation of MIS and GIS, with particular emphasis in defining users' requirements.
- Experience in designing capacity building activities, IGA and natural resources management trainings...
- Demonstration ability to deliver training sessions, interact with users to work effectively and with government officials and diverse range of counterparts and stakeholders.
- Adaptable to multicultural and multidisciplinary team of experts and willing to undertake intensive field works in the coastal/wetland haor areas of Bangladesh.
- Resourceful with initiative, excellent written and verbal communication skills in English and Bangla drafting speeches and reports.
- Ability to work under pressure and to deadlines; coordinate and monitor effectively while organizing occasional project events.

16. Fisheries Policy and Strategy Analyst (National) (01 position) (FAO-GEF)

Duration: 12 (twelve) man months; 1st year of the project
Duty Station: PMTSU, FAO-Dhaka (Frequent Field visits required)

Under the overall managerial, administrative and technical supervision of FAOR, NOO and coordination of the NPC, the incumbent will provide support in developing a package of modifications in policies and standards for Fisheries and Aquaculture to incorporate climate change resilience considerations. S/he will work closely with the PD and NPC. This assignment will provide inputs and guidance to all outputs and outcomes under the Project Component 1.2. His/her main tasks will be:

Key tasks

- Review and recommend practical application/ enforcement of existing conventions, agreements, laws, policies, acts, regulations relating to fisheries and biodiversity conservation and their enforcement and also review the present DoF institutional arrangements from central to grassroots level in terms of mandates, roles, strengths and weaknesses to recommend any needed changes to ensure efficient fisheries management.
- Examine, identify the means of improving legal and policy issues with a view to upgrade and strengthen the fisheries management and biodiversity conservation. Develop institutional framework which is socially acceptable for eco-friendly fisheries conservation-management.
- Review legislations, regulations, acts, policies and strategies pertaining to fisheries and aquaculture and correlate them with the related sub-sectoral other policy documents and highlight possible review, update and amendments needed to fit in climate change adaptation and mitigation options.
- Recommend policy advocacy and amendments to meet the climate change challenges, broad approaches for various policy amendments to include mitigation options of climate change.
- Recommend possible revision of national fishery sector policy and amendments to address issues and ways of monitoring, response measures and minimizing impacts from climate change hazards and subsequent adaptation strategies, and disaster risk reduction, institutional strengthening and coordination, and should conform and be harmonized with other related national policies of environment, national water plan, pollution, land use, Gender equity, Tourism, Shipping, Port authority, Maritime authority, etc. and Regional and Global policies, Protocols, Plan of Actions.
- Throw light on updating national strategies for fisheries and aquaculture to meet the future climatic and anthropogenic challenges.
- Revised policy should reflect ways of possible replacement of Top-down planning and encourage community-based (CB) Bottom-up planning with formalized, legally binding management plans which would establish pre-determined rules for responses to stock status, and implementation is monitored by groups of CB stakeholder where government advises, assists and regulates; C-B stakes would develop acceptable management arrangements which they will enforce themselves.
- Policy should highlight and emphasize implementation following CCRF, MCS, IUU fishing, VTMS, EAFM, ICZM, CMPAs, MRs, ECAs, ESAs, Sanctuaries, seasonal & gear regulation, mesh regulation, open & ban season.
- Policy should show ways of providing one-stop service for licensing and fitness certification from a single point; spell out coordination protocol with Bangladesh Navy and Bangladesh Coast Guard for safeguarding coastal/ marine fisheries and with the Forest Department for managing the Sundarbans fisheries.
- Given the context of 2 times hilsa production from the marine than inland, and the threats of climate change ahead, the policy should address guidelines for gradual implementation of HFMAP (conservation of gravid hilsa during spawning, food safety net coverage during hilsa fishing ban period, net and mesh regulation, etc.) in the coastal/marine sector.
- Policy should address the importance and conservation of mother shrimp grounds; shrimp hatcheries should be earmarked to use justifiable nos. of shrimp-mothers (restrict indiscriminate use) as per national yearly PL demand and their PL production capacity.
- Policy would recommend declaration of a complete ‘no-fishing zone’ or ‘no-take’ zone (somewhat similar measures like other Bay of Bengal Large Marine Ecosystem countries) in the area of 0-5 km from the beach (in addition to CMPAs and MRs) to protect the nursing and

feeding grounds of all marine resources; no fishing of any sort, even with cast nets, beach seines, drag/push nets, current nets, mosquito nets etc. would be allowed.
- Facilitate communications and advocacy with Ministry officials; help establish the inter-sectoral dialogue on climate change adaptation in the fisheries and aquaculture sector.

Key competencies/qualifications

- The Policy & Strategy Analyst should have a post-graduate degree, preferably having Ph. D. or equivalent in Fisheries and/or Natural Resources Management/ Environmental Law/ Institutional Policy or any closely related discipline from any recognized university or institution.
- At least 15 (fifteen) years of experience in the Bangladesh fisheries sector with wide sectoral ideas on fisheries, aquaculture, environment, agriculture policies and strategies and management, natural resource governance programming and planning;
- Working experience in relevant field with United Nations or similar including experience in dealing with Government agencies as well as the non-governmental sector;
- Proven experience in environmental law, institutional/legal approaches with ecology and biodiversity issues;
- Proven track record of experience supporting the preparation of laws and regulations related to fisheries and aquaculture;
- Clear idea pertaining to Fisheries, Environment, Agriculture, Water/ Land, Forest/ Wildlife, Shipping/ Maritime, Energy, Tourism, Disaster Management, etc. related policies, strategies, acts and legal issues, international/ regional conventions, plan of actions and strategies;
- Demonstrated ability to communicate, including advocating to GOs and NGOs;
- Have a track record of publications which reflects compiling, reasoning and writing skills;
- Adaptable to multicultural and multidisciplinary team of experts and willing to undertake intensive field works in the coastal/wetland areas of Bangladesh.
- Good analytical skills; resourceful with initiative, maturity of judgment.
- Excellent written and verbal communication skills in English and well computer literate.
- Ability to work under pressure and to deadlines; coordinate and monitor effectively while organizing occasional project events.

17. IT Support and Data Management Expert (National) (01 position) (FAO-GEF)

Duration: 10 (ten) man months (in the entire project life)
Duty Station: PMTSU, FAO-Dhaka (Frequent Field visits required)

Under the overall managerial, administrative and technical supervision of FAOR, NOO and coordination of the NPC, PD, other international experts and project personnel the incumbent will be responsible and provide specialized support for establishing database management system including GIS, information technology to the project. His/her main tasks will be:

Key Tasks

- Assess the hardware and software requirements and specification of the project.
- Install, develop and maintain the project's electronic data base information system, networking, GIS for project monitoring and evaluation purposes, explore and retrieve data from community surveys, ward, local and central level.
- Design, develop & create a web-based information system (web portal; structure an intranet portal and internet interface) for the project; coordinate continuous web-based information resource inputs; develop continuous refining and up-dating data base of information relevant for all aspects of project management, and establish collaborative relationships with other agencies (GoB, NGOs and donors) to ensure the maximum sharing through easy user friendly and accessible exchange of information and references;

- Provide assistance in the development of community maps for community analytical purposes and the preparation of other mapping requirements of the project for monitoring and reporting purposes.
- Liaison with GoB and UN agencies information systems and assistance in further development of required geographic information and database application software development.
- Training needs assessment and train up the project team in order to facilitate computerized analysis of survey/ data collection and processing for the project management related activities undertaken by the project or third parties.
- Setting up remote access telecommunication systems, Website hosting, provide technical input and supervise implementation partners of the project and perform any other duties assigned by the NPC/NPD.
- Develop a web-based information system for the project;
- Create the website for the project; and coordinate web-based information resources

Key competencies/ qualifications
The successful candidate should have/be:

- A post-graduate degree in Computer Science and Engineering/Electrical and Electronics Engineering or Graduate in Applied Physics with computer degrees or any related discipline.
- 10 years professional experience in managing intranet portals and high trafficked websites of which at least 5 years in installation and operation of MIS and GIS in Windows NT network environment.
- Proven experience in designing and maintaining project's database application, trouble-shooting networks, including setting up remote access via telecommunication link.
- Demonstration ability to deliver training sessions interacts with users to work effectively and with government officials and diverse range of counterparts and stakeholders.
- Excellent analytical and communication skills (written and spoken) in English and Bangla, resourceful with initiative, maturity of judgment.
- Micro Soft Certified Professional with higher level professional track record will be advantageous.
- Adaptable to multicultural and multidisciplinary team of experts and willing to undertake intensive field works in the coastal/wetland areas of Bangladesh.
- Ability to work under pressure and to assist the project team with any urgent services.

18. Operations Manager, National (01 position) (FAO-GEF)

Duration: 48(forty-eight) man months (Full time during project duration)
Duty Station: PMTSU, FAO-Dhaka (Frequent Field visits required)

Under the overall managerial, administrative and technical supervision of FAOR, NOO and coordination of the NPC, the incumbent will be responsible for general technical and operational oversight and management of the Project; supervising and coordinating the project activities to ensure its results are in accordance with the ProDoc and the rules and procedures established; coordinate day-today project management - both organizational and substantive matters – budgeting, planning and general monitoring and ensure adequate information flow, discussions and feedback among the various stakeholders; ensure adherence to the project's work plan, prepare revisions of the work plan, if required;

Key tasks

- Participate in inception and/or stakeholders' workshops organized by the project and contribute to the preparation of project implementation plan;
- Provide overall technical and management supervision of the PMTSU in close consultation with the NOO and the NPC;

- Provide overall administrative management, assume budget holder's responsibilities; support and ensure effective and timely allocation of funds and resources as per the ProDoc;
- Ensure timely submission of regular project progress and implementation reports (technical, financial and administrative) required by FAO, GEF and the GoB and prepare Final Report according to FAO standards and procedures, including project follow-up reports;
- Ensure proper handling of logistics related to workshops and events; prepare GEF quarterly progress reports, ToR for national and international consultants and subcontractors;
- Ensure smooth communications, information sharing and networking with the PMTSU (FAO), PIU (DoF), field offices, GEF, decentralized offices and resource persons involved in the project implementation;
- Develop and ensure timely implementation of the detailed work plan and budget using a log frame analysis, including targets to be met, resources to be allocated based on objectives, results and activities as per the ProDoc, and ensure effective technical and financial delivery;
- Coordinate, liaise and communicate, as and when necessary, with all stakeholders and partners (GoB, DoF, BFRI, GEF, DAE, DoE, MD, CDMP, WorldFish, IUCN, IFAD, etc.) for smooth running of the project implementation;
- Monitor the expenditure, commitments and balance of funds under the project budget lines, and draft project budget revisions; assume overall responsibility for meeting financial delivery targets set out in the agreed AWP, reporting on project funds and related record keeping;
- Shall liaise with project partners to ensure their co-financing contributions within the agreed terms;
- Assume overall responsibility for reporting on project progress vis-à-vis indicators in the logframe;
- Perform a secretarial role for PSC/PIC meetings, PMTSU meetings, PIU meetings, support national steering committee meetings as required and organize technical workshops/ consultation meetings/ conferences, local and overseas training programmes, etc. including identification/ mobilization of resource persons;
- Represent the Project in relevant project meetings, workshops and training programmes and organize events and prepare advocacy materials for external workshops and conferences seeking to facilitate coordination and integration, where appropriate, beneficial for the achievement of the Project's objectives;
- Shall provide technical support to project Consultants in coordinating and conducting different project activities (trainings, workshops, stakeholder consultations, arrangements of study tour, etc.);
- Shall keep regular contact with project experts/ Consultants to inform them about the project technical details and changes and also review the reports and other documents for technical content;
- Shall provide technical support to the development, implementation and/or evaluation of the project activities.
- Perform any other related official duties related to the project implementation.

Key competencies/qualifications

- Masters/Bachelors degree in Business Administration/ Accounting/ Commerce or Fisheries/ natural resources management/ Environmental Science from a recognized university.
- Proven experience with donor funded integrated and multi-subject project/ programme implementation and management is essential; must be able to fluidly handle on a daily basis the political, technical and HRD and management challenges that may arise during project implementation;
- Must be familiar with knowledge management systems, methods and tools related to natural resources management (ecosystem, biodiversity, fisheries, aquaculture, etc.);
- Must have experience of organizing, facilitating and management of workshops/ conferences/ consultation meetings/ training programmes;
- Strong interpersonal, communication, reporting and presentation skills is essential;

- Adaptable to multicultural and multidisciplinary team of experts and willing to undertake intensive field works in the coastal/wetland areas of Bangladesh as when needed.
- Excellent written and verbal communication skills in English and Bangla, and well computer literate in both languages.
- Good analytical skills; resourceful with initiative, maturity of judgment.
- Ability to work under pressure and to deadlines; coordinate and monitor effectively while organizing occasional project events.

19. Finance and Accounts Support Officer (National) (01 position) (FAO-GEF)

Duration: 48(forty-eight) man months (in the entire project life)
Duty Station: PMTSU, FAO-Dhaka (Frequent Field visits required)

Under the overall managerial, administrative and technical supervision of FAOR, NOO, coordination of the PMTSU and project personnel the incumbent will be responsible for the maintenance of overall aspects of the project accounts, books of accounts, budgeting, budget-tracking, financial operations and reporting, auditing, payroll, tours, transports and assist in setting up internal control systems through operating manuals, guidelines, formats as per UNDP/ERD DEX manuals; providing assistance in developing financial data based MIS and perform any other duties assigned by PMTSU, FAO. His/her main tasks will be:

Key Tasks

- Assist the PMTSU in the overall administrative and financial matters of the project.
- Shall be responsible for all administrative (contractual, organizational and logistical) and accounting (disbursements, record-keeping, cash management) matters of the project.
- Prepare periodic financial statements and compile the annual project activities and achievement of planned project outputs.
- Provide general administrative and financial support to the project to ensure smooth running of the PMTSU; provide logistical support to the project staff and consultants in conducting/achieving different project activities/achievements.
- Maintenance of overall aspects of the project accounts, books of accounts, budgeting, budget-tracking, financial operations and reporting, auditing, payroll, tours, transports and assist in setting up internal control systems through operating manuals, guidelines, formats as per UNDP/ERD DEX manuals;
- Shall monitor the budget expenditures by preparing payment documents, and compiling financial reports; maintain the project's disbursement ledger and journal; keep files with project documents, expert reports; control the usage of non expendable equipment (record keeping, drawing up regular inventories).
- Monitor the expenditure, commitments and balance of funds under the project budget lines, and draft project budget revisions; assume overall responsibility for meeting financial delivery targets set out in the agreed AWP, reporting on project funds and related record keeping;
- Shall draft and finalize correspondence of administrative nature; arrange duty travel; fax, post and e-mail transmissions, and co-ordinate appointments;
- Shall also perform any other administrative/financial duties as requested by the PMTSU and organize and coordinate the procurement of services and goods under the project.

Key competencies/ qualifications

The successful candidate should have/be:

- University degree preferably Post graduate degree in Accounting/ Commerce/ Account Keeping/ Economics/ Business Administration or related discipline or any closely related discipline from any recognized university.

- 05 years of relevant practical experience with any foreign aided project or international development organization or reputed multinational organization.
- Experience in UNDP and GoB accounting, auditing, financial management and reporting systems will get priority.
- Excellent computer literacy in MS Office (Word, Excel, Access, PowerPoint etc.) and computerized accounting to produce several financial/ technical reports and to maintain financial correspondence independently.
- Word processing in English and Bangla is essential with minimum accurate typing speed of 60 wpm in English and 40 wpm in Bangla.
- Skilled in procurement, store recording, petty cash handling, logistics supports, developing filing systems and reference materials.
- Knowledge in general administration, personnel matters, procurement, taxes, VAT and budgeting is essential.
- Excellent analytical and communication skills (written and spoken) in English and Bangla.
- Ability to produce high quality work under pressure and in stressful situations including interruptions and setbacks having outstanding time-management, organizational and inter-personal skills.
- Adaptable to multicultural and multidisciplinary team of experts and ability to produce high quality work under pressure and in stressful situations.

20. Procurement and Admin. Support Officer (National) (01 position) (FAO-GEF)

Duration: 48(forty-eight) man months (in the entire project life)
Duty Station: PMTSU, FAO-Dhaka (Frequent Field visits required)

Under the overall managerial, administrative and technical supervision of FAOR, NOO, coordination of the PMTSU and project personnel the incumbent will be responsible for the maintenance of overall aspects of secretarial, administrative support to project, ensure timely project procurements, maintaining of inventory and records of supplies and their usage, logistics maintenance, maintenance of all office equipment including carrying out minor repairs and maintenance and perform any other duties assigned by PMTSU, FAO. His/her main tasks will be:

Key Tasks

- Provide overall secretarial, administrative support to project, drafting routine letters/ messages/ reports to route in timely manner, arranging travel, itinerary preparation for visiting consultants, assist to arrange and organize workshops/ meetings/ training/ scheduled missions/ tours, mailing, reception, telephone, photocopying, binding, filing etc.
- Ensure project procurements and maintenance of overall aspects of the project accounts, books of accounts, budgeting, budget-tracking, financial operations and reporting, auditing, payroll, assist in setting up internal control systems through operating manuals, guidelines, formats as per UNDP/ERD DEX manuals;
- Maintaining of inventory and records of supplies and their usage, accounts, petty cash handling/ banking, logistics maintenance, maintenance of all office equipment including carrying out minor repairs;
- Control the usage of non expendable equipment (record keeping, drawing up regular inventories).

Key competencies/qualifications

- Post graduate degree in Commerce/ Economics/ Business Administration or related discipline from a recognized university/ institution. Diploma in computer/ secretarial science would be an additional experience.
- 3-5 years of relevant experiences with any foreign aided project or international organization or reputed organizations; Experience in UN projects and government systems will be

preferred. Experience in UN projects and GoB accounting, auditing, financial management and reporting systems will get priority.

- Proficient in MS Office (Word, Excel, Access, PowerPoint, troubleshooting, etc,) Internet, E-mail is required; word processing in English and Bangla is desirable with minimum accurate typing speed of 60 wpm in English and 40 wpm in Bangla is a must.
- Excellent analytical and communication skills (written and spoken) in English and Bangla.
- Knowledge in general administration, personnel matters, procurement, inventory management, accounts and cash management, taxes, VAT and budgeting is essential.
- Adaptable to multicultural and multidisciplinary team of experts and ability to produce high quality work under pressure and in stressful situations including interruptions and setbacks.

21. Training and Logistic Associate (National), 01 position (FAO-GEF)

Duration: 48(forty-eight) man months (in the entire project life)
Duty Station: PMTSU, FAO-Dhaka (Frequent Field visits required)

Under the overall managerial, administrative and technical supervision of FAOR, NOO, coordination of the PMU and project personnel the incumbent will be responsible for providing logistic support in the maintenance of overall aspects of secretarial, administrative activities of the project; support and assist timely project procurements, maintenance of inventory and records of supplies and their usage, logistics maintenance, maintenance of all office equipment including carrying out minor repairs and maintenance and perform any other duties assigned by PMTSU, FAO. His/her main tasks will be:

Key Tasks

- Provide overall logistic coordination and support to training activities, secretarial, administrative works, indexing incoming and outgoing communications, visiting consultants, workshops/ meetings/ training/ scheduled missions/ tours, mailing, reception, telephone, photocopying, binding, filing, maintenance of office equipments, office cleanliness, maintenance of water, tea and coffee, etc.
- Provide coordination and logistic support to procurements and project accounts, books of accounts, auditing, payroll, etc.
- Provide coordination and logistic support to inventory and records of supplies and their usage, accounts, petty cash handling/ banking, logistics maintenance, maintenance of all office equipment including carrying out minor repairs;

Key competencies/qualifications

- University degree in Arts/ Commerce/ Science/ or related discipline from a recognized university/ institution. Diploma in computer/ secretarial science would be an additional experience.
- 5 years of relevant experiences with any foreign aided project or international organization or reputed organizations; Experience in UN projects and government systems will be preferred.
- Proficient in MS Office (Word, Excel) Internet, E-mail is preferable. Excellent analytical and communication skills (written and spoken) in English and Bangla.
- Knowledge in general administration, personnel matters, procurement, inventory management, accounts and cash management, taxes, VAT and budgeting is essential.
- Adaptable to multicultural and multidisciplinary team of experts and ability to provide quality logistic support under pressure and in stressful situations including interruptions and setbacks.

22. Office Logistic Assistant (National) (01 position) (FAO-GEF)

Duration: 48(forty-eight) man months (in the entire project life)
Duty Station: MSU, FAO-Dhaka or PIU, DoF (Frequent Field visits required)

Under the overall managerial, administrative and technical supervision of FAOR, NOO, coordination of the PMTSU and project personnel the incumbent will be responsible for providing logistic support in the maintenance of overall aspects of secretarial, administrative activities of the project; support and assist timely project procurements, maintenance of inventory and records of supplies and their usage, logistics maintenance, maintenance of all office equipment including carrying out minor repairs and maintenance and perform any other duties assigned by PMTSU, FAO. His/her main tasks will be:

Key Tasks

- Provide overall logistic support of secretarial, administrative works, indexing incoming & outgoing communications, visiting consultants, workshops/ meetings/ training/ scheduled missions/ tours, mailing, reception, telephone, photocopying, binding, filing, maintenance of office equipments, office cleanliness, maintenance of water, and providing tea & coffee, etc.
- Provide logistic support to procurements and project accounts, books of accounts, auditing, payroll, etc.
- Provide logistic support to inventory and records of supplies and their usage, accounts, petty cash handling/ banking, logistics maintenance, maintenance of all office equipment including carrying out minor repairs;

Key competencies/qualifications

- University degree in Arts/ Commerce/ Science/ or related discipline from a recognized university/ institution. Diploma in computer/ secretarial science would be an additional experience.
- 5 years of relevant experiences with any foreign aided project or international organization or reputed organizations; Experience in UN projects and government systems will be preferred.
- Proficient in MS Office (Word, Excel) Internet, E-mail is preferable. Excellent analytical and communication skills (written and spoken) in English and Bangla.
- Knowledge of general administration, personnel matters, procurement, inventory management, accounts and cash management, taxes, VAT and budgeting is essential.
- Adaptable to multicultural and multidisciplinary team of experts and ability to provide quality logistic support under pressure and in stressful situations including interruptions and setbacks.

Appendix 7: Overall justification (Vulnerability assessment and matrix) of the selection of the pilot sites.

1. Overall justification (vulnerability assessment and matrix) of the selection of pilot areas

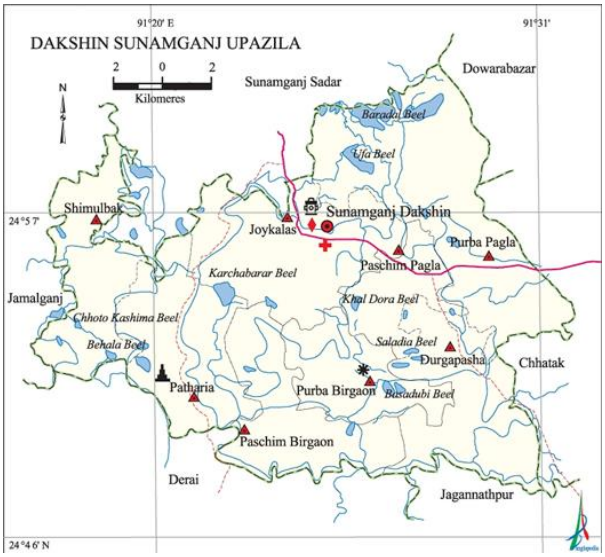
Through Rapid Rural Appraisal (RRA) on CC risks and vulnerability assessment (done by the National team and international experts), frequent field visits and Focus Group Discussions (FGDs) with the community people, dialogues with the DoF officials both at the field level and HQ, field personnel of BFRI, WorldFish in regard to vulnerability, and baseline co-funding situation (by other stakeholders) the following sites of the SW coastal region were finally identified for this project activities implementation.

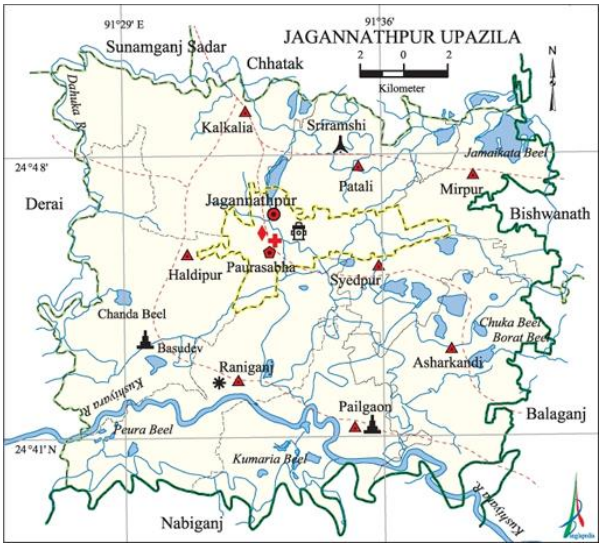
The following are the details of methodologies for CC risks and vulnerability assessment based on exposure, sensitivity and adaptive capacity.

1.1 NE Haor Basin

1.1.1 South Sunamgonj and Jagannathpur Upazilas

The two upazilas – South Sunamgonj (303 km^2) and Jagannathpur (368 km^2) are selected based on their relative higher vulnerability than their neighboring upazllas in the NE Haor basin (Table 1, Figs. 1-2). Both upazilas have a number of large and medium sized haor (wetlands in the northeastern part of Bangladesh which are a bowl or saucer shaped shallow depressions), beels (relatively large waterbodies with static water in the floodplains of Bangladesh), ponds, canals and ditches.



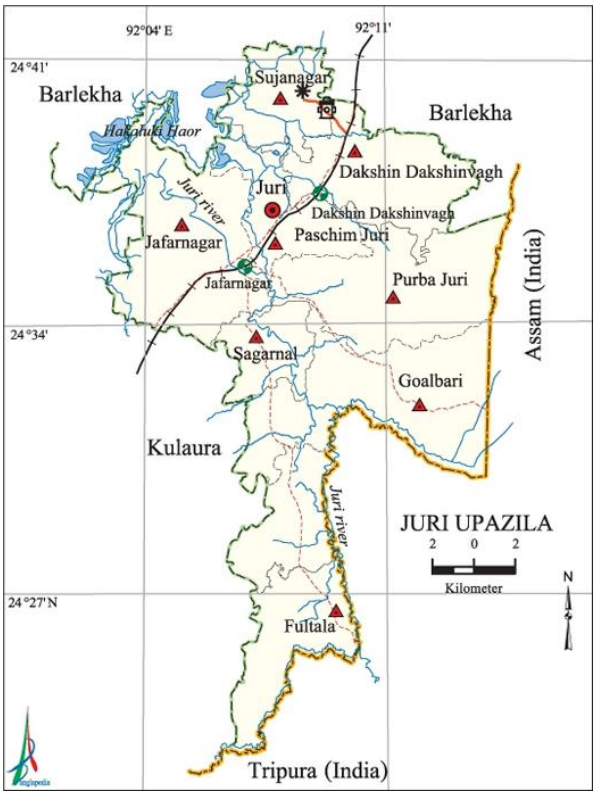


The selected two upazilas are located in the downhill area at the southern border of Sunamgonj distrct. As a result, flush flood from the upstream rushes and settles in the depressed haor and beel areas. Hence these two upazilas having many haors become a vast single sheet during the monsoon and again dries up into pools of small *beels* during the dry summer. As a result, the community living in and around the haors become vulnerable, in regard to increased exposure and sensitivity, and poor adaptive capacity compared to other upazilas. Climate hazards like erratic rainfall (delayed monsoon, sudden downpour), flush flood and drought spell in monsoon (increasingly more frequent with much longer duration) are very common in both upazilas. The numbers of landless people are very high in South Sunamgonj (56%) and Jagannathpur (61 %). The extreme poor population are 16-24% in in both upazilas. Infrastructurally, the two selected upazilas have one of the poorest road communication and electricity coverage (56 and 121 km mettaled road and 8% and 12% people use electricity in South Sunamgonj and Jagannathpur, respectively). Moreover, the people living in and around 4 haors (*Dekhar, Shaghai, Noluar and Pinglar*) selected in two upazilas for the proposed piloting, have neither metalic road nor thay have access to electricityat all.

Condition of South Sunamgonj is even worse than Jagannathpur as it is a relatively newly formed (declared in 6 June 2006). In almost all livelihood indices, it is poorer than Jagannathpur and other upazilas in the area.

High population densities coupled with acute problem of seasonal unemployment (people are employed only during the single paddy crop cycle and rest of the time depend only on the common pool resource from open water fisheries which is alarmingly dwindling due to habitat loss, decline in fish diversity, production and denied access by the leaeeholders), very poor literacy rate (32% and 40% in two upazillas), lack of educational institutes, medical facilities and other basic amenities and poor development initiative and programme make the two seemingly resourceful upazilas comparatively more vulnerable than adjoining upazilas to ongoing and upcoming shocks and stresses due to climate change. Development activities by GOs and NGOs are not very visible in the two upazilas.

1.1.2 Juri Upazila



Juri, an Upazila under Maulvibazar district with an area of 238.44 km^2, is bounded by Barlekha upazila on the north, Indian state of Tripura on the south, Tripura and Assam on the east and Kulaura upazila on the west. The upazila was officially created on 8 January 2005 with eight unions - four from each of two upazilas - Kulaura and Barlekha.

Hakaluki haor is situated in the eastern part of Bangladesh adjacent to the Assam-Bangladesh border and 5 upzillas comprise this haor's total area - Kulaura, Juri and Barlekha (Moulvibazar district) and Golapganj and Fenchuganj (Sylhet district). It covers a large surface area of more than 180 km^2. The total area of the haor is approximately 18,000 ha, including the inundated area during monsoon. Of this total area, beels (permanent wetlands) cover an area of 4,635 ha.

Juri upazila has a population of 1,68,423 - male 84,948, female 83,475 and along with Muslim and Hindus, indigenous communities such as Khasia and Manipuri lives in this upazila as well. Average literacy rate of the people is 39.8%, male 44.0% and female 35.5%. Main sources of livelihoods (%) are - Agriculture 37.9, fishing 14.1, labor 13.4, boatman 0.4, small trading 11.3, remittance 8.7 and others 14.1. The number of landless people in the upazila is very high 63%. The upazilas has one of the poorest road communication and electricity coverage (only 50 km mettaled road and 15% respectively). Only 29% people use sanitary latrines, 54% rely on non-sanitary latrines and 17% do not have any sorts of latrine facilities at all.

Recently Juri upazila and Hakaluki haor have become a rapidly-degrading landscape and facing increased pressure and threats. Such rapid degradation of the wetland ecology is causing devastating consequences on the people living in around and downstream of the Hakaluki haor, who, for generations, were dependent for their livelihoods upon ecosystem services and goods provided by this wetland. About 200,000 people live around the haor. All of them, more or less, are dependent on the resources of the haor for their livelihoods. As the haor floods annually, settlements are clustered along its slightly raised fringes. Some 190,000 people live in the area surrounding Hakaluki haor. The two main sources of livelihood for these people are fisheries and agriculture. Depending on how water levels are controlled, tensions arise between areas available for fish versus the area befitting for agricultural production. An important task facing wetland managers is thus to find equitable ways to

achieve the balance between these sometimes competing forms of production. On ground of rapid degradation of the resources and in recognition of the urgent need to protect the unique ecology and biodiversity of the haor, GoB has declared 18,000 ha of Hakaluki haor as an 'Ecologically Critical Area' (ECA) under the provision of the Bangladesh Environment Conservation Act (BECA) in 1999.

Clearing of riparian vegetation and unplanned cultivation in the watershed resulting from absence of land use policy and faulty leasing practices, linked with pollution from industrial effluents and agro-chemicals continue to upset ecological balance of *haors*. High climate vulnerability coupled with acute problem of seasonal unemployment, landlessness, very poor literacy rate, lack of basic amenities and poor development initiatives and programmes make Juri upazila highly vulnerable to ongoing and upcoming shocks and stresses due to climate change.

The Department of Environment (DoE), Government of the People's Republic of Bangladesh has established few fish sanctuaries in Juri (Rongchi beel, Agdar beel, and Maichlardak beel) and Barlekha (Pekuni beel, Moiajuri beel and Nimu beel) upazilas through its very recently phased out *Community-based adaptation in Ecologically Critical Areas (CBA-ECAs) through biodiversity conservation and social protection* and are being managed by the community (beel conservation groups, BCG). Basing on the rapid vulnerability assessment Juri upazila was selected for climate resilient up scaling of lessons learned and build on the activities achieved through DoEs CBA-ECAs project in the Agdar beel fish sanctuary of Juri upazila by the up-coming LDCF-GEF funded project.

1.1.3 Nasirnagar Upazila

Nasirnagar is an Upazila of Brahmanbaria District under the Division of Chittagong with an area of 311.66 km^2. It is bounded by Lakhai and Austagram upazilas on the north, Sarail and Brahmanbaria sadar on the south, Madhabpur on the east, Bajitpur and Austagram on the west. The present population is about 3,09,011 where the number of female 158,000 (51.27%) is more than the male 150,500 (48.73%).

Tail end of the *Dekahr* haor (of South Sunamganj) falls under Nasirnagar and known as *Medir* haor. *Medir* haor and adjacent Beel *Chachua* expands to more than 300 ha during monsoon. The upazila is also enriched with about 25 medium to large beels. The major ones are *Baklangal Atauri Beel* (225 ha), *Beel Kutia* (160 ha), *Beel Kupa* (120 ha), *Beel Shapla* (250 ha), *Beel Hural* (400 ha), *Beel Balenga* (200 ha) and *Dhaleshawri Nodi* (525 ha). Part of the four rivers flowing through the upazila are the Titas (Perennial), Dashadia (Seasonal), Rupsha (Perennial), Kulkulia (Perennial), Haral (Perennial) and Longgon Bolbhodro (Seasonal).

Nasirnagar has 40,917 units of house hold and total area 311.66 km^2. It has 13 Unions/Wards, 100 Mouzas/Mahallas, and 129 villages.

There are four Unions with a total population of 1,02,590 - located in and around *Medir* haor namely Goalnagar (Household number 3081 and population 17132), Nasirnagar (HH 5227 and Popn. 26181), Burishwar (HH 5885 and Popn. 31163) and Bholakut (HH 5287 and Popn. 28114).

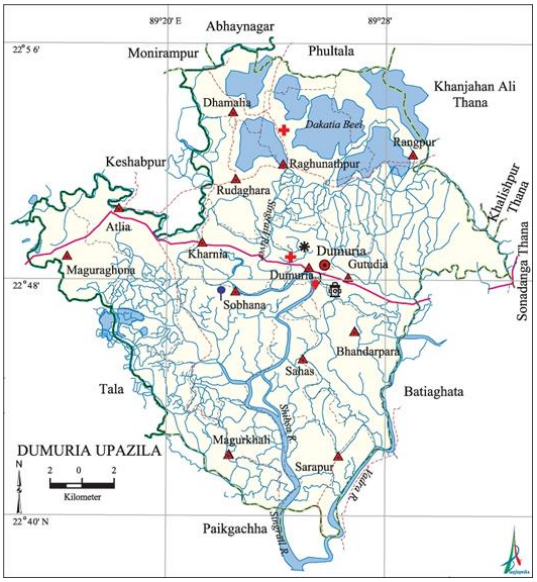
Average literacy rate of the people of Nairnagar is very poor and only 27.8% (male 32.1% and female 23.7%). Main sources of *income* of the people of the upazila is Agriculture (71.81%) followed by small business (11.95%), non-agricultural labourer (3.44%), and others. The number of landless people is very high (35.60%) in Nasirnagar. Regarding infrastructure, the upazilas has poor road communication (Pucca road 58 km, semi-pucca road 10 km, mud road 167 km; waterway 18 nautical miles). Though, all the unions of the upazila are under rural electrification net-work. However 9.69% of the dwelling households have access to electricity. Regarding sanitation, 17.39% (rural 15.85% and urban 46.66%) of dwelling households of the upazila use sanitary latrines and 75.05% (rural 76.56% and urban 47.21%) of dwelling households use non-sanitary latrines; 7.52% of households do not have any latrine facilities at all. The cyclone of 1971 devastated Chapartala and Chitna villages; besides, the floods of 1974 and 1988 caused heavy damages to settlements and other properties of this region.The combined effcets of all these factors turn the upazila vulnerable to climate change hazards compared to the other upazilas under Brahmanbaria and neighboring districts

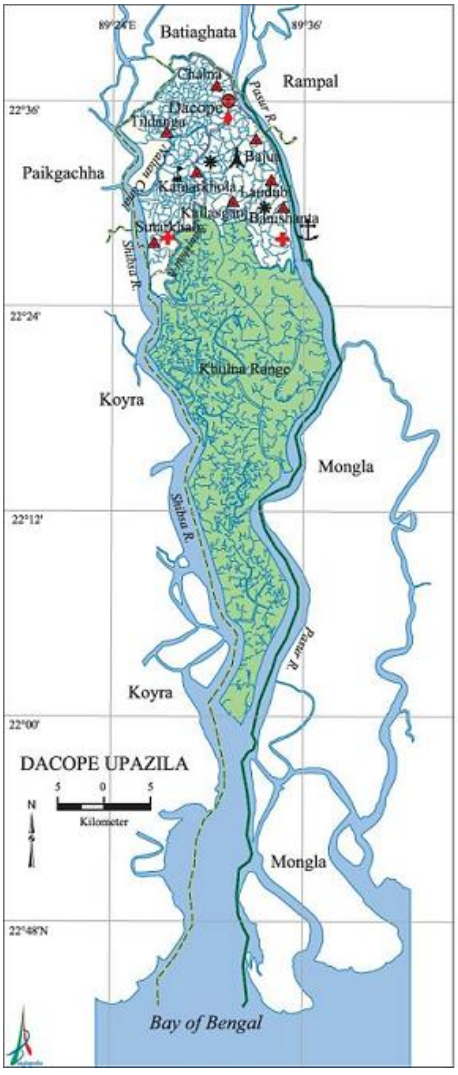
GOs e.g. MoFL and MoEF and NGOs e.g. BRAC, ASA, Proshika, Save the Children etc. run different development, training and credit programs in this Upazila.

1.2 SW Coastal Area

1.2.1 Dumuria and Dacope Upazilas, Khulna

Dumuria and Dacope are two bordering upazilas in Khulna district. Dumuria is well-connected with Khulna Sadar and positioned north of Dacope. Dacope (992 km^2) is nearly double in size of Dumuria (453 km^2) and extends upto the mangrove forest in Sundurban and the river mouth of Passur in the Bay of Bengal. The major rivers in the two upazilas are Passur, Sibsa, Singrail, Manki and Bhadra. There is a large beel in Dumuria named Beel Dakatia.





Both upazilas have numerous shrimp gher for bagda and galda. People depend largely on agriculture, coastal shrimp farming and openwater fishery. The numbers of landless people are 31% and 20% in Dumuria and Dacope, respectively. The extreme poor population are 16-24% in Dumuria and 25-30% in Dacope.

Both upazilas are prone to climate change hazards like salinity intrusion, sea level rise, drought, erratic rain and extreme events – storm and water surge (Table 1, Figs. 1-2). Salinity problem is very acute in the two upazilas for 3-4 months. Dacope is however more exposed to salinity intrusion and sea level rise with higher magnitude that Dumuria because its position (closer to the coast) and size (much larger and narrower – extends to Bay of Bengal). This makes Dacope highly exposed to storm surge as well. Drought and erratic rainfall also are common in both Upazilas with

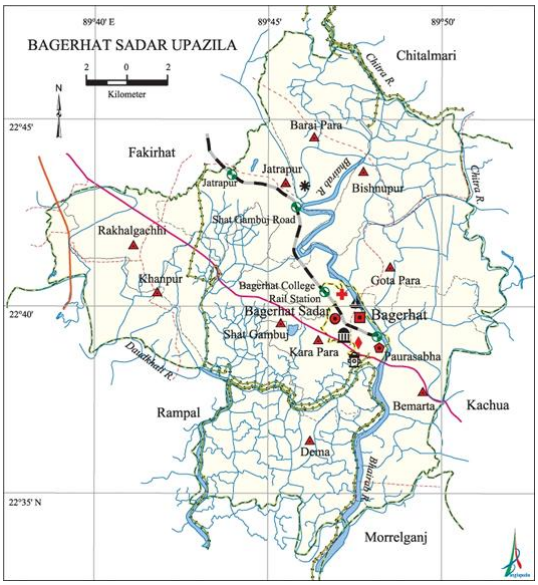
increasingly more frequencies and longer duration and resulting massive impacts on crop and fish production system.

Regarding infrastructure, the two upazilas have poor road communication and electricity coverage (129 and 29 km metalled road and 22% and mere 6% people use electricity in Dumuria and Dacope, respectively). Nearly 14% people of both Upazilas do not have latrin facilities and make use of open space for defecation. Only 40% people have access to tubewell for drinking water. The combined effcets of all these factors turn the two coastal upazilas extremely vulnerable to climate change hazards compared to the neighboring upazilas.

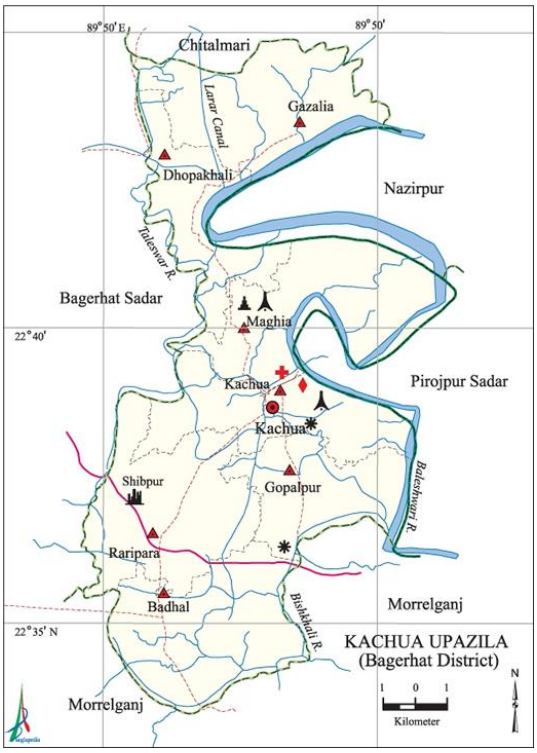
Several GOs - MoFL, MoEF, MoDMR and NGOs - BRAC, Prodipan, ASA, Proshika, Nijera Kari,Caritas, CSS, CARE, Progoti World Vision, HEED Bangladesh, Prodipon, Vost, ESDO etc. run different development, training and credit program in the two upazilas.

1.2.3 Bagerhat Sadar and Kachua Upazilas, Bagerhat

Bagerhat Sadar and Kachua are the two neighbouring upazilas under Bagerhat District. Area-wise, Kachua is the smallest (131 km^2) among seven upazilas selected for piloting and Bagerhat Sadar (273 km^2) is nearly double of the size of Kachua. The main waterbodies are the rivers – Bhairab, Chitra, Daudkhali, Taleswar, Baleshwar, Taleswar, Bishkhali and a canal named Larar.



Both upazilas have shrimp gher for bagda and galda. People depend largely on agriculture, coastal shrimp farming and openwater fishery. The numbers of landless people are 44% and 36% in Dumuria and Dacope, respectively, with 16-24% extreme poor population in two upazilas. Bagerhat Sadar (977 km^{-2}) and Kachua (737 km^{-2}) have the highest population densities among the seven sleeted pilot sites.



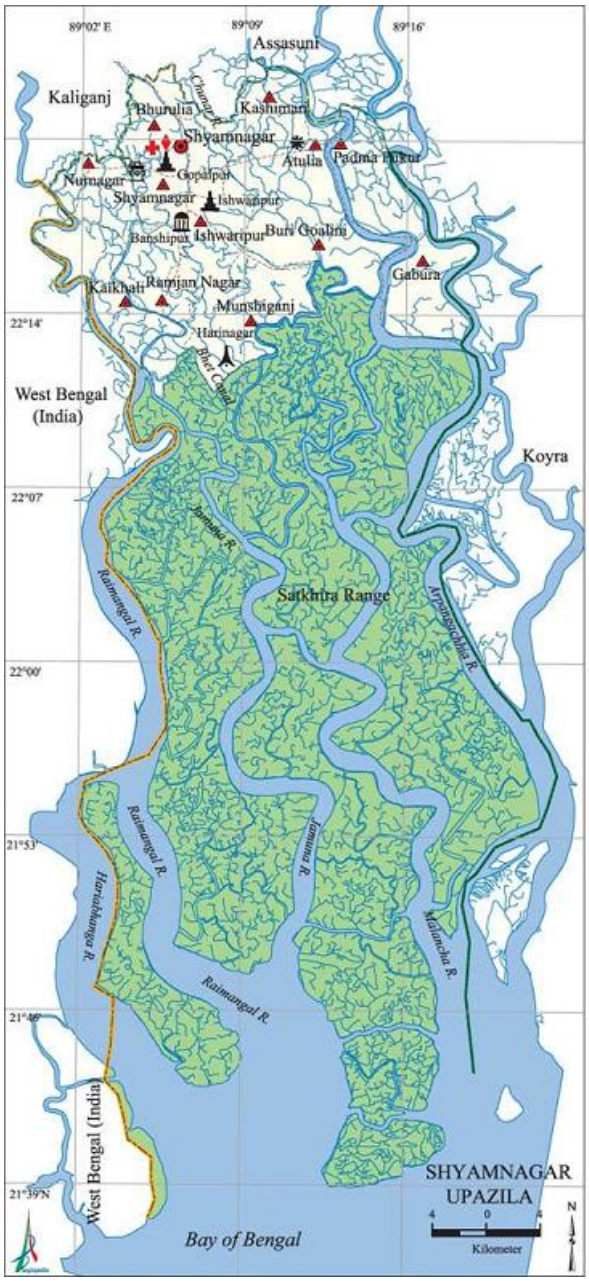
Both upazilas are prone to climate change hazards like salinity intrusion, sea level rise, drought, erratic rain and extreme events – storm and water surge. Salinity problem is very acute in the two upazilas for 3-4 months. Bagerhat Sadar is however more sensitive as it is highly populated with likelihood of more people will be affected both in normal and extreme events. Drought and erratic rainfall also are common in both Upazilas with increasingly more frequencies (3-4 times a year) and longer duration (> 15 days at a time) and resulting huge impacts on crop and fish production system.

Regarding infrastructure, the two upazilas have poor road communication and electricity coverage (212 and 142 km metalled road and 41% and mere 18% people use electricity in Bagerhat Sadar and Kachua, respectively). There are highest number of waterways (28) in both upazilas.

The combined effcets of all these factors turn the two upazilas of Bagerhat district highly vulnerable (Table 1, Figs. 1-2) to climate change hazards compared to the surrounding upazilas and selected for the project activities implementation.

NGOs like CARE, BRAC, Proshika, ASA, Onnesha, Prodeepan, CODEC etc. run different development, training and credit program in two upazilas.

1.2.4 Shyamnagar Upazila, Satkhira



Shyamnagar (1968 km^2) one of the largest upazilas of Bangladesh is located in the south-western tip of the country bordering Indian state of West Bengal under Satkhira district. It is part of the largest contiguous mangrove forest of the world – the Sundarban. The contextual setting of the upazila makes it a deprived area in comparison with the other regions of the Bangladesh. Some of the largest estuarine river flow through the upazila – Jamuna, Raymangal, Arpangasia, Malancha, Hariabhanga, Chunar and Bhet Canal is notable.

The upazila has numerous shrimp bagda gher. People depend largely on Sundarban (fishing, wood, golpata and honey collection), coastal shrimp farming and openwater fishery. The numbers of landless people are 43% and the extreme poor and poor population, respectively, are 25-34% and ≥50%.

Shyamnagar is extremely prone to almost all climate change hazards like salinity intrusion, sea level rise, drought, erratic rain and extreme events – storm and water surge. The upazila has long been exposed to a number of climate threats with strongest likelihood and highest magnitude. Sensitivity of the people to climate change is very high as majority (>80%) depend on the aquatic resources as gher owner, gher farmer/labour, fish farmer, PL collector, PL supplier, earth labour in gher, middlemen (foira), depot holder, PL nurserer, fish seed supplier (patilwala), crab farmer, fishers, fish retailers, fish wholesaler, net makers, trap makers, boat makers, input supplier to shrimp/fish farm and so on. Employment opportunity in non-fisheries sector is very limited. Moreover, adaptive capacity of the people of the upazila is very low. Regarding infrastructure, Shyamnagar, though holds a very large area, has very poor road communication and electricity coverage (89 km metalled road and mere 7% people use electricity). Only 36% people have access to tubewell for drinking water.

Lack of educational institutes, medical facilities and other basic amenities and lack of development initiative and programme make Shyamnagar extremely vulnerable to climate change. Disasters like cyclones are very common in Shyamnagar. Thousands of people remained water logged in Shyamnagar in the aftermath of Cyclone Sidr (15.11.07) and Aila (26.05.09). Several thousand homes were washed away while numerous agricultural lands and crops were damaged, shrimp/fish farms washed aways and freshwater ponds became salinized by the tidal surges in this low-lying coastal upazila. Many villages of Shyamnagar were either completely submerged in flood waters or destroyed. Several rivers broke through embankments, causing widespread inland flooding. In Shyamnagar, more than 50,000 people were left homeless.

Drought and erratic rainfall also are common in the upazila with increasingly more frequencies and longer duration and resulting massive impacts on fish and crop production system. The combined effcets of all these factors turn the Shymnagar extremely vulnerable to climate change hazards compared to any other areas of Bangladesh and selected for the project activities implementation (Table 1, Figs. 1-2). Several GOs - MoFL, MoEF, MoDMR and NGOs - BRAC, Prodipan, ASA, Proshika, Nijera Kari, Caritas, CSS, CARE, Progoti World Vision, HEED Bangladesh, Prodipon, Vost, ESDO etc. run different development, training and credit program in the two upazilas.

2. Vulnerability assessment methodology

A combination of qualitative and quantitative methods is used to assess the vulnerability on fisheries and aquaculture caused by climate change threats. Data and information collection was participatory where all concerned stakeholders were consulted and their views and opinions were taken in considerations. A physical visit was made in affected upazilas and local experts and stakeholders were consulted at community levels. Further, in-depth review of secondary documents published by FAO, UNDP, CDMP-II, IWM, DoE, DoF, BFRI, WorldFish, IPAC, IWCN, BCAS, BIDS, GIZ, etc was carried out. Particular attention was given to review the documents published by CDMP-II. Whenever necessary collected data and information were further cross-checked with officials from DoF, DoE, DAE, local leaders and NGO personnel working in target upazilas. Finally based on the data and information collected, climate exposure, sensitivity and potential adaptation capacity were determined.

2.1 Identification of threats

Three climate change threats identified for the for the north-eastern haor basin are flash flood, erratic rain and drought. From the haor basin, two upazilas are selected based on their comparatively higher vulnerability to the identified threats. In the southwestern coastal belt, identified seven climate threats are salinity, salinity intrusion, sea level rise, drought, erratic rain and storm surge. Five upazilas in coastal belt are selected for piloting based on their higher vulnerability than other upazilas in the area.

2.3 Assessing vulnerability of the pilot sites*

Vulnerability was assessed based on the three factors - climate exposure, sensitivity and potential adaptation capacity.

Exposure is determined on the basis of likelihood of a climate event in a given area multiplied by its extent of impact on that area (Table 2).

Sensitivity means the degrees of fishers/fish farmers are dependent on fisheries resources as major livelihood strategy and therefore susceptible to any change in the sector (Table 3).

Adaptive capacity is determined based on the poverty status, literacy, available/existing infrastructures in the form of community support, roads, educational institutes, medical facilities, GO and NGO assistance during emergencies, electricity coverage, drinking water facilities and presence of other amenities (Table 4).

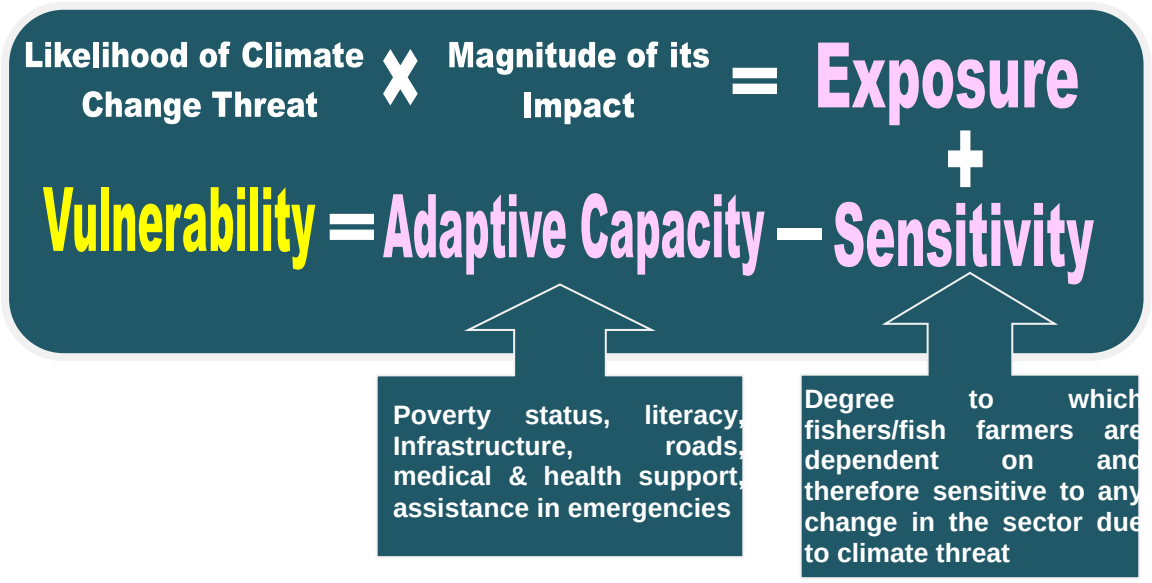


Figure 1: Vulnerability assessment based on exposure, sensitivity and adaptive capacity.

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* adapted from Cinner, J., McClanhan, T., Wamukota, A., Darling, E., Humphries, A., Hicks, C., Huchery, C., Marshall, N., Hempson, T., Graham, N., Bodin, O., Daw, T. and Allioson, E. 2013. Social-ecological vulnerability of coral reef fisheries to climatic shocks. FAO Fish. & Aquacult. Circular No. 1082. Rome, FAO. 63 p.

2.4 Quantifying the vulnerability assessment factors

Exposure (E): Likelihood of Climate Change Threat × Magnitude of the Impact.
25 is the maximum value for E

Likelihood of **Flush Flood** (*Number of times*): 5 = Very High (> 3 times/yr), 4 = High (3 times/yr), 3 = Moderately High (2 times/yr), 2 = Medium (1 time/year), 1 = Low (flush flood with no impact)

Magnitude of Impact of **Flush Flood** (*Duration of inundation*): 5 = Very High (>15 days or more), 4 = High (10-14 days), 3 = Moderately High (7-9 days, 2 = Medium (4-6 days), 1 = Low (2-3 days)

Likelihood of **Erratic Rain** (*Delayed monsoon, sudden downpour, drought spell during monsoon*): 5 = Very Frequent, 4 = Frequent, 3 = Occasional, 2 = Rare, 1 = Very Rare

Magnitude of Impact of **Erratic Rain** (*Duration of Event*): 5 = Very High (>15 days), 4 = High (10-14 days), 3 = Moderately High (7-9 days), 2 = Medium (4-6 days), 1 = Low (2-3 days)

Likelihood of **Drought** (*Average temperature, evaporation*): 5 = Very Severe, 4 = Severe, 3 = Moderate, 2 = Slight, 1 = No Drought

Magnitude of Impact of **Drought** (*Duration of Event*): 5 = Very High (>15 days), 4 = Moderately High (10-14 days), 3 = High (7-9 days), 2 = Medium (4-6 days), 1 = Low (2-3 days)

Likelihood of **Salinity** (*Highest, Lowest*): 5 = Very High (15 - 20 ppt), 4 = High (10-14 ppt), 3 = Moderately High (5-9 ppt), 2 = Medium (2-3 ppt), 1 = Low (1-2 ppt)

Magnitude of Impact of **Salinity** (*Duration of event*): 5 = Very High (5-6 months), 4 = High (3-4 months), 3 = Moderately High (1-2 months), 2 = Medium (< 1 month), 1 = Little (< 1 week)

Likelihood of **Salinity Intrusion** (*Soil and water salinization*): 5 = Extremely High, 4 = Very High, 3 = High, 2 = Medium, 1 = Little

Magnitude of impact of **Salinity Intrusion** (*% people affected*): 5 = >80%, 4 = 60-79%, 3 = 40-59%, 2 = 20-39%, 1 = <20%.

Likelihood of **Sea Level Rise**: 5 = Strongly Affected, 4 = Highly Affected, 3 = Affected

Magnitude of impact of **Sea Level Rise** (*% people affected*): 5 = >80%, 4 = 60-79%, 3 = 40-59%, 2 = 20-39%, 1 = <20%

Likelihood of **Temperature** (*Hottest, coolest*): 5 = >35°C, 4 = 30-34°C, 3 = <20°C, 2 = 20-24°C, 1 = slightly lower or higher than optimum temp. (25-29°C)

Magnitude of impact of **Temperature** (*Duration of spell*): 5 = Hot Spell (>10-15 days), 4 = Hot Spell (>5-9 days), 3 = Cold Spell (>10-15 days), 2 = Cold Spell (>5-9 days), 1 = slightly lower or higher than optimum temp. (5-15 days)

Likelihood of **Storm Surge** (*Dissipation probability*): 5 = Strongest, 4 = Strong, 3 = Moderate, 2 = Weak, 1 = Poor

Magnitude of Impact of **Storm Surge** (*% Area Affected*): 5 = >80%, 4 = 60-79%, 3 = 40-59%, 2 = 20-39%, 1 = <20%

Sensitivity (S): 25 = Very High (80% or above popln.), 20 = High (70-79% of popln.), 15 = Medium (50-69% of popln). 10 = Low (50% or less popln.). **25 is the maximum value for S**

Adaptive Capacity (AC): 50 = Excellent (popn. below lower poverty line 0%; infrastructure excellent); 30 = Very Good (popn. below lower poverty line 0%; infrastructure good); 20 = Good (popn. below lower poverty line $\leq$ 6%; infrastructure good); 10 = Moderate (popn. below lower poverty line 7-15%; infrastructure good); 5 = Poor (popn. below lower poverty line 16-24%; infrastructure good); 2 = Very Poor (popn. below lower poverty line 16-24%; infrastructure poor or popn. below lower poverty line 25-34%; infrastructure moderate); and 1 = Extremely Poor (popn. below lower poverty line 25-34%; infrastructure poorest).
50 is the maximum value for AC.

Table 1. Vulnerability assessment of North-eastern Haor basin and South-western Coastal area.

Area/ Threats	Exposure (E) to climate change threat	Sensitivity (S) (e.g. how many fishers and fish farmers are there)	Adaptive capacity (AC) (e.g. poverty status, literacy level, infrastructure, roads, government assistance, etc.	Vulnerability = (E + S) - AC
NE Haor basin				
South Sunamganj (*Dekhar haor and Shaghai haor*)				
Flash Flood	4 x 5 = 20	25	2	(20 + 25) - 2 = 43
Erratic Rain	4 x 4 = 16	25	2	(16 + 25) - 2 = 39
Drought	4 x 4 = 16	25	2	(16 + 25) - 2 = 39
			Mean Vulnerability = (43 + 39 +39) / 3 = **40.3**	
Jagannathpur (*Noluar haor and Pinglar haor*)				
Flash Flood	3 x 4 = 12	25	5	(12 + 25) - 5 = 32
Erratic Rain	4 x 4 = 16	25	5	(16 + 25) - 5 = 36
Drought	4 x 4 = 16	25	5	(16 + 25) - 5 = 36
			Mean Vulnerability = (32 + 36 + 36) /3 = **34.7**	

Juri (*Agdar Beel of Hakaluki haor*)				
Flash Flood	4 x 5 = 20	25	2	(20 + 25) - 2 = 43
Erratic Rain	4 x 5 = 20	25	2	(20 + 25) - 2 = 43
Drought	4 x 4 = 16	25	2	(16 + 25) - 2= 39
				Mean Vulnerability = (43 + 43 + 39) /3 = **41.7**
Nasirnagar (*Medir haor and Beel Chachua*)				
Flash Flood	4 x 4 = 16	25	5	(16 + 25) - 5 = 36
Erratic Rain	4 x 4 = 16	25	5	(16 + 25) - 5 = 36
Drought	4 x 4 = 16	25	5	(16 + 25) - 5 = 36
				Mean Vulnerability = (36 + 36 + 36) /3 = **36.0**

SW Coastal area				
Dumuria, Khulna				
Salinity	4 x 4 = 16	20	5	(16 + 15) - 5 = 26
Salinity Intrusion	4 x 4 = 16	20	5	(16 + 20) - 5 = 31
Sea Level Rise	4 x 3 = 12	20	5	(12 + 20) - 5 = 27
Temperature	5 x 3 = 15	20	5	(15 + 20) - 5 = 30
Erratic Rain	5 x 5 = 25	20	5	(25 + 20) - 5 = 40
Drought	4 x 4 = 16	20	5	(16 + 20) - 5 = 31
Storm Surge	3 x 4 = 12	20	5	(12 + 20) - 5 = 27
				Mean Vulnerability = (26 + 31 + 27 + 30 + 40 + 31 +27) / 7 = **30.3**
Dacope, Khulna				
Salinity	4 x 4 = 16	25	2	(16 + 25) - 2 = 39
Salinity Intrusion	4 x 3 = 12	25	2	(12 + 25) - 2 = 35
Sea Level Rise	5 x 3 = 15	25	2	(15 + 25) - 2 = 38
Temperature	5 x 3 = 15	25	2	(15 + 25) - 2 = 38
Erratic Rain	5 x 5 = 25	25	2	(25 + 25) - 2 = 48
Drought	4 x 4 = 16	25	2	(16 + 25) - 2 = 39
Storm Surge	4 x 4 = 16	25	2	(16 + 25) - 2 = 39
				Mean Vulnerability = (39 + 35 + 38 + 38 + 48 + 39 + 39) / 7 = **39.4**
Bagerhat Sadar, Bagerhat				
Salinity	4 x 4 = 16	20	2	(16 + 20) - 2 = 34
Salinity Intrusion	4 x 4 = 16	20	2	(16 + 20) - 2 = 34
Sea Level Rise	5 x 4 = 20	20	2	(20 + 20) - 2 = 38
Temperature	4 x 4 = 16	20	2	(16 + 20) - 2 = 34
Erratic Rain	5 x 5 = 25	20	2	(25 + 20) - 2 = 43
Drought	4 x 4 = 16	20	2	(16 + 20) - 2 = 34
Storm Surge	4 x 3 = 12	20	2	(12 + 20) - 2 = 31
				Mean Vulnerability = (34 + 34 + 38 + 34 + 43 + 34 + 31) / 7 =**35.4**
Kachua, Bagerhat				
Salinity	4 x 4 = 16	20	2	(16 + 20) - 2 = 34
Salinity Intrusion	4 x 4 = 16	20	2	(16 + 20) - 2 = 34
Sea Level Rise	5 x 4 = 20	20	2	(20 + 20) - 2 = 38
Temperature	4 x 4 = 16	20	2	(16 + 20) - 2 = 34
Erratic Rain	5 x 5 = 25	20	2	(25 + 20) - 2 = 43

Drought	4 x 4 = 16	20	2	(16 + 20) - 2 = 34
Storm Surge	4 x 4 = 16	20	2	(16 + 20) - 2 = 34
Mean Vulnerability = (34 + 34 + 38 + 38 + 43 + 34 + 34) / 7 = **36.4**				
Shyamnagar (Munshiganj), Satkhira				
Salinity	5 x 5 = 25	25	1	(25 + 25) - 1 = 49
Salinity Intrusion	5 x 5 = 25	25	1	(25 + 25) - 1 = 49
Sea Level Rise	5 x 5 = 25	25	1	(25 + 25) - 1 = 49
Temperature	5 x 5 = 25	25	1	(25 + 25) - 1 = 49
Erratic Rain	5 x 5 = 25	25	1	(25 + 25) - 1 = 49
Drought	4 x 4 = 16	25	1	(16 + 25) - 1 = 40
Storm Surge	5 x 5 = 25	25	1	(25 + 25) - 1 = 49
Mean Vulnerability = (49 + 49 + 49 + 49 + 49 + 40 + 49) / 7 = **47.7**				

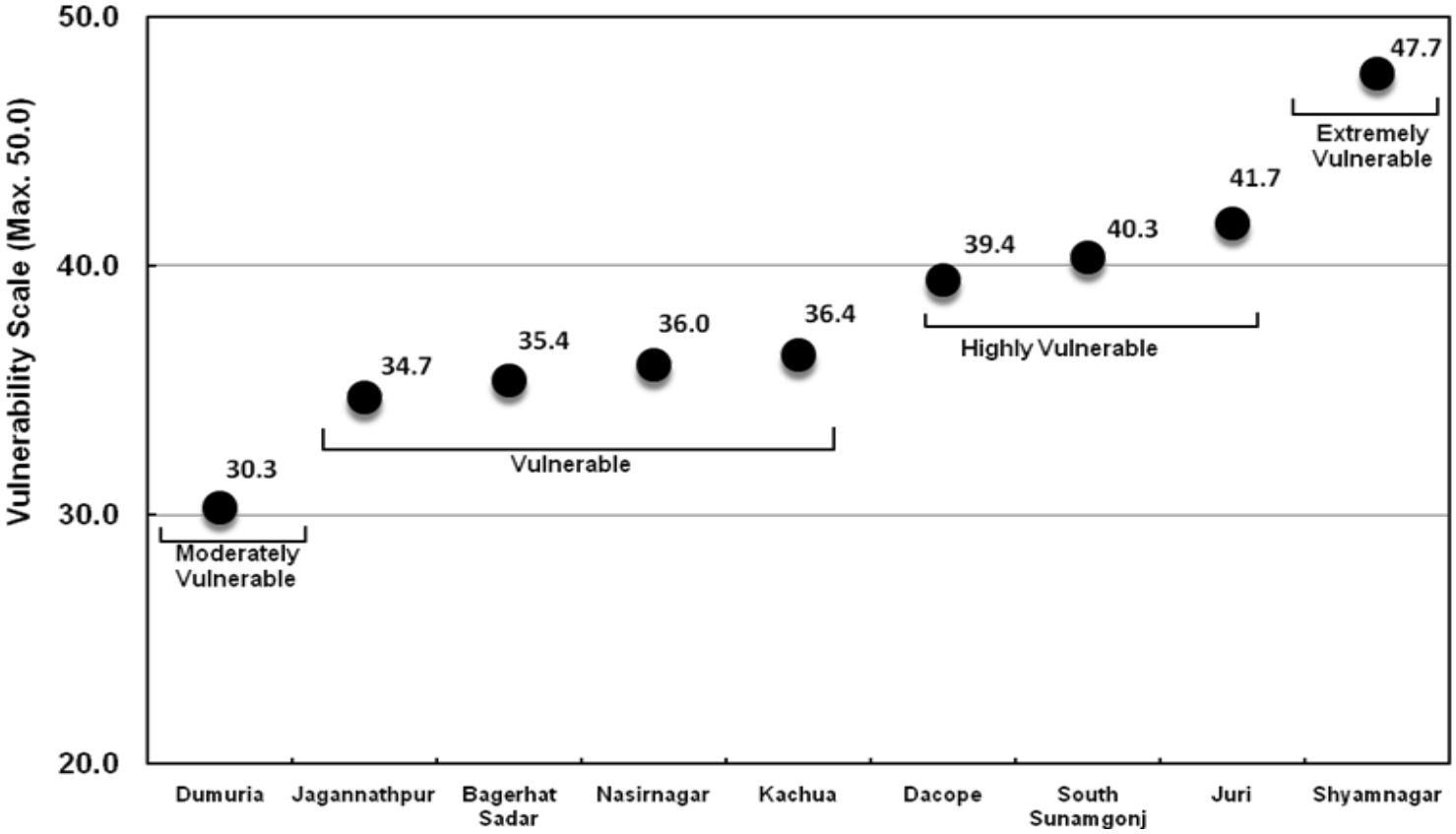

Figure 2. Comparative vulnerability indices of eight pilot upazilas based on exposure, sensitivity and adaptive capacity.

Appendix 8: Relevant sectoral policies, action plans and multilateral agreements

The Government of Bangladesh (GoB) has introduced multiple sectoral policies, strategies, action plans, guidelines and legislation relating to relevant/appropriate environment, climate change and disaster management, fisheries and aquaculture, water/land, agriculture, forestry/wildlife, and sustainable development are summarized below.

Environment

- National Environment Policy 1992 and Draft National Environment Policy, 2013
- National Environment Policy and Implementation Plan, 1992
- National Forestry Policy 1994
- Bangladesh Environment Conservation Act, 1995 (amendment 2000, 2002 & 2010)
- National Environment Management Action Plan (NEMAP), 1995
- Environment Conservation Rules (ECR), 1997
- Environment Court Act, 2000
- National Biodiversity Strategy and Action Plan, 2004
- National Adaptation Program of Action (NAPA) ,2005 and update in 2009
- National Biodiversity Framework, 2007
- Bangladesh Climate Change Strategy and Action Plan (BCCSAP), 2009
- Ecologically Critical Area (ECA) management Ordinance, 2010
- National 3 R (Reduce, Reuse, Recycle) Strategy, 2010
- Ship-breaking and Hazardous Waste Management Rules, 2010
- National Conservation Strategy 1998 and Draft Update 2013
- Amendment to the Bangladesh Environment Conservation Act. 2010
- Draft Roadmap for National Adaptation Plan (NAP) in Bangladesh
- National Disaster Management Plan
- Updated Standing Orders on Disasters
- National Water Management Plan
- Integrated Coastal Zone Management Plan, 2005
- Sector-wise EIA Guidelines
- Guidelines on Environmental Management, Waste Treatment and Workers' Occupational Health and Safety for Ship Breaking Yard in Bangladesh

Fisheries

- Tanks Improvement Act, 1939 (amended 1986)
- Protection and Conservation of Fish Act, 1950 (East Bengal Act 18 of 1950) and its subsequent amendments of 1963, 1970, 1982, 1985, 1987, 2003, 2005, 2006, 2007 and 2011
- Fish and Fish Products (inspection and quality control) Ordinance, 1983
- Marine Fisheries Ordinance, 1983
- Marine Fisheries Rules, 1983 and subsequent amendments of 1993, 2000, 2004, 2005, 2006, 2007 and 2010
- Fish and Fish Products (inspection and quality control) Rules, 1989
- National Fisheries Policy, 1998
- Draft National Wetlands Policy, 1998
- Draft Fisheries Monitoring & Evaluation Strategy, 2004
- National Fisheries Strategy and Action Plan for the Implementation of the national Fisheries Strategy, 2006
- Marine Fisheries Sector sub-strategy, 2006
- Bangladesh Marine Action Plan, 2006
- Fish Hatchery Act, 2010 (mainly to register fish/shrimp hatcheries and quality fish/shrimp seed production)
- Shrimp Hatchery Rules and Regulations, 2010

- Fish and Fisheries Product Acts, 2010
- Hatchery, Food and Feed Act, 2010
- Fish Hatchery Rules, 2011 (broader explanation of the Act, mainly to register fish/shrimp hatcheries and for quality fish/shrimp seed production including the inbreeding control)
- Draft Marine Fisheries Policy, 2014

Water/Land
- Embankment and Drainage Act, 1952
- Irrigation Water Rate Ordinance, 1983
- Water Supply and Sanitation Act, 1996
- National Policy for Safe Water Supply and Sanitation, 1998
- National Water Policy, 1999
- GoB Policy Note of ICZM issues February, 1999
- Water Reservoir Conservation Act (2000
- Water Conservation Act, 2000
- National Water Management Plan (NWMP), 2001 and its three phases: Short –term: 2000-2005; Mid-term: 2006-10; and Long-term: 2011-25.
- National Land Use Policy, 2001
- Coastal Zone Management: an analysis of different policy documents (PDO-ICZM), 2003
- National Water Management Plan, 2004
- Integrated Coastal Zone Policy and Strategy, 2005
- Integrated Coastal Resources Database, 2005
- Coastal Development Strategy, 2006
- National Coastal Zone Strategy, 2006
- Conservation Management Plan for Hakaluki Haor, 2006
- Public Water body Management Policy, 2009
- Haor Master Plan (2012)
- Bangladesh Water Act, 2013

Forest/Wildlife
- Forest Act, 1927 (Amendment 1990, 2000, 2012)
- Protection and Conservation of Fish Act, 1950
- Hunting Shooting and Fishing Rules, 1959
- Bangladesh Wildlife Preservation Order, 1973
- Bangladesh Wildlife (Preservation) (Amendment) Act, 1974
- Wildlife Conservation Act, 1973
- Wildlife (Preservation) Order, 1973
- Forestry Rules, 1979
- *Khal* closure Regulation, 1989
- Bangladesh Forestry Master Plan, 1994
- National Forestry Policy (1994–2015)
- National Policy for Conservation of Mangrove forests (habitats)
- Closed season Regulation, 2000
- Revised National Conservation Act, 2010
- Bangladesh Wildlife Conservation and Security Act, 2012
- Bangladesh Wildlife (Conservation and Security) Act, 2012

Agriculture
- Pesticide Ordinance, 1971
- Pesticides Law, 1985
- National Agriculture Policy, 1999

Others

- Poverty Reduction Strategy Paper-II 2009-11; Priority Investment Programme 2006
- Sixth Five Year Plan (2011-15)
- Perspective Plan of Bangladesh (2010-2021)
- Country Investment Plan (2011-2015)
- National Plan for Disaster Management (2010-2015)
- Disaster Management Act, 2012
- National Livestock Development Policy, 2007

Multilateral Environmental Agreements

Bangladesh is also a signatory to a number of multilateral environmental agreements, and those are important and relevant to the LDCF financed project, and with which the project will comply, are outlined below:

- Convention on Biological Diversity (CBD) signed in 1992 and ratified in 1994.
- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) signed in 1975 and ratified in 1982.
- Convention on the Conservation of Migratory Species of Wild Animals (CMS or the Bonn Convention) ratified in 2005.
- MoU signed in 2004 to conserve Marine Turtles in the Indian Ocean and South-East Asia.
- Convention on Wetlands of International Importance especially as Waterfowl Habitats, ratified in 1992.
- United Nations Convention to Combat Desertification (UNCCD) signed in 1994 and ratified in 1996.
- United Nations Framework Convention on Climate Change (UNFCC) signed in 1992 and ratified in 1994.
- Convention on the Elimination of Discrimination against Women (CEDAW) acceded to in 1984 and the Optional Protocol on CEDAW was subsequently ratified in 2000.

Appendix 9: Beneficiary selection criteria

Each of the common interest groups (CIGs) or CBOs or occupational groups (OGs) would be of 25 members and may comprise of men only, women only or mixed. The CIGs/CBOs/OGs (beneficiaries) will be selected and formed by the Upazila team and will be duly endorsed by the Upazila Coordination Committee (UCC)[49]. The beneficiaries will be selected using a set of criteria focusing on farmers' needs, farming systems practiced, economic and social status of farmers, educational status, abilities to learn and understand better management practices and willingness to work as a member of a team/cluster. Each targeted HH will be intervened with training/input supports for only one adaptive option by the project. In a village or community, beneficiaries will be selected during the first phase of the project. Overall there will be 40% women among the beneficiaries. The criteria will also ensure that gender and child labor issues are addressed in the selection of beneficiaries. Beneficiaries are expected to follow technical and other instructions by the project. Beneficiaries must be willing to contribute/participate in the project interventions. One person from a HH will be taken as CBO/CIG/OG members, HHs having pregnant or lactating mother (not limited to) should get priority. In case of capacity building training both husband and wife of the targeted HH will be included. One CIG/CBO member can get involved in only one adaptive option of the project, except for Fish Sanctuary + habitat restoration and Openwater fish stocking and Beel nursery management. One village should not have two adaptation piloting. Beneficiaries are expected to follow technical and other instructions of the project.

Table 1: The beneficiaries – definition and selection criteria.

Piloting Activity	Nos. of groups	Possible areas	Remarks
Cage fish culture	5	Kachua, Shyamnagar, South Sunamganj, Jagannathpur, Nasirnagar	Depth flexible *Cage* (depth flexible) *fish culture* (with salinity tolerant seabass, mugil, mullets, nona-tengra, etc. or with mono-sex tilapia and major carps) at best stocking density, combination and ratio and management regimes. This can be tried both by the fishers of openwater capture fishery and the shrimp/prawn/white fish aquaculturists. BFRI and some private entrepreneurs (viz. the Dakatia river cage culture, Chandpur and the Meghna/ Dhawleshwari river cage culture in Araihazar, Narayanganj and in hilly creeks of Rangamati), are successfully doing cage cultures. Best practices from there can easily be piloted during May-November period.
Pen fish culture	6	Dumuria-Dacope (1), Bagerhat sadar-Kachua (1), Shyamnagar, South Sunamganj, Jagannathpur and Nasirnagar	*Pen fish culture* (with salinity tolerant seabass, mugil, mullets, nona-tengra, etc. in the SW or major carps and SISs in the NE; at best stocking density, combination and ratio and management regimes) in sheltered river, khal, oxbow. This can be tried both by the fishers of openwater capture fishery and the shrimp/prawn/white fish aquaculturists. BFRI and some private entrepreneurs have successfully demonstrated pen culture in borrow pits in Chandpur Irrigation Project and in hilly creeks of Rangamati; BFRI have got the tested technology.
Kua fish culture	5	South Sunamganj (2), Jagannathpur (2) and Nasirnagar (1)	*Kua fish culture* (with major carps and SISs at best stocking density, combination and ratio and management regimes) in selected haors/beels. This can be tried both by the fishers of openwater capture fishery and the shrimp/prawn/white fish aquaculturists. Kua fish culture is traditionally practiced in haor regions, needs little improvement. Best practices and lesson learned from there can easily be piloted in the flooded haors during May-November

[49] UCC will be detailed in the TAPP (Technical Assistance Project Proposal).

			period.
Pond fish culture	8	Dumuria, Dacope, Bagerhat sadar, Kachua, Shyamnagar, South Sunamganj, Jagannathpur and Nasirnagar	*Polyculture of white fish* in depth flexible ponds (best stocking density, combination and ratio and management regimes) by small-scale fish farmers having suitable water areas. Collaboration to be done with other agencies (base line co-funding) for excavation[50] to maintain needed water depth. If not possible, community would provide labor for small-scale excavation but cost of subsistence food to be borne by the project.
Bagda SI culture	6	Dacope (2), Bagerhat Sadar, Kachua & Shyamnagar (2)	*Bagda* monoculture (semi-intensive) 2 crops/yr, and *mud crab fattening* (best stocking density and management regime) in separate ponds within the bagda gher/ cages/ plastic pots or in sheltered areas of rivers/khals (15-20 days cycle for each crop) in suitable high saline regime areas. This can be tried both by the fishers of openwater capture fishery and the shrimp/ prawn/ white fish aquaculturists. Collaboration to be done with other agencies (base line co-funding) for excavation to maintain needed water depth. If not possible, community would provide labor for small-scale excavation but cost of subsistence food to be borne by the project.
			In some cases mixed SI culture of *bagda-golda-tilapia-pangas* would be tried in the same *gher* in areas.
			In other cases alternate *bagda-golda-tilapia, mugils, seabass, nona-tengra, pershe, etc.** SI culture (high salinity time, winter) and *Integrated* (slat tolerant or Locally Improved Variety or as per DAE) *and concurrent paddy-cum-FW prawn+ white fish* farming (in monsoon FW time) would be tried in the same *gher*.
Bagda+Rice-Fish culture	5	Dacope, Bagerhat sadar, Kachua & Shyamnagar (2),	Alternate *bagda-golda-tilapia, mugils, seabass, nona-tengra, pershe, etc.* Semi-intensive (SI) monoculture (high salinity time, winter) and *Integrated* (slat tolerant or Locally Improved Variety or as per DAE) *and concurrent paddy-cum-FW prawn+ white fish* farming (in monsoon FW time) in the same *gher*. Collaboration to be done with other agencies (base line co-funding) for excavation to maintain needed water depth. If not possible, community would provide labor for small-scale excavation but cost of subsistence food to be borne by the project.
Golda+ Rice Fish culture	6	Dumuria, Bagerhat Sadar, Kachua, South Sunamganj, Jagannathpur & Nasirnagar	Alternate rice in winter and Integrated and concurrent integrated paddy-cum-FW prawn+ white fish farming (in monsoon) in the same field. Collaboration to be done with other agencies (base line co-funding) for excavation to maintain needed water depth. If not possible, community would provide labor for small-scale excavation but cost of subsistence food to be borne by the project.
Mud crab fattening alone	2	Dacope, Shyamnagar	Mangrove crabs fetch a good price per kilo, and a strong export market exists. It can be done profitably with small amounts of space and also has the potential to work well for women. At present mud crabs are collected directly from Sundarbans and shrimp farms, and there is huge demand for crablets to stock crab fattening farms. The dependence on collection of larvae from the wild is, however, unsustainable. Hatchery establishment is essential. Collaboration to be done with other agencies (base line co-funding) for excavation to maintain needed water depth. If not possible, community would provide labor for small-scale

[50] In every case efforts will be given to implement the envisioned activities where earth works (pond, gher, canal dikes) are done by other baseline projects. If the earth works are lacking and there remain risks of flooding or erosion then minor earth works would be done by the CBOs/OGs. In this case subsistence for food for the CBOs/OGs would be needed from the project budget.

			excavation but cost of subsistence food to be borne by the project. In some cases concurrent *mud crab fattening* with *mugils, seabass, nona-tengra, pershe, etc.* (high salinity time, winter) and alternate mixed culture of *tilapia, pangas, mugils, seabass, nona-tengra, pershe* (in monsoon) in the same *gher* for increasing farm income.
Fish Sanctuary Habitat restoration	6 Same 6 groups	Bagerhat sadar - Kachua (1). Shyamnagar (1), South Sunamganj (1), Jagannathpur (1), Nasirnagar (1) & Agdar beel of Hakaluki haor (DoE managed fish sanctuary), Juri,	Establishment of Fish sanctuary and habitat restoration with macrophyte plantation. Collaboration to be done with other agencies (base line co-funding) for excavation to maintain needed water depth, linking river and khals for enhancing water exchange facilities and for reestablishment/ reopening of fish migration and dispersal routes so far lost/degraded. If not possible, community would provide labor for small-scale excavation but cost of subsistence food to be borne by the project. Collaboration will be developed with IFADs CALIP/HILIP project (base line co-funding) for excavation of haor linking river and khal (important/ dead sections) in the NE for reestablishment/ reopening of fish migration and dispersal routes so far lost/ degraded. Similar collaboration in the SW will be sought. Reopening of fish migration and dispersal routes would augment fish yield in the haors.
Openwater fish stocking Beel nursery management	6 Same 6 groups	Bagerhat sadar - Kachua (1). Shyamnagar (1), South Sunamganj (1), Jagannathpur (1), Nasirnagar (1) & Agdar beel of Hakaluki haor (DoE managed fish sanctuary), Juri,	Openwater fish stocking of small indigenous species (SIS) would be done through beel nursery management in those fish sanctuaries to improve the depleted fish stocks, as SIS would establish and breed in the next year. Openwater supplemental stocking of small indigenous species – SIS (e.g. shar punti – *Puntius sarana*, Bata – *Labeo bata*, Ghonia – *L. gonia*, Meni – *Nandus nandus*, Foli – *Notopterus notopterus*, Chirka baim – *Mastacembelas armatus*, koi – *Anabas testudineus*, magur – *Clarias batrachus*, Shing – *Heteropneustes fossilis*, snakeheads, etc.) along with major carps (rohu, katla, mrigel, kalibaush, etc.) through *beel nursery management system* could be piloted for rejuvenation of the depleted mother fish stocks. For this purpose 1-2 Fish Seed Multiplication Farms (FSMFs) of the DoF in the NE and the SW would be selected, minor renovation completed, functioning condition improved, broods of shar puti, bata, ghonia, nandus, koi, shing, magur and mono-sex tilapia will be procured from the nearby areas, artificial breeding done there and fingerlings produced, transported in small trucks with steel tanks and aeration, stocked in the selected areas. Modalities and details will be elaborated later. Broods of other native SIS and larger species (Kholisha, Taki, Shoil, Gozar, Baila, Tengara, Aeir, Chital, etc.) will be procured live and stocked live in the selected areas just before 1st onset of monsoon, so that those can breed in the openwater. This would ensure quality fish seed both for aquaculture and openwater stocking. These NIS/SIS would act as mother stock and breed in the next year and help rejuvenating the depleted stocks.
Improve hatchery & Brood Banking	4	Dumuria-Dacope (1), Bagerhat-Kachua-Shyamnagar (1), South Sunamganj-Jagannathpur (1) & Nasirnagar (1)	Establishment of fish brood bank of major carps, golda, mono-sex tilapia, nona-tengra, pershe in suitable public/ private hatcheries for supporting enhanced aquaculture production. For this purpose minor renovation, functioning condition need to be improved, broods of major carps, golda, mono-sex tilapia, nona-tengra, pershe, and if possible, shar puti, bata, ghonia, nandus, koi, shing, magur and mono-sex tilapia will be procured from the nearby FSMSs, artificial breeding done there and fingerlings produced, transported in small trucks with steel tanks and aeration, stocked in the fish sanctuaries. Modalities and details will be elaborated later on. Broods of other native SIS and larger species (Kholisha, Taki, Shoil, Gozar, Baila, Tengara, Aeir, Chital, etc.) will be procured live and stocked live in the selected sanctuaries just before 1st

			onset of monsoon, so that those can breed in the sanctuary. This would ensure quality fish seed both for aquaculture and openwater stocking. These NIS/SIS would act as mother stock and breed in the next year and help rejuvenating the hoars.
Duck rearing	3	South Sunamgonj, Jagannathpur & Nasirnagar	To further increase the adaptive capacity of the said communities at intervention sites, additional livelihoods– including duck rearing or Nets and traps making will be developed and demonstrated. Through these diversified approaches dependency of the communities on fisheries and aquaculture will be reduced, thereby promoting conservation of the fishery ecosystems. These additional livelihood options were identified during the PPG phase through workshops and consultations with a wide range of national and local government officials and the community. *Nets, Traps making or Duckery* (as alternative and diversified livelihood options) in sheltered river, khal, oxbow. *Nets, Traps making or Duckery* (with local DLS assistance) would be tried only in cases where cage/Pen fish culture seems difficult. This can be tried both by the fishers of openwater capture fishery and the prawn/white fish aquaculturists.
Net, trap making	8	Dumuria (1),Dacope (1), Bagerhat Sadar (1), Kachua (1), Shyamnagar (1), South Sunamgonj (1), Jagannathpur (1) & Nasirnagar (1)	
Technical support for feasibility study for a mud crab (*Scylla serrata*) hatchery establishment.		Munshiganj area of Shyamnagar Upazila.	Provide technical/technological support (field a short term Inter. Consultant) to BFRI or FD project supported by GiZ or WorldFish/CREL Project for feasibility study, designing and producing an operational manual for a mud crab (*Scylla serrata*) hatchery establishment.
Technical support for proper functioning of all existing govt. and private Golda hatcheries and make them fully operational and efficient.		Khulna-Bagerhat-Satkhira area	Provide technical support (field a short term Inter. Consultant) for proper functioning of all existing govt. and private Golda hatcheries in the SW to make them fully operational and efficient. This would meet the demand of golda juveniles and boost golda production in the area.
Organize fish/prawn seed dealer, establishment of fish/prawn seed market and ensure testing of PLs through PCR to get WSSV-free PLs.		Dumuria, Dacope, Bagerhat, Kachua and Shyamnagar are	Organize/ mobilize authorized prawn/shrimp PL and fish fry/fingerling dealer, and establishment of PL/fingerling markets in Bagerhat and Dacope and ensure testing of PLs through PCR to get WSSV-free PLs.

Community/Occupational Groups' criteria:

A total of **70** communities/Occupational Groups (OCs/CBOs) proposed initially. All communities (OGs/CBOs) will be involved in all activities relating to achieving out puts of Components 1, 2, 3 and 4.

Each occupational group (based on the adaptive options that the project implements) under each upazila is considered as a community.

40% of the member of the communities will be **women**; some groups will be composed of by women only.

Each community will have **25** members.

Each of the Field Facilitator in the SW will be responsible for **8-10** community groups in an upazila, while in the NE each. Field Facilitator will be responsible for **8-9** community groups in each upazila.\

Appendix 10: GEF Climate Change Adaptation (CCA) Tracking Tool

Please refer to the separate excel file.

Appendix 11a: Project Environmental and Social (E&S) Screening Checklist

Would the project, if implemented?	N/A	No	Yes	Un-known
I. FAO VISION/STRATEGIC OBJECTIVES				
Be in line with FAO's vision?			X	
Be supportive of FAO's strategic objectives?			X	
II. FAO KEY PRINCIPLES FOR SUSTAINABILITY IN FOOD AND AGRICULTURE				
Improve efficiency in the use of resources?			X	
Conserve, protect and enhance natural resources?			X	
Protect and improve rural livelihoods and social well-being?			X	
Enhance resilience of people, communities and ecosystems?			X	
Include responsible and effective governance mechanisms?			X	
ESS 1 NATURAL RESOURCES MANAGEMENT				
❖ **Management of water resources and small dams**				
Include an irrigation scheme that is more than 20 hectares or withdraws more than 1000 m3/day of water?		X		
Include an irrigation scheme that is more than 100 hectares or withdraws more than 5000 m3/day of water?		X		
Include an existing irrigation scheme?		X		
Include an area known or expected to have water quality problems?				X
Include usage of non-conventional sources of water (i.e. wastewater)?		X		
Include a dam that is more than 5 m. in height?		X		
Include a dam that is more than 15 m. in height?		X		
Include measures that build resilience to climate change?			X	
❖ **Tenure**				
Negatively affect the legitimate tenure rights of individuals, communities or others[51]?		X		
ESS 2 BIODIVERSITY, ECOSYSTEMS AND NATURAL HABITATS				
Make reasonable and feasible effort to avoid practices that could have a negative impact on biodiversity, including agricultural biodiversity and genetic resources?			X	
Have biosafety provisions in place?			X	
Respect access and benefit-sharing measures in force?			X	
Safeguard the relationships between biological and cultural diversity?			X	
❖ **Protected areas, buffer zones and natural habitats**				

[51] In accordance with Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests in the Context of National Food Security (VGGT) http://www.fao.org/docrep/016/i2801e/i2801e.pdf

Located such that it poses no risk or impact to protected areas, critical habitats and ecosystem functions?			X	
ESS 3 PLANT GENETIC RESOURCES FOR FOOD AND AGRICULTURE				
❖ **Planted forests**				
Have a credible forest certification scheme, national forest programmes or equivalent or use the Voluntary Guidelines on Planted Forests (or an equivalent for indigenous forests)?	X			
ESS 4 ANIMAL - LIVESTOCK AND AQUATIC- GENETIC RESOURCES FOR FOOD AND AGRICULTURE				
❖ **Aquatic genetic resources**				
Adhere (Aligned) to the FAO Code of Conduct for Responsible Fisheries (CCRF) and its related negotiated instruments?			X	
Aligned, where applicable, with FAO's strategic policies established in the FAO Technical Guidelines for Responsible Fisheries (including aquaculture)?			X	
❖ **Livestock genetic resources**				
Aligned with the Livestock Sector Strategy including the animal disease, public health and land degradation provisions?			**X**	
ESS 5 PEST AND PESTICIDES MANAGEMENT				
Involve the procurement or provision of pesticides?		X		
Result in increased use of pesticides through expansion or intensification of production systems?		X		
Require the disposal of pesticides or pesticide contaminated materials?		X		
ESS 6 INVOLUNTARY RESETTLEMENT AND DISPLACEMENT				
Avoid the physical and economic displacement of people?			X	
ESS 7 DECENT WORK				
Adhere to FAO's guidance on decent rural employment, promoting more and better employment opportunities and working conditions in rural areas and avoiding practices that could increase workers' vulnerability?			X	
Respect the fundamental principles and rights at work and support the effective implementation of other international labour standards, in particular those that are relevant to the agri-food sector?			X	
ESS 8 GENDER EQUALITY				
Have the needs, priorities and constraints of both women and men been taken into consideration?			X	
Does the intervention promote women's and men's equitable access to and control over productive resources and services?			X	
Does the intervention foster their equal participation in institutions and decision-making processes?			X	
ESS 9 INDIGENOUS PEOPLES AND CULTURAL HERITAGE				
Are there any indigenous communities in the project area?		X		
Are project activities likely to have adverse effects on indigenous peoples' rights, lands, natural resources, territories, livelihoods, knowledge, social fabric, traditions, governance systems, and culture or heritage (tangible and intangible)?		X		
Are indigenous communities outside the project area likely to be affected by the project?		X		
Designed to be sensitive to cultural heritage issues?			X	

Appendix 11b: E&S Risk Classification Certification Form

After completing the E&S screening checklist, the LTO completes and certifies this certification form.

Project symbol: GCP/BGD/055/LDF

Project Title: Community-Based Climate Resilient Fisheries and Aquaculture development in Bangladesh

A. RISK CLASSIFICATION

[X] Low [ ] Moderate [ ] High

1. Record key risk impacts from the E&S Screening Checklist
   A. Minimal risks of impacts on water quality and modification of habitats (e.g. mangroves)
   B. _____
   C. _____
   D. _____

2. Has the project site and surrounding area been visited by the compiler of this form?

   [X] Yes [ ] No

B. STAKEHOLDER CONSULTATION/ ENGAGEMENT

Identification of stakeholder(s)	Date	Participants	Location
Multiple meetings in the preparation of the project	Between July 2014 and June 2015	More than 100 consulted	Khulna, Sylhet, Central Dhaka

1. Summarize key risks and impacts identified from the stakeholder engagement
   A. Minimal risks of impacts on water quality and modification of habitats (e.g. mangroves) but overall the project should improve local environmental management of natural resources.
   B. _____
   C. _____
   D. _____

2. Have any of the stakeholders raised concerns about the project?
   Local NGO indicated concerns about modification of natural habitats but these will be minimize through project activities and furthermore the environmental conditions should be improved.

The LTO confirms the information above

Date_____

Signature_____