

CLIMATE INVESTMENT FUNDS

PPCR/SC.7/5
October 25, 2010

Meeting of the PPCR Sub-Committee
Washington, D.C.
November 10, 2010

STRATEGIC PROGRAM FOR CLIMATE RESILIENCE
BANGLADESH

Proposed Decision by PPCR Sub-Committee

The PPCR Sub-Committee reviewed document PPCR/SC.7/5, *Strategic Program for Climate Resilience: Bangladesh*, endorses and agrees to the further development of activities foreseen in it. The Trust Fund Committee agrees to an envelope of up to \$50million in grant resources and \$60million in concessional loans in PPCR funding to finance the Program.



Bangladesh: Strategic Program for Climate Resilience (SPCR)

**Prepared for the
Pilot Program for Climate Resilience (PPCR)**

September 29, 2010

Dhaka, Bangladesh

ABBREVIATIONS AND ACRONYMS

| | |
|---------|--|
| BCCSAP | Bangladesh Climate Change Strategy and Action Plan |
| BRI | Bangladesh Rice Research Institute |
| BWDB | Bangladesh Water Development Board |
| CEGIS | Center for Environment and Geographic Information Services |
| CCTF | Climate Change Trust Fund |
| CSOs | Civil Society Organization |
| CBOs | Community Based Organization |
| CPS | Country Partnership Strategies |
| DPs | Development Partners |
| DCC | Department of Climate Change |
| ERD | Economic Relation Division |
| EOI | Expression of Interest |
| FFWC | Flood Forecasting and Warning Centre |
| GED | General Economic Division |
| GOB | Government of Bangladesh |
| HFA | Hyogo Framework for Action |
| INC | Initial National Communication |
| JDCF | Japan Dept Cancellation Fund |
| LGED | Local Government Engineering Department |
| MOEF | Ministry of Environment and Forests |
| MOA | Ministry of Agriculture |
| MF&DM | Ministry of Food and Disaster Management |
| MOWR | Ministry of Water Resources |
| MLGRD&C | Ministry of Local Government, Rural Development and Cooperatives |
| MSW | Ministry of Social Welfare |
| MH&FW | Ministry of Health and Family Welfare |
| MOF | Ministry of Finance |
| NAPA | National Adaptation Program of Action |
| NCSA | National Capacity Self-Assessment |
| NWP | National Water Policy |
| NWNP | National Water Management Plan |
| NDMC | National Disaster Management Council |
| PRSP | Poverty Reduction Strategy Paper |
| PPCR | Pilot Program Climate for Climate Resilience |
| SPCR | Strategic Program for Climate Resilience |
| TOR | Terms of Reference |
| UNFCCC | United Nations Framework Convention on Climate Change |

| Summary – Strategic Program for Climate Resilience | | |
|--|---|--|
| 1. Country/Region: | Bangladesh/South Asia | |
| 2. SPCR Funding Request: | <i>Grant: US\$50.0 million</i> | <i>Concessional Loan: US\$60million</i> |
| 3. National Focal Point: | <i>Economic Relations Division, Ministry of Finance</i> | |
| 4. National Implementing Agency (SPCR coordination) | <i>Ministry of Environment and Forests</i> | |
| 5. Multilateral Development Banks/focal points: | <i>MDB HQ focal point: ADB: Jiangfeng Zhang IFC: Mrinal Kanti Sircar World Bank: Maria Sarraf</i> | <i>MDB country focal point: ADB: Same IFC: Same World Bank: Sayeeda Tauhid</i> |
| 6. SPCR Description: | | |
| <p>(i) Key development challenges (vulnerability) related to climate change/variability:</p> <ul style="list-style-type: none"> For Bangladesh, damaging effects of climate change include floods, salinity intrusion and droughts, which are translating into increased submergence of arable agricultural lands and residential areas, drainage congestion, river bank erosion, saline water intrusion into surface ground water aquifers limiting access to fresh water for drinking, household use and for irrigation and fishery, increased intensity and frequency of cyclonic events and storm surges particularly in the coastal zone where PPCR interventions will be focused. <p>(ii) Areas of intervention – sectors and themes</p> <ul style="list-style-type: none"> <u>Investment Project 1</u>: Promoting Climate Resilient Agriculture and Food Security <u>Investment Project 2</u>: Coastal Embankments Improvement and Afforestation <u>Investment Project 3</u>: Coastal Climate Resilient Water Supply, Sanitation, and Infrastructure Improvement <u>Technical Assistance 1</u>: Climate Change Capacity Building and Knowledge Management <u>Technical Assistance 2</u>: Feasibility Study for a Pilot Program of Climate Resilient Housing in the Coastal Region <p>(iii) Expected Outcomes from SPCR</p> <ul style="list-style-type: none"> Increased resilience of coastal infrastructure (housing, connectivity, flood control and improved drainage systems within polders, improved water supply and sanitation) for withstanding effects of climate induced seasonal and natural disasters. Reduced water and soil salinity and improvements in agricultural and fisheries production Improved capacity of Ministry of Environment and Forests (MOEF) to manage and coordinate investments in and knowledge on climate resilient initiatives | | |
| Key SPCR Results and Indicators of Success (consistent with PPCR Results Framework): | | |
| Investment Project 1: Promoting Climate Resilient Agriculture and Food Security Key Result: Agricultural products and practices that are adapted to the changing agro climatic conditions of the coastal zones ensuring food security and livelihoods for the most vulnerable | <ul style="list-style-type: none"> - Number of farmers adopting stress tolerant and adaptive varieties - Acreage of cropped land under adaptive varieties - Number of farmers adopting adaptive water management techniques - Accessibility to irrigable water - Percentage reduction in crop loss - Percentage increase in crop yields - Percentage increase in farmers' income | |

| | |
|--|--|
| <p>Investment Project 2: Coastal Embankments Improvement and Afforestation <u>Key Result:</u> Strengthened coastal embankments to withstand daily, seasonal and erratic climate induced disasters including floods and cyclonic storms</p> | <ul style="list-style-type: none"> - Length of rehabilitated embankments that can withstand daily and seasonal severe climate induced events including cyclonic storms - Total acreage of arable lands available for year round planting - Acreage of established green belts on embankments foreshores to enhance potential of embankments to withstand tidal surges and strong winds |
| <p>Investment Project 3: Coastal Climate Resilient Water Supply, Sanitation, and Infrastructure Improvement <u>Key Results:</u> Improved water supply, sanitation and connectivity</p> <ul style="list-style-type: none"> - improved water supply and sanitation systems that are resilient to climate change impacts - Reduced poverty and raise incomes in the coastal districts by sustained year round access to social services through construction and rehabilitation of all weather access roads that can withstand severe flooding | <ul style="list-style-type: none"> - Number of people with secured and sustained access to safe drinking water all year round particularly during the periods immediately following disasters - Number of water management cooperative associations (WMCA) with at least 30% women membership - Number of WMCAs that are strengthened to undertake annual maintenance activities - Improved 400 km of roads and 1,500 m of bridge/culverts - 20 growth centers/markets improved and climate-proof with 15% space allocation for women |
| <p>Technical Assistance 1: Climate Change Capacity Building and Knowledge Management</p> | <p>Viable MOEF equipped with the requisite human resources and technology for managing and coordinating investments in and knowledge on climate resilient initiatives</p> |
| <p>Technical Assistance 2: Feasibility Study for a Pilot Program of Climate Resilient Housing in the Coastal Region</p> | <p>Requisite information base for making investment decisions on low cost, storm and cyclone proof individual housing for coastal population and their livestock that are economically, environmentally and socially</p> |

7. Project concepts proposed under the SPCR :

| Project Concept Title | MDB | Requested PPCR Amount (\$'million) | Financing Modality | Expected Co-Financing (\$'million) | Source(s) of co-financing | MDB Fee (\$'000) | Total (\$'million) |
|---|-----|------------------------------------|--------------------|------------------------------------|---------------------------|------------------|--------------------|
| Investment Project 1: Promoting Climate Resilient Agriculture and Food Security | IFC | 13.1 | Grant and Loan | TBD | TBD | 262,000 | 13.362 |
| Investment Project 2: Coastal Embankments Improvement and Afforestation | WB | 25 | Grant | 300 | IDA | 436,000 | 325.436 |
| Investment Project 3: Coastal Climate Resilient Water Supply, Sanitation, and Infrastructure Improvement | ADB | 71 | Grant and Loan | 215 | ADF | 436,000 | 286.436 |
| Technical Assistance 1: Climate Change Capacity Building and Knowledge Management | ADB | 0.5 | Grant | TBD | TBD | 50,000 | 0.55 |

| | | | | | | | |
|---|-----|-----|-------|-----|-----|--------|------|
| Technical Assistance 2: Feasibility Study for a Pilot Program of Climate Resilient Housing in the Coastal Region | IFC | 0.4 | Grant | TBD | TBD | 50,000 | 0.45 |
| 8. Timeframe (tentative) – Approval ¹ milestones Project 1: FY12 Project 2: FY13 Project 3: FY13 | | | | | | | |
| 9. Other Partners involved in SPCR ² : CIDA, DFID, JICA, UNDP participated in the two joint missions | | | | | | | |
| 10. Key national stakeholder Groups involved in SPCR design: <ul style="list-style-type: none"> ➤ Bangladesh Water Development Board under the Ministry of Water Resources ➤ Department of Agriculture Extension and Bangladesh Rice Research Institute under the Ministry of Agriculture ➤ Disaster Management Bureau under the Ministry of Food and Disaster Management ➤ Local Government Engineering Department, and Department of Public Health Engineering under the Ministry of Local Government Rural Development and Cooperatives ➤ Ministry of Social Welfare ➤ Department of Forests under the MOEF ➤ Ministry of Health and Family Welfare | | | | | | | |

¹ Expected Date of Signature of Loan/Grant Agreement between country government and MDB

² Other national and international partners involved in design and implementation of SPCR

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PART 1

INTRODUCTION AND BACKGROUND

1. The geographic location and geo-morphological conditions of Bangladesh have made the country one of the most vulnerable ones to climate change, particularly to Sea Level Rise. Bangladesh is situated at the interface of two different environments, with the Bay of Bengal to the south and the Himalayas to the north. This peculiar geography of Bangladesh causes not only life-giving monsoons but also catastrophic ravages of natural disasters, to which now are added climate change and SLR. As a result disasters - floods, torrential rains, erosion, and severe cyclonic storms and tidal surges – have claimed lives, caused severe damage to infrastructure and other economic assets with adverse effects on livelihoods. Climate change is expected to exacerbate the intensity and frequency of these natural hazards. Current global climate models predict upward trends in mean temperatures, warmer winters, precipitation during monsoon months and drier months, and frequency and intensity of tropical cyclones. For a country like Bangladesh, effects of climate change could reverse any progress in tackling extreme, plunging the most vulnerable in the communities –women, children and the disabled into deeper poverty.

2. The Pilot Program for Climate Resilience (PPCR) of the Strategic Climate Funds (SCF) established under the Multi-donor Climate Investment Fund (CIF) aims to help countries transform to a climate resilient development path, consistent with poverty reduction and sustainable development goals. The PPCR will complement, yet go beyond, currently available adaptation financing in providing finance for *programmatic* approaches to upstream climate resilience in development planning, core development policies, and strategies. In this context, it is important to note that the PPCR is designed to catalyze a transformational shift from the “business as usual” sector-by-sector and project-by-project approaches to climate resilience. PPCR will promote a participatory approach towards development of a broad-based strategy to achieving climate resilience at the national level in the medium and long-term.

3. Given Bangladesh’s vulnerability to climate change, its protracted experience in dealing with natural disasters, its commitment to mainstream climate change in development policies and planning, the country was nominated to participate in the Pilot Program for Climate Resilience (PPCR) by the PPCR Expert Group in January 2009. GOB submitted an Expression of Interest (EOI) in March 2009 to participate in the PPCR. Other pilot countries in the PPCR include Bolivia, Cambodia, Mozambique, Nepal, Niger, Tajikistan, Yemen and Zambia. Two regional programs - Caribbean and the South Pacific - were also included as regional pilots.

4. As a pilot country, Bangladesh is eligible to receive financial and technical assistance to support efforts for building climate resilience. PPCR also provides the added value of assisting the Government to manage its climate change adaptation resources efficiently and comprehensively avoiding duplication and enabling a platform for leveraging support from both local and international development partners including the private sector. The pilot program adopts a consultative process that involves all relevant stakeholders and facilitates the environment for MDBs – ADB, IFC and World Bank to jointly work together in close collaboration with the Government both in designing and implementing interventions. Cumulatively, the PPCR will contribute to fostering sustainable outcomes from poverty reduction interventions in the medium to long term.

5. In its EOI, Bangladesh requested the pilot to focus on the following five key sectors: agriculture and food security, extreme climate events and climate induced disaster, water resources, and public health, migration and social protection to pilot adaptation and to demonstrate ways to mainstream climate vulnerability and resilience into national policies and plans consistent with poverty reduction and sustainable development goals.

6. Subsequently, GOB appointed the Ministry of Environment and Forest (MOEF) as the focal ministry for the PPCR and designated the Joint Secretary (Development) in the MOEF as the focal counterpart. In December 2009 GOB also designated focal counterparts for each of the following Ministry/Organization – Ministry of Food and Disaster Management (MF&DM); Ministry of Agriculture (MOA); Ministry of Water Resources (MOWR); Ministry of Local Government, Rural Development and Cooperatives (MLGRD&C); Ministry of Social Welfare (MSW); Ministry of Health and Family Welfare (MH&FW); Economic Relations Division (ERD) and General Economic Division (GED) of the Ministry of Finance (MOF); Bangladesh Rice Research Institute (BRRRI); Center for Environment and Geographic Information Services (CEGIS); Bangladesh Water Development Board (BWDB); and the Local Government Engineering Department (LGED).

7. Generally, the PPCR is structured in two phases. Phase I will initiate a series of tasks in each country, including facilitation of a cross-sector dialogue to arrive at a common vision of climate resilience in the medium and long-term, and formulation of a strategic approach for climate resilience. During Phase I, a *Strategic Program for Climate Resilience (SPCR)*, outlining an underlying investment program, will be developed. Endorsement by the PPCR Sub-Committee (PPCR-SC) of the SPCR for further development marks the transition to Phase II. Phase II will focus on implementing the SPCR through actions such as support to policy reform, institutional capacity building, and scaling-up other investments in key sectors. However, based on the level of progress Bangladesh has already made in the analytical and planning areas by conducting a number of workshops and consultations with stakeholders including the Development Partners (DPs) and finalizing the Bangladesh Climate Change Strategy and Action Plan-2009 (BCCSAP) and National Adaptation Program of Action - 2009 (NAPA), it was envisaged that the GOB and other stakeholders including the DPs are ready to complete the Phase I of the PPCR in-house, without any major inputs from consultants.

8. In accordance with the PPCR Guidelines, GOB in consultation with ADB and the World Bank drafted the terms of reference (TOR) for launching a Joint Mission (JM) for Phase I (TORs available on the CIF PPCR website (http://www.climateinvestmentfunds.org/cif/Joint_Missions)). The JM led by the MOEF was launched in February 2010 and included members from six GOB Ministries and DPs including WBG, ADB, DFID, CIDA and UNDP. The JM focused on the following objectives:

- Strengthening country ownership process through consultations;
- Review of completed, ongoing and pipeline activities on adaptation;
- Identification of climate vulnerable hotspots through rapid climate risk assessment, desk review, consultations and field visits;
- Identifying sector specific adaptation needs and coordinated intervention options;
- Reaching consensus on the areas, scope, interventions needed for the PPCR and agree on a TOR for Phase I (preparation); and

- Finalizing the SPCR with TOR for Preparation Funds

9. The JM also decided that the PPCR will focus interventions in the coastal zone of Bangladesh which are most vulnerable to climate variability. However, the design and implementation process of this pilot program will provide a platform for identifying synergies in new and on-going climate resilient initiatives and leverage funding, while avoiding duplication of efforts and resources. The implementation will build on the comparative advantages of relevant stakeholders in the country including government, civil society, private sector, academia, think tanks and bilateral and multilateral development partners to enable a participatory, coherent and sustainable response for adaptation.

10. In line with the program guidelines, the Strategic Program for Climate Resilience (SPCR) has been developed as a broad-based strategy for achieving climate resilience at the national level in the medium and long-term using as its basis the BCCSAP and the NAPA. It was designed through an inclusive and participatory process involving relevant stakeholders with particular reference to the beneficiaries, especially women and the most vulnerable communities from the coastal zone.

11. The SPCR document is divided into three parts. Part 1 provides the background and rationale; Part 2 identifies the proposed Investment Program and summarizes the overall programmatic approach and justification for components in light of the country's agreed strategic approach to climate resilience; and Part 3 concludes with the request for Preparation Grant funds to develop a quality investment project or program by financing feasibility studies and associated analytical and design tasks.

Section 1: Country Context & Regional Perspective

12. **Extreme Vulnerability to Climate Change:** Bangladesh, a low lying delta located between the Himalayas and the Bay of Bengal with a population of over 150 million, is one of the most climate vulnerable countries in the world. With over 1000 persons per sq. km. the country has one of the highest population densities in the world. With an average elevation of 4 to 5 meters above mean sea level, nearly a third of the country is susceptible to tidal inundation and nearly 70% of the country gets flooded during heavy monsoons. However, the country has made impressive economic and social progress in the past decade, despite frequent natural disasters and external shocks. Poverty declined from 57% of the population in 1990 to 40% in 2005. Broad-based private sector led growth and macroeconomic stability contributed to significant decline in rural and urban poverty. The average GDP growth over the last six years was over 5%.

13. Bangladesh has also made commendable progress in social and human development. It has met the MDG for gender parity in education and universal primary school enrolment well ahead of time. Nearly 80% of teenage girls today have completed primary education, compared to a similar ratio of only 20% for women who are in their fifties today. Infant and maternal mortality has improved significantly over the last decade, and total fertility rates have dropped by more than 50 percent compared to the mid-1970s.

14. Despite these successes Bangladesh faces considerable development challenges. Inadequate power and gas supplies are a major constraint to growth. Only 47% of households have access to commercial energy sources. Growing urban congestion due to rising vehicular growth tends to reduce the benefits of urbanization. Migration to urban centres particularly in capital Dhaka from climate vulnerable coastal areas is compounding the problem of sustainable urban management. These challenges in the foregoing are further exacerbated by the threats posed by climate variability and change.

15. Bangladesh is most vulnerable to tropical cyclones. Located between the Himalayas and the Bay of Bengal and with three major rivers converging on its territory, Bangladesh is prone to floods, torrential rains, erosion, and severe cyclonic storms and tidal surge. The central and western coastal regions, which have a low and flat topography, are particularly vulnerable to cyclones. The coastal area of Bangladesh and the Bay of Bengal are located at the tip of northern Indian Ocean, which has the shape of an inverted funnel. The area is frequently hit by severe cyclonic storms, generating long tidal wave surges which are aggravated because of the shallow continental shelf.

16. Climate variability and change are clearly critical development issues for Bangladesh. The combination of frequent natural disasters, high population density and growth, and low resilience against economic shocks, makes Bangladesh particularly vulnerable to these climatic risks. The high incidence of poverty and heavy reliance on agriculture and natural resources increase vulnerability to climate change impacts. In most years between 30-50% of the country is affected by floods. Global climate models predict that for Bangladesh mean temperatures will increase, with greater warming in winter. Also, changes in the pattern of rainfall are projected, notably higher precipitation during the monsoon months and drier conditions in winter. These trends could negatively impact agro productivity and the development prospects of the country.

17. **Investments in Policy Reforms and Capacity Development for building Resilience to Climate Change:** Over the last thirty five years, in response to routine natural disasters the GOB has adopted various policies and invested over \$10 billion to make Bangladesh more resilient to extreme climate events like floods, river erosions, cyclones and tidal surges. Over time, the country's ability to manage disaster risks, in particular floods and cyclones, has evolved and improved; this has been the result of a gradual shift from a response-based approach to a strategy that incorporates elements of greater emergency preparedness and risk mitigation. As mentioned before, GOB has also set out a comprehensive strategy for the next 20-25 years to meet the climate change challenge facing the country in the BCCSAP.

18. **Unique Geographical Location within the Region:** The regional context of climate change is very critical for Bangladesh due to its unique and vulnerable geographical location, a delta through which over 310 rivers flows into the Bay of Bengal. Given Bangladesh's situation as the lowest riparian country, occupying only 7% of the Ganges-Brahmaputra-Meghna river basin and receiving water from 57 international rivers, it inevitably faces numerous challenges associated with the greater watershed beyond its borders. The Ganges, the Brahmaputra and the Meghna river system drain out about 1,205 billion cubic meter water annually of total catchment area of about 1.72 million sq km to the Bay of Bengal. Being the lower riparian, Bangladesh has to drain 93% cross boundary flow within only 7% of the catchment lying in it. Most of the water flows within just 5 months of the year, with limited infrastructure and space to store the water for the long dry season. These mighty rivers also carry huge sediment load from the large catchment: about 1.0 to 1.1 billion tons annually which clog distributaries and reduce fresh water availability during the dry-season. During the monsoon, up to 70% of Bangladesh is highly prone to flooding. Yet behind this apparent abundance lies tremendous variability.

19. Bangladesh has a very low and flat topography, except the northeast and southeast regions. About 10% of the country is hardly 1 meter above the mean sea level (MSL), and one-third is under tidal excursions. The country has 3 distinct coastal regions—namely, western, central, and eastern coastal zones. The western part, also known as the Ganges tidal plain, comprises the semi-active delta and is cross-crossed by numerous channels and creeks. The topography is very low and flat. The southwestern part of the region is covered by the largest mangrove forest of the world, popularly known as the Sundarbans, a declared World Heritage Site. The mangrove forests act as deterrent to the fury of tropical cyclones and storm surges. The central region is the most active one, and continuous processes of accretion and erosion are going on here. The very active Meghna River estuary lies in the region. The combined flow of the three mighty rivers—the Ganges, the Brahmaputra, and the Meghna (GBM river system) ranks as one of the largest river systems in the world and discharges under the name of Meghna into the northeastern corner of the Bay of Bengal. This estuarial region has seen the most disastrous effects of tropical cyclones and storm surges in the world and is highly vulnerable to such calamities. The eastern region, being covered by hilly areas, is somewhat stable and has one of the longest beaches in the world.

20. Its location coupled with high levels of poverty and population density has rendered South Asia especially vulnerable to climate change impacts. Over 50% of South Asians (more than 750 million people) have faced at least one extreme event in the past two decades, resulting in over 230,000 deaths and US\$45 billion in damages. As the region shares common geological formations and river basins, natural hazards frequently transcend natural boundaries. Climate variability will further aggravate the situation. The monsoon, a significant climate event drives

the region's economic calendar. High rainfall may trigger severe floods, whereas low and untimely rainfall will affect food production. Climate projections indicate that the risk associated with monsoon variability are likely to worsen.

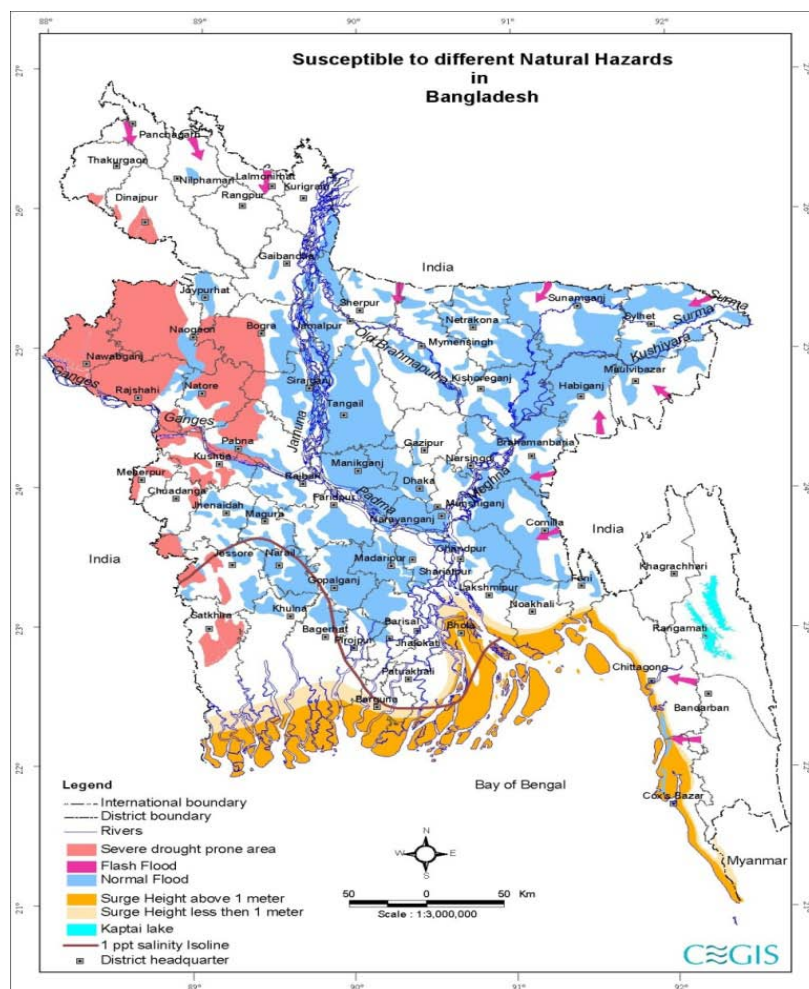
21. The Himalayan ecosystem supports some 1.5 billion people in South Asia who live directly in the floodplains of its many rivers. This system influences monsoon dynamics, acts as a natural reservoir to sustain crops, provides ground water recharge, and is home to a diverse endemic species. Rising temperature has already caused retreat of the Himalayan glaciers more rapidly than global average. An unprecedented threat to water availability is now real throughout the region. The glacial retreat illustrates the interconnectedness of South Asia. Therefore many of the most severe impacts of climate change are likely to be regional and will call for coordinated regional response as well.

Section 2: Development Context and Climate Risks

22. Bangladesh is already evidencing the adverse impacts of global warming and climate change. Summers are becoming hotter, monsoon irregular, untimely rainfall, heavy rainfall over short period causing water logging and landslides, very little rainfall in dry period, increased river flow and inundation during monsoon, increased frequency, intensity and recurrence of floods, crop damage due to flash floods and monsoon floods, crop failure due to drought, prolonged cold spell, salinity intrusion along the coast leading to scarcity of potable water and redundancy of prevailing crop practices, coastal erosion, riverbank erosion, deaths due to extreme heat and extreme cold, increasing mortality, morbidity, prevalence and outbreak of dengue, malaria, cholera and diarrhea, etc. Climate change impacts are already adding significant stress to physical and environmental resources, human ability, and economic activities.

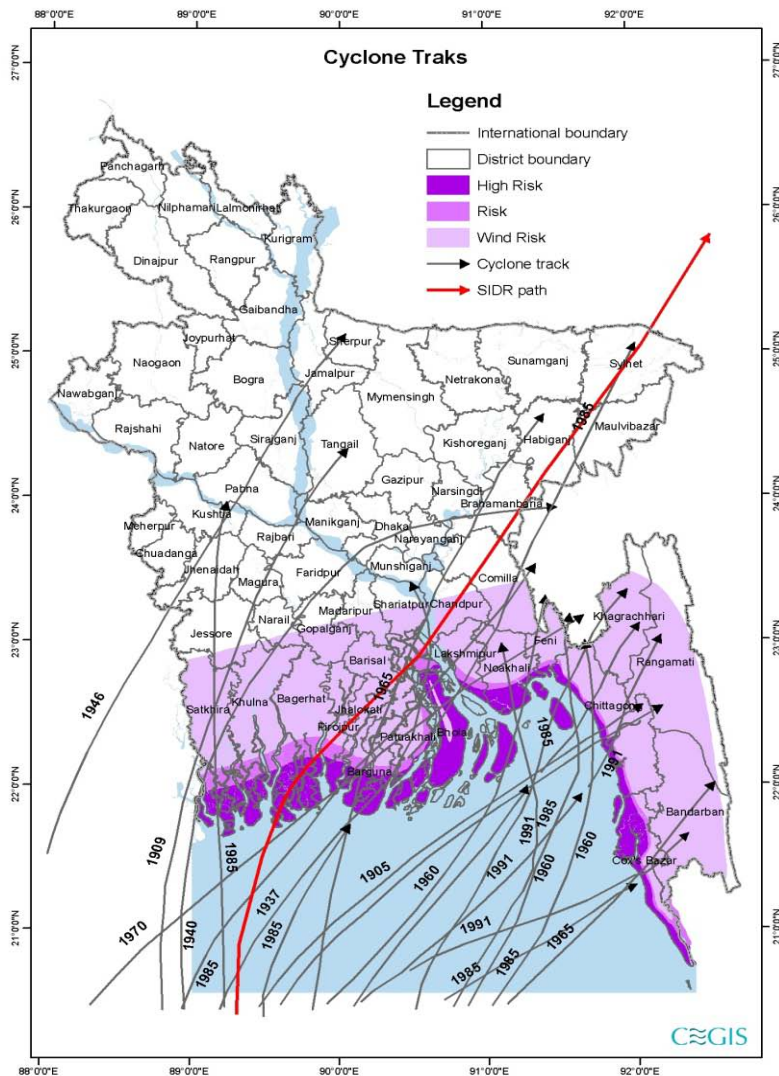
23. Bangladesh experiences frequent natural disasters, loss of life, damage to infrastructure and other economic assets, which adversely impacts lives and livelihoods, especially of the poor people. Different regions of the country are affected differently by the various natural hazards. Figure 1 below illustrates geographical areas susceptible to various natural disasters. Climate change is expected to exacerbate many of the current problems and natural hazards that Bangladesh faces, which are discussed below.

Figure 1: Vulnerability to Different Natural Hazards



24. **Increasing Frequency and Intensity of Tropical Cyclones:** As the most vulnerable country in the world to tropical cyclones, 60% of the worldwide deaths caused by cyclones in the last 20 years were in Bangladesh. A severe tropical cyclone hits Bangladesh on average every 3 years. These storms generally form in the Bay of Bengal in the months just before and after the monsoon and are accompanied by high winds of over 150 km per hr which can result in storm surges up to seven meters high. These storms can, therefore, result in losses of lives and livelihoods and extensive damages to houses and infrastructure in the coastal areas. The storm surges tend to be higher in Bangladesh than in neighboring countries because the Bay of Bengal narrows towards the north, where Bangladesh is located. Figure 2 below demonstrates the tracks of cyclones that have hit Bangladesh over the last 50 years.

Figure 2: Tracks of Cyclones over last 50 years

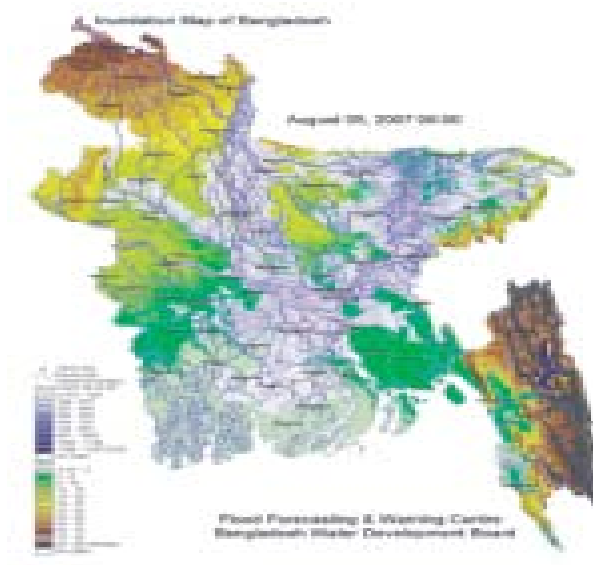


25. Two recent tropical cyclones ‘Sidr’ and ‘Aila’ caused extensive damages. ‘Sidr’ struck the south-west coast of Bangladesh on 15 November 2007, affecting 2.3 million households and causing damage and losses estimated around US\$1.7 billion. ‘Aila’ struck the southern coast of Bangladesh on 25 May 2009 affecting nearly 5 million people and causing infrastructure damage

of over US\$60 million. Climate change is expected to increase the frequency and intensity of tropical cyclones. With higher wind speeds and storm surges, these storms are expected to cause even more damages in the coastal regions.

26. **Erratic Rainfall and Floods:** Bangladesh is the sixth most vulnerable country to floods in the world. Most of Bangladesh lies in the delta of 3 of the largest rivers in the world, the Ganges-Brahmaputra-Meghna basin – with globally the second highest water flow during the flood season. In most years between 30-50% of the country is affected by floods. These cause losses in agriculture, damages to households and livelihoods. However, every 4 to 5 years, there is a major flood that inundates 60% of the country and cause losses of life, substantial damage to infrastructure, housing, agriculture and livelihoods. In the last 25 years, Bangladesh has experienced six severe floods. In 2007, two successive floods inundated over 70% of the country, destroyed over 85,000 houses, affected almost 1 million households and destroyed 1.2 million acres of crops. Total estimated damage from these floods was over US\$1 billion.

Figure 3: Flood affected area



27. Climate change is predicted to lead to heavier and more erratic rainfall, especially during the monsoon season. This is expected to result in higher river flows, causing over-topping and breaching of embankments and widespread flooding in rural and urban areas. Increased river bank erosion is expected to lead to losses of homes and agricultural lands while the resulting increase in sedimentation will lead to drainage congestion and water logging.

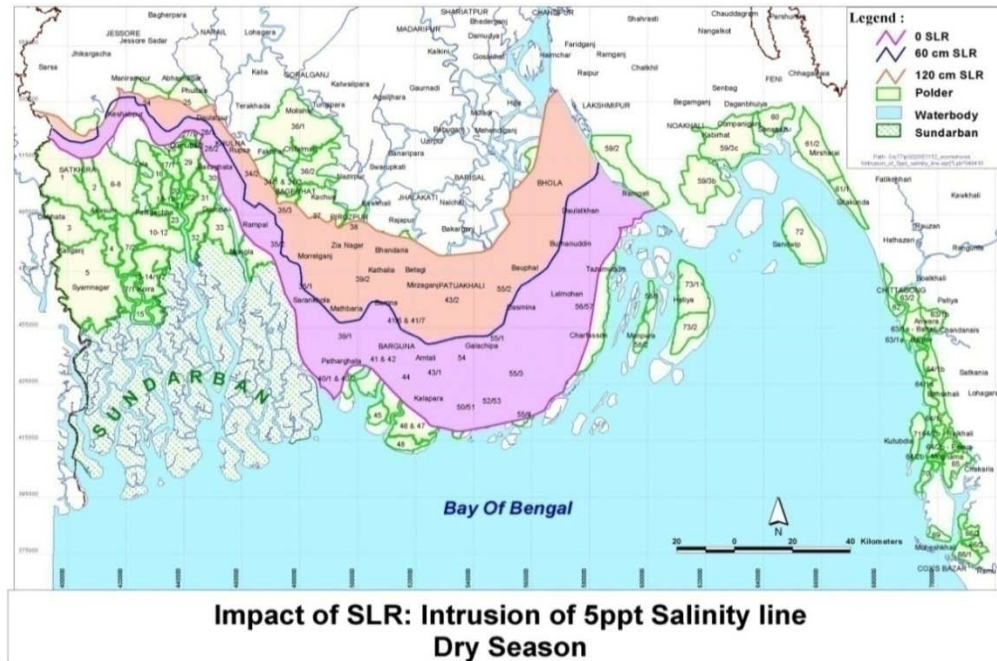
28. **Droughts:** Droughts in Bangladesh are seasonal and can have a devastating impact on crops, leading to particular hardships for agricultural laborers. Droughts most commonly affect the northwestern region, which generally has lower rainfall than the rest of the country. This drought causes '*Monga*' or seasonal hunger in northern regions in the months leading up to the November-December rice harvest. Climate change is expected to result in increasing droughts, especially in drier northern and western regions of the country. The country is already facing drought in the northwestern region and the moderately drought affected areas will be turned into severely drought prone areas within next 20-30 years. During 1960 to 1991, there were 19

drought years, which covered as much as 47% of the country's area and 53% of the current population.

29. **Sea Level Rise:** Two thirds of the country is less than five meters above sea level and therefore susceptible to sea level rise as well as tidal flooding during storms. Sea level rise resulting from climate change will lead to submergence of low lying coastal areas leading to losses in shelter and livelihoods. Saline water intrusion up coastal rivers and into ground water aquifers will reduce the availability of fresh water. Global sea level rose at an average of 1.8mm per year between 1961 and 2003. This rate increased to 3.1 mm per year between 1993 and 2003. Thermal expansions of the oceans and decreasing glaciers and ice caps have contributed to this increase. In the coastal area of Asia, the current rate of sea level rise is reported to be marginally greater than the global average. A World Bank study showed 10 cm, 25cm and 1 m rise in sea level by 2020, 2050 and 2100 in Bangladesh; affecting 2%, 4% and 17.5% of total land mass respectively. A study by SAARC Meteorology Research Centre found that tidal level in Hiron Point, Char Changa and Cox's Bazaar raised 4.0 mm/year, 6.0 mm/year and 7.8 mm/year respectively, observing tidal gauge record of the period 1977-1998. Organization for Economic Co-operation and Development (OECD, 2003) study suggested that 1 (one) meter rise in sea level would inundate 18% of Bangladesh's total land which would directly threaten 11% of the country's population with inundation. Based on climate models, the area flooded in Bangladesh is projected to be increased by at least 23–29% (IPCC, 2008). Figure 4 below shows the effect of sea level rise on saline water intrusion.

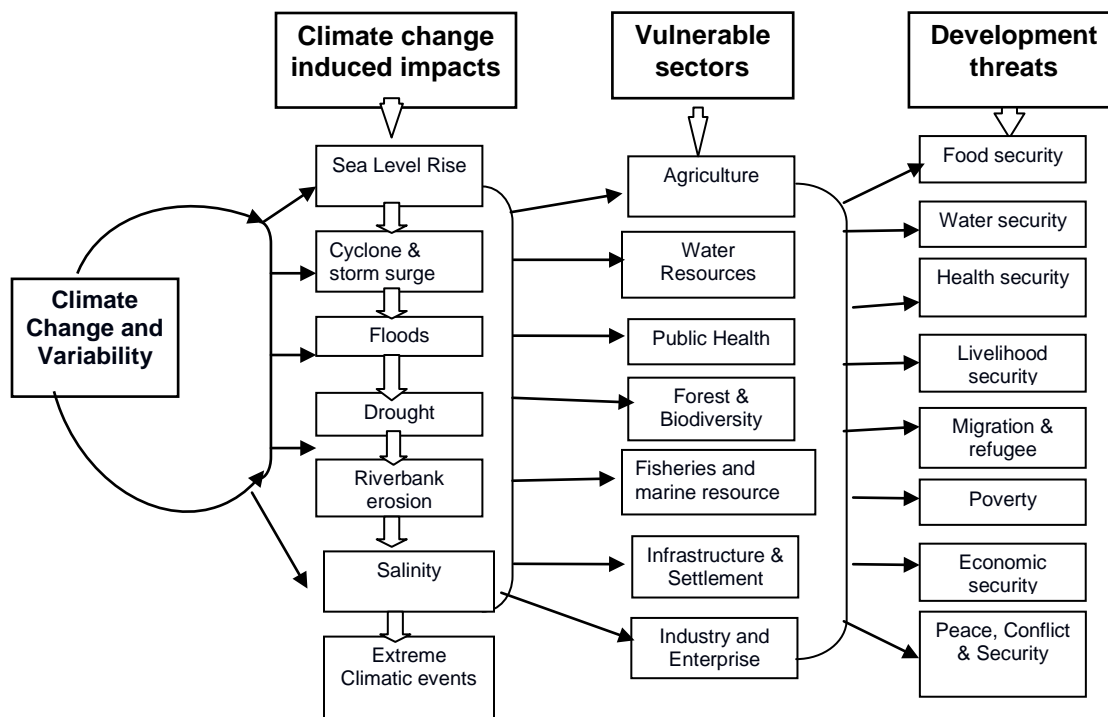
30. Sea level rise will also have an impact on the biodiversity of Bangladesh. The Sundarbans are located on the south west coast of Bangladesh and are a World Heritage Site. A 45 cm sea level rise is projected to inundate 75% of the Sundarbans. Inundation on this scale would directly impact an estimated 11% of the population, presenting unprecedented challenges in terms of loss of income, displaced populations (environmental refugees), and exacerbating stresses on settlements, infrastructure and facilities. Moreover, the quality of groundwater resources is likely to worsen with sea level rise in the coastal districts. This has important implications for agriculture productivity and drinking water supply for rural communities.

Figure 4: Impact of Seal Level Rise



31. Almost all of the development sectors of the country are sensitive and vulnerable to climate change and variability. Key vulnerable sectors of the country includes: Agriculture, Water Resources, Human Health, Forest, Fisheries and Livestock, Infrastructure and Settlements. It is anticipated that there will be huge impacts on the macro economy of the country including impacts on growth, employment, trade patterns, inflation, balance of trade, etc. that needs to be further investigated. Climate change impacts, vulnerability and linkage with development in Bangladesh are shown in Figure 5 below.

Figure 5: Climate change impacts, vulnerability and linkage with development



32. **Climate Change Impacts and Gender:** Climate change does not affect women and men in the same way and it has, and will have, a gender-differentiated impact. Therefore, all aspects related to climate change need the inclusion of gender perspective. Gender-specific implications of climate change outcomes on human, food, biomass energy and livelihood security, are well documented. Due to climate induced events like flood, drought, cyclone, SLR, heat wave, etc. women and children will suffer earliest and most. It is also reported that increase in climate induced natural disasters is likely to affect women more than men. In addition, there are some specific gender attributes which increase women's vulnerability in some respects. A recent report revealed that women and children are 14 times more likely to die than men during disasters. In an example of extreme climatic events with gender-differentiated effects, of the 140,000 deaths that were caused by the 1991 cyclone in Bangladesh, 90% of the total deaths were women. Women tend to be disproportionately affected during post disaster period. Report from all over the country during such periods include flood and drought induced food insecurity, hurdle to collect safe drinking water in salinity ingress areas, sanitation problem, energy insecurity, out migration during coastal and riverbank erosion, reproductive and maternal health problems, mental and physical trauma, sexual harassment, etc. Moreover most of the issues on climate change, policies and programs are not gender sensitive. In light of the above situation, several areas required specific attention, which are: gender-specific effects of climate change; climate vulnerability related to gender aspect; women's capacity to adapt with climate induced natural disasters and extreme events; gender and decision-making on climate change; and gender specific role in adaptation and mitigation. Women and children account for more than 75% of displaced people following natural disasters. For instance, during the July 2007 floods in Bangladesh, 4.2 million children were affected, 300,000 of them under the age of five. Besides women, indigenous peoples and other marginalized groups are also highly vulnerable.

Section 3: Overview of Climate Change Related Activities & Policies of the Government

The International Context

33. **Bangladesh is at the forefront in climate change adaptation.** GOB has taken several creditable initiatives particularly for adaptation and has managed to draw international attention and cooperation to address climate change adaptation in Bangladesh. The country signed the United Nations Framework Convention on Climate Change (UNFCCC) in June 1992 and ratified it in April 1994. The country ratified the Kyoto Protocol in October 2001. GOB has submitted the Initial National Communication (INC) to UNFCCC in October 2002 and is now preparing its second national communication which will be completed by this year. GOB has already adopted the Hyogo Framework for Action (HFA) and working on its five areas of priority action, guiding principles and practical means for achieving disaster resilience for vulnerable communities in the context of sustainable development.

34. **Bangladesh has been an active participant in the international discussions on climate change.** Bangladesh's initial response to the Bali Action Plan in December 2007 emphasized that the specific interventions within the country have to be within the framework of ensuring the security of food, water, energy and livelihoods for her people. The statement given by Bangladesh on behalf of the LDCs at the UN General Assembly in February 2008 emphasized that LDCs need immediate international support to build their resilience to global warming and climate change. Subsequently Bangladesh actively took part in climate change talks in CoP 14 in Poznan in December 2008 and CoP 15 in Copenhagen in December 2009 and made submission for negotiations that has entered a critical phase now. The present Government is firmly committed to implementing its election pledge that provides for adoption of "*an integrated policy and plan to protect the country from the adverse effects of global warming*" as well as to ensure food for all by 2013, eradicate poverty, create enabling environment for increased employment, and guarantee access to energy and power. The government strategy is to integrate climate change challenges and opportunities into the overall development plan and programs involving all sectors and processes for economic and social development.

35. **Since 2004, climate change has been treated as a priority at SAARC meetings** with discussions focusing on the increasing vulnerability of the region and the need for increased regional cooperation. At the recent 16th SAARC meetings in Bhutan, Ministers expressed a determination for South Asia to be a world leader in climate resilience with plans to establish an Inter-governmental Expert Group on Climate Change to develop policy directions for regional cooperation as envisaged in the SAARC Plan of Action on Climate Change.

National Climate Change Policies and Strategies

36. Bangladesh launched the National Adaptation Program of Action (NAPA) in 2005 which identified 15 priority activities, including general awareness raising, capacity building, and project implementation in vulnerable regions with special focus on agriculture and water resources. NAPA was further updated in 2009 and identified 45 adaptation measures with 18 immediate and medium term adaptation measures. The National Capacity Self-Assessment (NCSA) for implementing the provisions of multilateral agreements, including the UNFCCC and UNCCD, was launched in 2007 where capacity building for climate change received high

priority. The Capacity Development Action Plan (CDAP) of NCSA identified a package of 15 actions for climate change thematic area.

37. GOB also prepared the Bangladesh Climate Change Strategy and Action Plan (BCCSAP) in 2008 and revised it in 2009. This is a comprehensive strategy to address the climate change challenges in Bangladesh and has six thematic areas: (a) food security, social protection and health; (b) comprehensive disaster management; (c) infrastructure development; (d) research and knowledge management; (e) mitigation and low-carbon development; and (f) capacity building and institutional strengthening. Forty four programs have been identified and prioritized within these six thematic areas.

38. Given the vulnerability to frequent natural disasters, GOB has also made significant progress in policies and investments for reducing disaster risks. GOB drafted the National Plan for Disaster Management (NPDM: 2008-2015) in 2008 for addressing disaster risk reduction (DRR) and climate change adaptation comprehensively. GOB has made significant progress in shifting its focus from traditional 'relief and rehabilitation' to a DRR approach which emphasizes cost effectiveness in approaches to DRR. GOB has also formulated a Country Framework to mainstream Climate Risk Management and Adaptation in 2006. The objective of the country framework is to establish a mechanism that facilitates national development planning and implementation to integrate adaptation to climate change and climate risk management systematically and over time.

Mainstreaming Climate Adaptation in Key National Policies

39. In the recent Bangladesh Second Poverty Reduction Strategy Paper (PRSP-2), one of the supporting strategies which touches on *caring for the environment and supporting climate change*, emphasizes mainstreaming and strengthening climate change adaptation across various sectors including improved crop production practices, watershed management, and particularly in the coastal zone it emphasizes increasing afforestation, building cyclone shelters and embankments, improving salinity control measures, enhancing public awareness, climate research, and data collection.

40. There are a number of other national policies which addressing the new dimension of climate change; however, these policies and related strategies need to be reviewed to incorporate the new risks and mitigation measures from climate change. The Coastal Zone Policy, 2005 and Coastal Development Strategy, 2006 integrates issues on climate change adaptation and disaster risk management as does the National Agriculture Policy (1999). Other national policies that partially address climate change include:

- National Water Policy (NWP) 1999 provided the first comprehensive look at short, medium and long term perspectives for managing water resources in Bangladesh.
- National Water Management Plan (NWMP) 2001 examines the implementation and investment responses to address the priorities identified in the NWP. Although, the NWP does not clearly mention climate change, the NWMP indicates that it is one of the factors determining future water resources management water supply, including the impacts of sea level rise, which guides the implementation of the NWP.
- The Draft National Disaster Management Policy (2008) integrates DRR approach and climate change adaptation in all development plans, programs and policies. The Policy

highlights priorities for disaster risk reduction and adaptation through assessment of climate change risk, community based programs for risk reduction, public awareness, improving early warning and community alerting systems, integrates strategy of combining structural and non-structural measures, modern communication facilities, strengthening emergency response systems, and international cooperation for overall disaster management, etc.

41. Other national policies including Bangladesh Environmental Policy (1992), National Food Policy (2006), National Environmental Management Action Plan (1995), National Land Use Policy (2001), National Forest Policy (1994), Fisheries Policy (1998), National Energy Policy (1996), and National Health Policy (2000) do not explicitly address climate change issues but provide the scope for addressing this agenda. “The private sector has also expertises in technology and service delivery and capacity to develop innovative solutions to climate risks. In this role it could receive adaptation funding that can be leveraged with its own financial resources and help deliver adaptation on the ground (Study on *Strategy to Engage the Private sector in climate Change Adaptation in Bangladesh. A summary of this Study is in Annex 4. The complete study is being posted on the PPCR website*).

Local Level Capacity to withstand Vulnerabilities to Climate Induced Hazards

42. Bangladesh has developed a world-renowned community-based early warning system and has built about 2500 cyclone shelters in the coastal districts. In 2007, cyclone shelters combined with the very effective early warning system helped to limit the number of fatalities in cyclone Sidr to around 3,500. Infrastructural investment in disaster risk reduction measures include provision of cyclone shelters in the coastal area; about 6,000 km of coastal embankments to protect coastal lands from inundation by tidal waves and storm surges and more than 4,770 km of drainage channels within the polders. GOB has also undertaken an important mangrove reforestation program along the coastline to break the strength of cyclones and storm surges as they travel inland from the Bay of Bengal. Although the above projects were part of routine disaster management, flood protection, cyclone and tidal protection measures, they are now serving as solid foundations for the new challenges posed by climate change.

43. GOB has also initiated a number of agricultural programs such as the development and distribution of drought and saline resistant rice varieties to enhance year round production. Scientists at the Bangladesh Rice Research Institute (BRRI) have developed salinity-tolerant rice varieties, including BRRI 47 for coastal areas of the country where crop lands are badly exposed to sea water intrusion. High yielding, submergence tolerant and short-duration (110-120 days) rice varieties are making a huge difference in boosting food security. BRRI is also developing drought-tolerant varieties of rice for release in the near future.

44. In addition to the infrastructural provision by GOB, the Bangladesh coastal community has over the years adapted community based activities to address disasters. Based on past experience, they have developed several indigenous coping techniques, such as raising the plinths of their homes, structural adjustment and specific forms of housing for long-term adaptation and developing floating gardens (locally called ‘*baira*’) to cultivate vegetables. Their prediction of cyclones using the community radio service, cell phone broadcasts, etc. and also their ability to survive before any institutional help arrives after a cyclone hits, their indigenous knowledge and strategies for disaster management and to survive 'before', 'during' and 'after' the

cyclone have helped them in building resilience against super cyclones for which they are known the world over. They are examples to the global community of a successful, home grown disaster management strategy against cyclone and flood. However, with the likely increase in intensity and frequency of these forces, a more robust program is urgently needed to address the climate change impacts on these communities

Funding Estimates for Adaptation

45. The magnitude of funding required for climate change adaptation in Bangladesh is yet to be fully estimated. Revised NAPA prepared in 2009 identified 45 priority projects under six thematic areas which are roughly estimated to cost more than US\$ 4 billion to implement. BCCSAP has roughly estimated the cost of about US\$ 500 million (for years 1 and 2) to support programs for immediate actions such as strengthening disaster management, climate proofing of infrastructure, ensuring food and water security, research and knowledge management, capacity building and public awareness programs, and urgent investment in cyclone shelters. The total costs estimated in the BCCSAP for programs commencing in the first 5 years is estimated at \$5 billion. According to a recent study by Institute of Water Modeling (IWM), Bangladesh needs at least \$4.17 billion, only for the construction of polders to save the lives of coastal people from sea level rise and storm surge. A joint assessment carried out by the GOB and Development Partners (DPs) after Cyclone Sidr in 2008 estimated that US\$1.4 billion is required in the short term and US\$ 4 billion for the long-term (15 years) for adaptation and mitigation measures.

Support for Adaptation to Climate Change

46. During FY 2009-10 the GOB set up a 'Climate Change Trust Fund (CCTF) and allocated about US\$100 million in its budget for tackling climate change. A similar amount has been budgeted for FY 2010-11 as well. Recently, a fund titled Bangladesh Climate Change Resilience Fund (BCCRF) has been created with an amount of US\$110 million. An amount of US\$ 110-120 million in the form of grants and highly concessionary loan from MDBs is expected to be available for piloting adaptation activities in climate vulnerable areas through the PPCR. Support for adaptation to climate from multilateral and bilateral development partners is detailed in Annex 2 and summarized below.

Multilateral Organizations

47. **Asian Development Bank:** In line with ADB's policy on climate change, the Country Partnership Strategies (CPS) and Country Operations Business Plan (COBP) for Bangladesh highlight the need for mainstreaming climate change in all ADB supported development projects. Accordingly, ADB developed a Bangladesh Climate Change Implementation Plan (CCIP) in 2009. ADB also approved a \$2 million technical assistance (TA) grant in 2009 to support the implementation of BCCSAP so as to assist MOEF and technical line agencies in climate change resilient project preparation, implementation, and policy formulation. The TA on *Strengthening the Resilience of the Water Sector in Khulna to Climate Change*, which was approved in 2008 for \$600,000, assessed the potential impact of climate change in 2030 and 2050 on urban drainage and water supply systems in Khulna and proposed climate proofing options for planned future investment projects. The *Second Crop Diversification Project* approved in 2010 will test and disseminate climate resilient crop varieties and cropping patterns and technology to help farmers adapt to climate change. The *Participatory Small-Scale Water*

Resources Sector Project will enhance agriculture productivity and sustainability through interventions in flood management, drainage improvement, water conservation, and command area development. Projects in the pipeline with climate resilience design features include, among others, (i) the Khulna Water Supply Project (\$75 million); (ii) Sustainable Rural Infrastructure Improvement Project (\$60 million); (iii) Regional Transport Connectivity Project (\$120 million); (iv) Dhaka Water Supply Project II (\$185 million); (v) Greater Dhaka Sustainable Urban Transport Corridor Project (\$125 million); (vi) Urban Governance and Infrastructure Improvement Project (\$100 million); (vii) Coastal Towns Infrastructure Improvement Project (\$100 million); and (viii) Upazila Townships Development Project (\$100 million).

48. **The World Bank Group:** WB has drafted its own climate change strategy -*The South Asia: Shared Views on Development and Climate Change* articulates the guiding principles for the World Bank's climate-related work in the region. It builds upon the World Bank's *Strategic Framework for Development and Climate Change* that defines the pillars and priorities for climate challenge. In Bangladesh, WB and IFC are implementing programs on adaptation in the areas of disaster management and rehabilitation, adaptation in agriculture, TA on coastal risks and defenses, water and sanitation program in vulnerable areas, infrastructure design, clean air initiatives in urban areas and strengthening human resources and institutional capacity. The World Bank included "Climate Change and Environmental Degradation" as one of the four pillars in its Country Assistance Strategy for 2010-2014 and is presently implementing several projects that are relevant to adaptation. Notable among them are: Clean Air and Sustainable Environment Project (CASE; \$62.2m), Dhaka Water Supply and Sanitation Project (DWSS; \$149 m), Emergency Cyclone Recovery and Restoration Project (ECRRP; \$109m), Water Management Improvement Project (WMI \$102.26 m), and Rural Electrification and Renewable Energy Development (RERED; \$130m). Under the ECRRP, the World Bank has recently launched two national studies one for the Proposed Coastal Embankment Improvement Project, and the second one for the proposed Disaster Shelter System.

49. **UNDP:** The 2008 UNDP Climate Change Strategy, *Climate Change at UNDP: Scaling Up to Meet the Challenge*, presents a framework for UNDP's ongoing work. UNDP's climate change work falls into four main areas: help the poor to adapt, make sure developing countries have the knowledge and skills they need, make carbon finance markets work for the poor, energize and climate-proof the MDGs. UNDP's umbrella project, 'Capacity Development for Policy Makers to Address Climate Change' is a ground breaking effort to strengthen the capacity of developing countries to assess climate change policy options across different sectors and economic activities. Currently, 19 countries including Bangladesh are participating in this project. UNDP Bangladesh is currently implementing *National Adaptation Program of Action (NAPA)* for climate change in 2005 prepared with UNDP-GEF support. NAPA priority projects on 'Community based adaptation to climate change through coastal afforestation' (\$5.6 m). *Second National Communication to the UNFCCC* is also ongoing with support from GEF. Climate Risk Management under *Comprehensive Disaster Management Program (CDMP)* was completed in 2009. *CDMP Phase-II*, with a budget of \$50 million started recently. The *Poverty-Environment-Climate Mainstreaming initiative* (\$1 million) aims to improve environmental outcomes for the poor through mainstreaming pro-poor environment and climate change in the national development processes and local level planning.

50. **European Commission (EC):** EC's Country Strategy Papers (2007-2013) for Bangladesh concentrates its commitments on three focal areas and two non-focal areas.

Environment, disaster management, water resources and sanitation and food security issues will be addressed under the non-focal areas. As part of the EU's global commitment to climate change adaptation, the EC will support GOB in its endeavor to improve climate warning capacities of local communities by supporting related technologies.

Bilateral Assistance

51. **DFID** has mainstreamed climate change activities into its development programs and now provides direct support for programs that reduce vulnerability to climate variability and change. DIFD in association with Institute of Development Studies (IDS) developed 'ORCHID' (Opportunities and Risks of Climate Change and Disasters) -- a systematic climate risk management methodology to assess the relevance of climate change and disaster risks to its portfolio of development projects. DFID already supports disaster risk reduction and climate change adaptation initiatives through targeted interventions such as the Comprehensive Disaster Management Program (CDMP), contributing £12m. DFID also contributed about £6 million for assisting CDMP mainly to support the Climate Change Cell (CCC) in the MOEF. The Government of United Kingdom launched a £75 million program to support the creation of the Bangladesh Climate Change Resilience Fund (BCCRF). DFID is also planning to invest £30 million to implement the '*Climate Change Program –Climate and Life*' during 2009 – 2014.

52. Climate change vulnerability and disaster issues are addressed by **USAID** under 'improved food security and disaster mitigation, preparedness and relief'. USAID's focus areas includes: emergency preparedness and disaster mitigation, food security of vulnerable populations, emergency assistance for disaster, promotion of renewable energy, management of protected areas, etc. In 2008, **DANIDA** provided \$103 million for the *Agricultural Sector Program Support Project* (Phase II) and \$68 million for the *Water Supply and Sanitation Sector Program Support*, (Phase II) to implement a Climate Management Plan for the water and agricultural sectors of the country. DANIDA also has supported flood related Disaster Risk Reduction (DRR) activities since 1995 through '*Support to National Flood Forecasting and Warning Services*' (DKK 6 million). The 2008 2-year project on climate change adaptation and DRR in Bangladesh is under implementation by the Flood Forecasting and Warning Center (FFWC) and the Institute of Water Modeling (IWM), which directly contributes to accurate early warnings through a strengthened FFWC. DANIDA supported *Community Based Climate Change Adaptation and Disaster Risk reduction* (DKK 8 million) is being implemented by Action Aid Bangladesh.

53. **Canadian International Development Agency (CIDA)**: CIDA supported ongoing *Bangladesh Environmental Institutional Strengthening Project* (\$5 million)' aims to strengthen the capacity of the DOE for environmental management. CIDA also supported the *Reducing Vulnerability to Climate Change*' (RVCC) project focused on reducing vulnerabilities through community based adaptation, capacity building and advocacy. The *Bangladesh Environmental Management Project* (BEMP; CAN\$12 million) is designed to assist DOE to strengthen its capacities in strategic planning, and operate in a policy context to make its planning horizons more futuristic. The **Swedish International Development Cooperation Agency (SIDA)** specifically works in the education and health sectors which constitute some 80% of its total cooperation program. Climate Change and Environment are small components and will be addressed under those two sectors as sub-components. The **Netherland Development Cooperation** has a long tradition of involvement in the water sector including coastal zone

management. This includes the Water, Sanitation and Hygiene Program (WASH) implemented by BRAC; Integrated Planning of Sustainable Water Management Project (IPSWAM) by the BWDB; the Southeast Asia Integrated Water Resource Management Project (Southeast-IWRM), and Char Development and Settlement Project (CDSP I-III). **The Swiss Agency for Development and Cooperation's (SDC)** thematic areas of support include disaster risk reduction and disaster preparedness and prevention. **JICA's** support to Bangladesh for climate adaptation is focused on agriculture and rural development, disaster management, water and sanitation, etc. Major ongoing projects are: Emergency Disaster Damage Rehabilitation Project (JPY 6.9 billion), Grant for Disaster Prevention and Construction of Multipurpose Cyclone Shelters in the cyclone Sidr affected areas (JPY 960 million), Flood forecast/warning system (JPY 260 m), Small Scale Water Resource Development Project (JPY 7.5 billion), Model Project for Community-Health Improvement through Total Sanitary and Hygiene Education at Primary School.

Non-Government Organizations

54. Various national NGOs such as the Bangladesh Centre for Advanced Studies (BCAS), Centre for Natural Resource Management (CNRS), IUCN Bangladesh, Action Aid Bangladesh, CARE Bangladesh, Oxfam Bangladesh, Practical Action Bangladesh, Bangladesh Red Crescent Society, Concern Worldwide, and Caritas are prominent in the area of climate change adaptation. Besides, the research institutions such as Center for Environment and Geographic Information System (CEGIS), Institute of Water Modeling (IWM), Bangladesh University of Engineering and Technology (BUET), Khulna University, Dhaka University, Chittagong University, and Bangladesh Agriculture University are also working in many areas relating to climate adaptation.

Section 4: Rationale for PPCR Support

55. Key challenges in enhancing resilience to climate change in Bangladesh are ensuring food and water security, managing disaster risk, protecting climate sensitive infrastructure, maintaining health security, ensuring social protection, tackling involuntary migration and addressing overall environmental degradation. These problems are further aggravated by constantly changing climate, uncertainty in determination of potential impacts and their spatial distribution. For a climate vulnerable country like Bangladesh, adaptation to climate change is, therefore, a fundamental development priority.

56. As reflected in the NAPA and BCCSAP, the **financing need for climate change adaptation** are huge and mobilizing adequate and timely financing is vital to addressing the looming challenge. The current financial allocation for climate change adaptation in Bangladesh is quite inadequate considering the extent of vulnerabilities and the number of people potentially exposed. Cyclone Sidr in 2007 and Aila in 2009 hit the coastal areas of Bangladesh caused extensive damages and huge losses. Damage and losses caused by Sidr is estimated at about US\$ 1.4 billion in the short-term and US\$ 4 billion over a 15 year period. US\$1.15 billion is needed to assist in the recovery and reconstruction after cyclone Aila. Restoration and repair of coastal polders and roads inside the polders, provision of safe drinking water and sanitation, food, shelter and health facilities are the priority areas for assistance in Aila affected areas. GOB will not be able to accomplish all this with its own resources only and external support of the kind provided and mobilized under the PPCR would complement mainstream development finance to accelerate the GOB's efforts in delivering basic services to vulnerable people, both in the immediate and long term.

57. Given that PPCR aims to help countries transform to a climate resilient development path, consistent with poverty reduction and sustainable development goals, a key ingredient for addressing adaptation efforts successfully is the **availability of appropriate policies, procedures, guidelines and institutions** which are adequately empowered and enabled to carry out their roles in a comprehensive fashion and on a sustainable basis. Bangladesh has taken a number of steps to address climate change related issues over the years and has updated policies that will contribute to successful implementation of climate related adaptation and mitigation programs. Strengthening institutions to handle the climate change issues effectively and decisively would warrant an appropriately designed capacity building program aimed at addressing this important constraint to facilitate a move towards climate resilient development path is obvious.

58. Development and dissemination of appropriate technologies, as the means of enhanced institutional capacity, has a significant role to play in meeting the challenges of adaptation to climate change. This role may be in the form of climate proofing infrastructure, clean energy and efficient energy use, adoption of appropriate and efficient land use options, agriculture production and processing, and others. However, translation of technologies into practical applications in the field to realize the benefits requires appropriate vehicles. These include enhancing awareness for adoption by creating conditions for adoption and promoting demand, promulgation and enforcement of appropriate policies for transformation, building institutional capacities for efficient and appropriate levels of delivery, and financing. Obviously institutional and non-institutional stakeholders have a major role to play and promoting the development and adoption of appropriate technologies that enhance climate resilience. Support and assistance by

multilateral development institutions and bilateral development partners would be critical in mobilizing the resources and prompting the decision makers to undertake climate change relevant research and development activities and facilitate their adoption as a means of adaptation to climate change.

59. Climate change has implications for many economic sectors. **Integrating climate issues into other aspects of development work** (by mainstreaming them into strategies for growth and poverty reduction) and defining a common agenda for action will require investments in research and knowledge generation specific to the problems of the least-developed countries, together with institutional strengthening and financing—all within a coherent framework. Knowledge gaps are a key impediment to integrating climate risks into development initiatives and major high-value infrastructure investments. First of all, information on the likely damages at the country, sector, and local levels for a set of climate change scenarios is needed. It is also useful to know how will adaptation unfold at the grassroots level, and how can the process be supported by national policies. Social impacts need to be explored by understanding how the rural and urban poor will be affected by climate change, how migration within and across borders will take place, and to what extent climate change will exacerbate conflicts.

60. Obviously, the benefits of research and studies aimed at (i) development of better options to enhance resilience to climate change; and (ii) enhance awareness of decision makers to help mainstreaming climate change in development policy and planning cannot be overemphasized. There is also a **need for data collection and analysis on various aspects of resilience to climate change** in affected sectors and dissemination to the potential beneficiaries. This should be possible through commissioned studies on specific topics, using national and international experts. Given the range of assistance programs (bilateral, multilateral, GOB, other) for building resilience to climate change through appropriate climate change adaptation programs and projects, appropriate level of coordination and information sharing would go a long way in reducing overlap and duplication. In addition, the need for an institutional home for climate change relevant data and information is needed to provide a one-stop shop for potential users of the information that would readily become available. A capacity building program that encompasses raising the awareness of decision makers in the public and the private sector, develops and disseminates knowledge products that not only aid the process of awareness raising but help bring relief to climate change vulnerable communities by providing various science-based options to enhance climate resilience, and support an institutional home for climate change management would be a step in the right direction.

61. Given the non-conventional approach to development adopted under the PPCR, **special capacity building programs tailored to climate resilience would need to be designed and implemented.** These capacity building programs should aim at enhanced awareness of climate change and its implications, adaptation and mitigation options, need for change of mindset for pooling resources, integrating development strategies with programs that address climate change, and promulgation of policies and even institutional restructuring, if necessary, not on account of external pressures but on account of felt need resulting from enhanced awareness. This would require a comprehensive assessment that includes both the institutional structures, cross sector linkages and coordination/collaboration mechanisms, vertical and horizontal integration, functions and enforcement capabilities, gaps in the generation and dissemination of knowledge products would help identify the capacity constraints that must be addressed to mainstream climate change adaptation in development policies and planning, identify challenges in

implementation of PPCR related projects and programs. The assessment would result in recommendations that would enhance institutional capacities, both in public and the private sector (including NGOs and CSOs) to ensure effective implementation of climate resilient development programs and projects, facilitated by PPCR, leading towards the path for transformational change.

62. Under the umbrella of capacity enhancement, the PPCR can also assist with enhancing the Government's capacity to undertake fiduciary responsibilities of overseeing large flow of climate finance such as the PPCR, but also BCCRF and the CCTF, in a comprehensive and coordinated fashion within the broader context of sustainable development and poverty reduction.

63. PPCR can also **play a catalytic role in assisting the Government's efforts in leading, organizing and managing climate adaptation related activities.** Key priority adaptation actions proposed under the NAPA and BCCSAP include: improved weather forecasting and warning systems, improved and restored livelihoods in climate vulnerable areas, developing climate resilient rice and crop varieties and disseminating them to farmers, constructing more climate resilient shelters, systems to reduce water logging and saline intrusion in the coastal areas, extended green belt for coastal protection, repair and maintenance of existing flood embankments and cyclone shelters, improve field data and climate change modeling at a scale useful for sub-national planning, revision of sector policies for climate resilience, awareness raising and public education towards climate resilience, capacity building and institutional strengthening, etc. While the PPCR resources alone may not be sufficient to address all of the above issues, a comprehensive and detailed strategy to address these issues would provide a fair basis for blending multilateral funds as well as provide an opportunity to attract co-financing or parallel financing from other development partners.

64. PPCR may also assist in **exploring some innovative approaches in certain critical areas in climate adaptation.** As already mentioned, Bangladesh has had a long and substantial experience in coping with climate adaptation. While the Government has of necessity taken the lead in the provision of various climate resilient infrastructures, it has also demonstrated significant capacity in raising public awareness about climate related hazards and mobilizing and organizing the people to help themselves. Extensive networks of NGOs and CBOs which are active all over Bangladesh have played an important supportive role in the self-help efforts. While the resources available under the PPCR are limited, it is expected that at least a small portion of this can be utilized to pilot and demonstrate some new approaches to adaptation in the areas of technology, financing, and public/private collaboration.

65. PPCR could explore opportunities for **disseminating useful lessons from Bangladesh's experience** with mainstreaming climate resilience to other vulnerable developing countries across the region and beyond.

Section 5: Participatory Process followed for Development of the SPCR

66. Under the coordination and overall guidance of the MOEF, several preparatory meetings took place ahead of the formal Joint Mission in February 2010. GOB had appointed specific staff as focal points in the various ministries involved in climate change activities. A list of persons met during the Mission is available on the CIF PPCR website (http://www.climateinvestmentfunds.org/cif/Joint_Missions) The JM held detailed meetings with the following ministries to explore specific sector priorities for adaptation to climate change and to develop a clear understanding of the GOB's requirements for climate resilience:

- Ministry of Environment and Forest
- Ministry of Water Resources
- Ministry of Agriculture
- Ministry of Food and Disaster Management
- Ministry of Local Government, Rural Development and Cooperatives
- Ministry of Social Welfare
- Ministry of Health and Family Welfare

67. A stakeholder consultation workshop was held with participation of representatives from concerned ministries, line agencies, NGOs, civil society organization (CSOs), Community Based Organization (CBOs), research/academic institutes, private sector, media and other development partners. The multi-stakeholder consultation meeting had strong government ownership and good coordination among various involved ministries, line agencies, DPs and MDBs. A list of persons met during the Mission and the workshop participants is available on the CIF PPCR website (http://www.climateinvestmentfunds.org/cif/Joint_Missions). Based on the priorities identified in the NAPA and the BCCSAP, the workshop was organized for discussions in the following four thematic groups:

- Group 1: Agriculture and Food Security (Chaired by the Ministry of Agriculture and Co-chaired by IFC)
- Group 2: Extreme Climate Events and Climate Induced Disasters (Chaired by Ministry of Disaster Management and Co-chaired by DFID)
- Group 3: Water Resource Management (Chaired by Ministry of Water Resources and Co-chaired by CIDA)
- Group 4: Public Health, Migration and Social Protection (Chaired by Ministry of Local Government and Co-chaired by UNDP)

68. The consultations identified challenges and opportunities to mainstream climate change adaptation for detailed study and consideration for inclusion in the SPCR around the four thematic areas as follows:

Outcomes from the Consultations during the Joint Programming Mission

| Sectors | Sector impact & vulnerability | Required priority actions |
|--|--|---|
| Agriculture and Food Security | <ul style="list-style-type: none"> - Higher temperature, saline water intrusion and changing monsoon rainfall patterns impacting crop production - Salinity intrusion due to SLR would reduce coverage of agricultural land resulting in decreased production - prolonged drought may increase needs for inputs like irrigation & fertilizers - Temperature increase would have severe impact on food production, especially wheat | <ul style="list-style-type: none"> - Development and dissemination of climate resilient crop varieties and cropping systems for water-logging and salinity affected coastal areas - Innovation and dissemination of drought tolerant crop varieties in ever increasing drought prone areas against climate change effects - Improved food security through climate resilient crop varieties and storage mechanisms and crop diversification. - Improve knowledge and agricultural extension services - Development of climate resilient and eco-friendly rice and related technology; - Sugar crops and other high value crops (HVC) improvement for adverse climate condition through biotechnology approach - Agronomic manipulations such as shifting planting dates, using short duration crop cultivars - Cultivation of vegetable crops in floating garden and raised beds - Promotion of research on drought, flood and saline tolerant varieties of crops to facilitate adaptation |
| Extreme Climate Events and Climate Induced Disasters | <ul style="list-style-type: none"> - Frequency and intensity of tropical cyclone and storm surge are increasing - Between 1991 and 2000, 93 major disasters recorded, resulting in 200,000 deaths, \$ 5.9 billion in damage and losses in agriculture and infrastructure - Due to changing monsoon rainfall pattern, crop production uncertain - Bay of Bengal more rough making it difficult for fishermen and small craft to | <ul style="list-style-type: none"> - Construction of Multi-purpose Cyclone Shelter Centre for people and construction of raised platforms for livestock - Construction of climate resilient building/house or climate resilient community shelter; Small-scale community shelter home - Formation of disaster resilient community/village with construction of two-storied buildings, greenbelt of trees with livelihood diversification - Livelihood support to the coastal community |

| | | |
|--|---|--|
| | <ul style="list-style-type: none"> put to sea - Both heat and cold waves observed in the country - Country observed untimely rainfall and also heavy rainfall in shorter period of time disrupting urban drainage system and creating flooding and water logging | <ul style="list-style-type: none"> - Strengthen cyclone preparedness program and improve broadcasting of early warning and forecasting - Climate change and adaptation information dissemination to vulnerable community for emergency preparedness and awareness raising on enhanced climatic disaster - Flood protection coastal defense structure - Integrated project with promoting micro-finance in the vulnerable coastal areas; involvement of private sectors in the coastal areas through promoting micro-enterprise development |
| Water Resource Management | <ul style="list-style-type: none"> - Too much water in wet season, too little water in dry season, untimely water and saline water are all experienced in the country - Flooded and water logged area is increasing - SLR exacerbating drainage congestion & water logging - Problems related to availability of fresh water for drinking becoming acute - Frequency of intense rainfall in the country increasing and causing severe floods, landslides and mud flows - Water borne diseases also increasing | <ul style="list-style-type: none"> - Modernisation of existing irrigation schemes and demand management aimed at optimising physical and economic efficiency in use of water resources and recycled water in water-stressed areas - Protection of groundwater resources and water catchment areas - Rainwater harvesting, creation of water reservoir, low cost filter in salinity affected areas - Increase surface water storage and restore natural water courses |
| Public Health, Migration and Social Protection | <ul style="list-style-type: none"> - Water, air, and vector-borne diseases and outbreak of Cholera, Diarrhea and Dengue increasing - Children, women, elderly and poor people suffering more from heat and cold waves - People displaced due to cyclone and storm surge, sea level rise, river erosion, etc. 'Climate migrants' becoming a key emerging | <ul style="list-style-type: none"> - Improved housing and living condition in climate vulnerable zones - Better irrigation water management to reduce mosquito breeding sites - Livelihood protection in ecologically fragile areas and protection of vulnerable socio-economic groups - Better and/or improved diseases/vector surveillance and monitoring - Education, training & awareness campaign on public health issues |

| | | |
|--------------|---|---|
| | <p>issue in the country</p> <ul style="list-style-type: none"> - People losing livelihood options due to extreme climate events - Women and children are becoming more vulnerable in changing climate | <ul style="list-style-type: none"> - Monitoring of internal and external migration and providing support for rehabilitation - Improving the education and work skills of migrants and financing of resettlement costs and rehabilitation; support to enhance social welfare of 'climate migrants' |
| Multi-sector | | <ul style="list-style-type: none"> - Mainstreaming climate change in national, sector and spatial development programmes - Institutional strengthening & building human resource capacity |

69. Two technical missions were fielded in March and May, 2010 for field visits to the coastal areas, review and refine the criteria for selecting the areas where PPCR activities would be undertaken, and recommend a number of priority polders/areas and adaptation options for SPCR preparations. During the field visits the PPCR team comprising GOB, ADB and World Bank met with district officials, local government officials, NGOs active in the area, and potential beneficiaries of future PPCR interventions. The field visits and the discussions contributed substantially to the design of the interventions being proposed in the SPCR.

Section 6: Institutional Assessment

70. The institutional assessment provides an overview of the way the GOB is set up to deal with climate change and an analysis of the most effective institutional arrangements for PPCR interventions. With climate change impacting most of the important development sectors the PPCR intends to adopt an integrated cross-sector approach in designing activities to be carried out, taking into consideration the current institutional needs and set up.

71. The table below shows the structure, functions and form of representation for each tier of sub-national and local government in Bangladesh.

Structure and Functions of Local Government

| Local Govt. Structure | Functions | Representations |
|---|--|---|
| 6 Regions (Dhaka, Chittagong, Khulna, Rajshahi, Sylhet & Barisal) | Oversight, supervision and management of all administrative and development activities at district and sub-district level | No direct political representation. Divisional Commissioner is Executive Head |
| 64 Districts Average pop: 1.9 million Average area: 2,250 km ² | Management and monitoring of GOB programs & projects, implementation of district level public works and maintenance activities, grants and scholarships. | No direct political representation. District Development Coordination Committee comprises Deputy Commissioner and line department heads. |
| 482 Upazilas Average pop: 250,000 Average area: 300 km ² | Planning, implementation, coordination and monitoring of all infrastructure and services including health, education, public works, irrigation and water, agriculture, fisheries, livestock, forestry, community development | No direct political representation. Upazila Nirbahi Officer (UNO) is CEO. Union Parishad Chairpersons voting members of District Co-ordination Committee (DCC) consisting of UNO & line department officers |
| 4,498 Union Parishads Average pop: 27,000 Av. area: 30 km ² | 38 functions (10 mandatory & 28 optional). Construction and maintenance of small scale infrastructure, dispute settlement, registration of births & deaths. | Elected Chairperson and 12 elected members (one for each of nine wards and 3 women members each representing 3 wards). |
| 68,000 Village (Gram) Committees Average pop: 1,600 Av. area: 2 km ² | Participatory planning, local community mobilization, project implementation, community contracting. | No direct political representation. 15 person council chaired by UP member. |

72. Most ministries involved in infrastructure development or service provision are represented at the regional, district and/or the *upazila* levels. The activities of all the ministry

representatives are essentially coordinated from Dhaka, while some degree of planning and operational control is also exercised by Divisional Commissioners, Deputy Commissioners and the Upazila Nirbahi Officers (UNO) within their respective jurisdictions.

Existing Institutional Structure for Managing Climate Change Adaptation and Disasters

73. In Bangladesh, all key development sectors are impacted by the increasing frequency of climate related hazards. Different ministries, line agencies, research organizations, academic institutions and NGOs play major roles in various activities related to adaptation to climate change. These roles are summarized in the following table.

Institutional Responsibilities for Climate Change in Bangladesh

| Name of Institution | Roles and responsibilities in climate change adaptation and climate induced disaster management |
|--|--|
| Ministries | |
| Ministry of Environment and Forests | Hosts Climate Change Unit and coordinate Climate Change Cells located at relevant ministries and line agencies; responsible for complying with decisions under the UNFCCC and Kyoto Protocol including preparation of national communication, implementation of NAPA and BCCSAP, administering climate funds (e.g. CCTF/ BCCRF), attending international negotiations, mainstreaming climate change at national and sector level. |
| Ministry of Food and Disaster Management | Provide support to the Disaster Management Bureau and Cyclone Preparedness Program. Responsible for pre- and post disaster rehabilitation. Formulation and implementation of Disaster Management Plan and related activities. Arrange meetings of the National Disaster Management Council and Disaster Management Coordination Committee to assess disaster preparedness of different Ministries, agencies, departments, local governments, CPP, Red Crescent, NGOs, etc. |
| Ministry of Agriculture | Develop and disseminate climate resilient crop varieties, promote adaptive agriculture, conduct research. Stock seeds suitable for disaster prone and climate risk areas. Arrange for training of various levels of officers for participation in different steps of disaster preparedness activities. Provide technical solution for adaptive agriculture in the country. |
| Ministry of Water Resources | Construct, repair and maintain coastal infrastructure. Act as focal point for Flood Forecasting and Warning Centre (FFWC). Undertake operation of sluice gates and other water discharging devices in polders. |
| Ministry of Local Government, Rural Development and Cooperatives | Assist local government agencies to build roads, bridges & culverts. Advise people to keep foundations of homes above flood level. Prepare maps showing population concentration and deep wells, protected ponds and other sources of drinking water. Ensure availability of drinking water at times of need. Direct local government institutions for extending assistance to DC and TNO for rescue and relief operations. |
| Ministry of Health and Family Welfare | Advocate adaptive public health intervention & monitoring communicable diseases. Establish temporary hospitals in Health Sub-centers and cyclone shelters in emergencies. If hospitals and Health Centers destroyed by cyclone, set up improvised hospitals in cyclone shelters. |

| Name of Institution | Roles and responsibilities in climate change adaptation and climate induced disaster management |
|--|---|
| Ministry of Social Welfare | Work on the unprivileged sector of the society. Implement programs for disadvantages and vulnerable communities. |
| Ministry of Information | Popularize techniques for preparedness and survival during pre- and post-disaster periods through distribution of printed material and using press and electronic media. Arrange publicity using mass media about cyclone and flood warning signals. Monitor performance of Radio, Bangladesh TV, News Media, Press Information Department, Mass Communication Department and Films and Publications Department during normal times and specially during cautionary/ warning and disaster stages. |
| Ministry of Planning | Facilitate overall planning. Support sector planning and provide guidance to sector ministries. |
| Ministry of Finance | Allocate budget. Formulate climate funds. |
| Line Agencies | |
| Bangladesh Water Development Board | Construction, repair and maintenance of coastal infrastructure. Deal with flood control and drainage, irrigation, river bank and town protection, flood forecasting and warning services, hydro-meteorological data management, land reclamation and protection against tidal surge. |
| Water Resource Planning Organization | Nation-wide water resource planning and management. Monitoring implementation of the National Water Management Plan. Key player in addressing water related vulnerabilities. |
| Dept. of Environ. Climate Change Cell (CCC) | Hosting CCC, carry out research, implement climate change projects, policy advocacy, awareness campaign and international negotiation. |
| Department of Forests | Implementation of community based adaptation measure through coastal afforestation. Raising greenbelt/afforestation along the coast. Create forest biomass carbon inventory and develop forest based CDM projects. |
| Disaster Management Bureau | Coordinate activities related to disaster management from national to grass roots level. Formulation and implementation of Disaster Management Plan and focal point for administration of 'Natural Disaster Risk Reduction Fund'. Provide support to disaster management decision makers, planners and practitioners in disaster preparedness, local level disaster contingency planning, awareness training, facilitating improved information collection. |
| Dept. of Agricultural Extension, BIRRI, BARC, BARI | Dissemination of climate resilient crop variety, promotion and extension of adaptive agriculture to farmers. Carried out research on adaptive agriculture. |
| Department of Fisheries | Carry out research on adaptive aquaculture. |
| Department of Livestock | Carry out research on adaptive livestock management. |
| Local Govt. Engineering Department | Rural and urban infrastructure development and small scale water resource development. Construction of roads, bridges/ culverts and markets, cyclone shelters, social mobilization, empowerment and environmental protection. |

| Name of Institution | Roles and responsibilities in climate change adaptation and climate induced disaster management |
|--|--|
| Dept. of Public Health Engr. | Provision of drinking water supply, sanitation and waste management and advisory service in framing policy and action plans for water and sanitation. |
| Bangladesh Meteorological Department | Monitor surface and upper air layers, provide weather forecasts for public, farmers, mariners and aviators and issue warnings for severe weather phenomena. Exchange meteorological data, forecasts and warnings and archive and publish climatic data. Prepare special weather bulletins and publicize through news media such as radio, television and newspapers. |
| Economic Relation Division | Mobilize external resources for socio-economic development. Interfacing with development partners, coordinating all external assistance inflows into the country. Assess needs for external assistance, devise strategy for mobilizing foreign assistance, signing of loan and grant agreements. |
| Planning Commission | Preparation of development plans and allocation of funds for implementing development projects or technical assistance. Approve all DPPs and TPPs. |
| Local Government Institutions (Union Parishad, Upazila Parishad) | Implement development and service-oriented activities for climate change adaptation, disaster risk management and environment conservation. Mobilizing local resources, establish good governance, providing civic/utility services to municipalities and city corporations. Rural and urban infrastructures development, supply safe drinking water, solid waste disposal and sanitation. |
| Research Organizations | |
| Institute of Water Modeling | Research on water related issues on climate change, climate modeling, prepare climate and disaster risk maps, policy advocacy and training. |
| Centre for Environment and Geographic Information Services | Carryout research on climate change, climate modeling, prepared climate and disaster risk map, policy advocacy and training. |
| Bang. Inst. of Dev. Studies (BIDS) | Research and knowledge management on climate change related issues. |
| BUET- Institute of Water and Flood Management/ Climate Change Study Cell | Research and capacity development in water and flood management, climate related disasters and provide advisory and consultancy services; conducting various activities such as facilitating research, organizing short courses, workshops and seminars, providing advisory services to government and relevant organizations, hosting international and national conferences, publishing journal, and developing climate change database. |
| Universities at Dhaka, Chittagong, Khulna, Jahangir Nagar, Rajshahi | Conducting research and implementing small research projects on climate change. |
| NGOs | |
| Red Crescent Society | Project implementation on CCA and DRM, pre- and post disaster rehabilitation, dissemination of cyclone and other disaster warning signals. |

| Name of Institution | Roles and responsibilities in climate change adaptation and climate induced disaster management |
|---|--|
| IUCN Bangladesh | Research, training, awareness campaign, policy advocacy, and project implementation related to CCA and DRM. |
| Action Aid Bangladesh | Research, policy advocacy and project implementation related to climate change adaptation and disaster risk reduction. |
| Practical Action Bangladesh | Project implementation on climate change and disaster management. |
| Oxfam | Research, policy advocacy, networking on climate change and disaster related matter. |
| CARE Bangladesh | Project implementation on climate change and disaster risk management. |
| Bangladesh Centre for Advanced Studies (BCAS) | Research, training, policy advocacy, and project implementation related to climate change. |
| Centre for Natural Resource Studies (CNRS) | Research and project implementation on CCA and DRM. |
| Equity BD | Policy advocacy and campaign on climate change. |
| Unnayan Onneshon | Policy advocacy and campaign CCA and DRM. |

Coordination Mechanism

74. The GOB has instituted Climate Change Cells (CCC) in several ministries and line agencies headed by a Focal Point to coordinate and ensure that their activities reflect consideration for climate change. The MOEF is mandated to provide the overall coordination and integrate climate change risk management at both national and local levels. A Climate Change Unit (CCU) has been established in the MOEF to facilitate and coordinate with the CCCs. The CCU is supposed to focus on building the capacity of the government to mainstream climate change issues, particularly adaptation, in development activities, creating awareness, strengthening partnerships and enhancing capacity to adapt local livelihoods to the changing climate. The GOB has also recently created the 'Trust Fund Unit' at MOEF to manage the CCTF and BCCRF. Cabinet has recently approved a "Climate Change Trust Fund Policy" as part of an integrated plan to face disasters due to climate change. More recently the MOEF is also considering the creation of a Department of Climate Change (DCC).

75. The National Disaster Management Council (NDMC), headed by the Prime Minister, is the highest forum in Bangladesh for formulating and reviewing disaster management policies. An Inter-Ministerial Disaster Management Coordination Committee is in charge of implementing disaster management policies and decisions by the NDMC.

76. It is clear from the foregoing that Bangladesh has been quite active in addressing climate change related issues for a long time. In doing so, it has created various climate specific organizations and agencies, and has also assigned climate change specific responsibilities to existing ministries, departments and agencies. At this point of time technical assistance support is needed to address these capacity constraints and facilitate knowledge management. While an integrated mechanism for strengthening coordination between various institutions involved in climate change adaptation and disaster risk management is needed, technical assistance would be crucial for exploring the options for establishment of the Department of Climate Change (DCC)

to address the constraint in facilitating effective implementation of national policies for mainstreaming climate change and associated issues, including knowledge management.

Institutional Priorities for the PPCR

77. The PPCR recognizes that adaptation is a multidimensional phenomenon, with economic, political and social aspects, and that development is interconnected with adaptation in complex ways. To create a platform for coordinating new and on-going donor and government initiatives, the PPCR process will be coordinated by the MOEF in collaboration with the following focal points nominated by the Government:

- Bangladesh Water Development Board under the Ministry of Water Resources
- Department of Agriculture Extension and Bangladesh Rice Research Institute under the Ministry of Agriculture
- Disaster Management Bureau under the Ministry of Food and Disaster Management
- Local Government Engineering Department under the Ministry of Local Government Rural Development and Cooperatives
- Ministry of Social Welfare
- Department of Forests under the MOEF (no separate focal point has been appointed)
- Ministry of Health and Family Welfare

78. Detailed discussions have taken place between the GOB stakeholders, the World Bank Group and the Asian Development Bank. Other donors who have taken an active interest in the development of the SPCR are DFID, CIDA, IFC, JICA and UNDP. It has been decided that the primary focus in the use of funds from the PPCR should be in two broad areas. First, the capacity of the government for planning, coordinating, implementing and monitoring of climate change related activities in a sustainable manner needs to be strengthened substantially in a systematic fashion at least at two levels – at the macro level (MOEF) and at the micro level – implementing ministries/departments/agencies. PPCR resources could also be utilized to selectively strengthen other governmental agencies involved in climate change induced adaptation and mitigation activities. The second area of PPCR activities would be for interventions for the improvement and development of climate resilient infrastructure in 12 coastal districts, which suffer the most from climate related events. These activities will impact the MOEF, Disaster Management Bureau, Ministry of Agriculture, LGED, Ministry of Social Welfare and the Ministry of Health and Family Welfare. Once the detailed technical assistance and infrastructure development activities are agreed upon, different development partners would be expected to finance different parts of the program based on the resources available and potential for blending PPCR funding with their ongoing or planned programs/projects while keeping the institutional arrangements as simple and realistic as possible.

79. Since PPCR interventions are likely to focus on the coastal districts, it would be important to conduct an institutional analysis of the selected districts to determine the role of each national department/sector agency, local government agencies/administrative units at various levels of administration, NGOs, LCOs, CSO, etc. and an assessment needs to be made of the needs for institutional strengthening to ensure effective implementation. This would be important given the plethora of institutions that are likely to be responsible for implementation of various activities of the SPCR and to identify the most effective chain of command (for flow of funds, responsibility and accountability) from national to the district and lower levels.

Section 7: Outline of the Strategic Program for Climate Resilience

80. The overall aim of the PPCR is to help countries transform to a climate resilient development path consistent with the MDG; increased application of knowledge on integration of climate resilience into development; complement and provide incremental resources to support a programmatic approach to mainstream climate resilience in development planning, policies, and strategies; and enable a harmonized effort from all associated development partners under a common platform. The first step in the PPCR process is the preparation of a strategic investment program, the Strategic Program for Climate Resilience (SPCR). As mentioned before, Bangladesh has already completed a comprehensive strategy and action plan to deal with the main climate change challenges which is reflected in the NAPA and the BCCSAP. A summary of recommendations made in these documents is in Annex 3.

81. As a follow up to the NAPA and BCCSAP, the Government has taken several other important steps to manage the various sources of funding and coordinate both internal and DP's efforts to support the implementation of the NAPA and BCCSAP. As stated earlier, several DPs, large and small, are preparing various projects related to climate change adaptation activities (See Annex 1). All in all, these efforts have been and continue to be quite significant. However, given the magnitude of the climate related challenges and the resource and capacity constraints that Bangladesh faces generally, much more needs to be done in the years ahead.

82. **The NAPA, BCCSAP, the CCAP and the 44 specific program recommendations in the CCAP (summarized in Annex 3), combined with all the other steps that the GOB has already initiated, essentially comprise the SPCR for Bangladesh.** Considering the very substantial needs of Bangladesh for climate adaptation, it is proposed that the limited PPCR resources be used strategically to complement some of the critical objectives and interventions already laid down by the GOB in its strategy documents. Accordingly, it is recommended that the SPCR should have the following focused and realistic objectives:

- (i) assist GOB in the implementation of priority and selected activities identified under BCCSAP as they pertain to the southern coastal region of the country;
- (ii) pilot and demonstrate an integrated and multi-sector approach to planning and implementing a comprehensive set of hardware and software interventions in selected climate vulnerable hotspots;
- (iii) pilot innovative approaches for investment to enhance climate resilience through appropriate and effective adaptation measures; and,
- (iv) build capacity, raise awareness, monitor results, and systematically disseminate lessons for handling climate related risks.

83. The activities under the SPCR would include: (i) Promoting Climate Resilient Agriculture and Food Security and related TA to be led by IFC; (ii) Coastal Embankment Improvement and Afforestation in 12 coastal polders to be led by the World Bank; (iii) Climate Resilient Water Supply and Infrastructure Improvement to be led by ADB; (iv) TA for Capacity Building for Mainstreaming Resilience to Climate Change and Knowledge Management (including systematic data collection, analysis and dissemination) to be led by ADB; and (v) TA for preparation of feasibility study for a Pilot Program of Climate Resilient Individual Family Housing to be led by IFC.

84. The intention is to prepare a comprehensive package of interventions which would address the issues identified as high priority both by GOB and other stakeholders consulted during SPCR preparation. It is envisaged that the World Bank, ADB and IFC will include some of the projects that are prepared in the work program and other DPs, depending on their interest and resource availability, will finance the remaining items. Accordingly, a brief overview of the **Proposed Investment Program Components** in the SPCR is summarized below.

85. **Investment Project 1: Promoting Climate Resilient Agriculture and Food Security**

Objective:

- Livelihood diversification through adaptive agriculture;
- Scaling up climate resilient varieties of rice and crops including efficient irrigation system;
- Early warning system for farming communities for field crop protection.

Responsible MDB: IFC

Government Implementing Agencies: IFC will assume the lead role to assist in administering the PPCR funds. Department of Agricultural Extension (DAE) of the Ministry of Agriculture and Bangladesh Meteorological Department (BMD) has been identified at the initial stage.

Total Project estimate: \$13.1 million (including \$0.1 million for feasibility studies)

PPCR Request: \$3.1 million grant and \$10.0 million concessional financing.

Preparatory studies: Feasibility studies for project preparation estimated to cost US\$0.1million. Since part of this project will scale up an existing and successful IFC program, one key component of the project related to demonstrating and promoting stress tolerant crop varieties can move into implementation upon receipt of the funds. However, to scope out application of other appropriate technologies and practices a feasibility study including baselines will be undertaken.

86. **Investment Project 2: Coastal Embankments Improvement and Afforestation**

Objective:

- **Embankment Stabilization:** Climate proofing (rehabilitate and/or raise the height/or realign) of existing polders/embankments to withstand the current and projected estimates of cyclone and tidal surges;
- **Internal Polder Water Management:** Rehabilitate, build and/or improve water management related structures (e.g. sluice gates, flushing inlets, regulators, drainage channels, etc.) within polders for improved drainage, reduced flooding and water logging, and improved agricultural and fish productivity;
- **Afforestation:** Raise coastal greenbelt along the embankments through afforestation/ reforestation measures to counter tidal surges, strong winds and stabilize the embankment; coastal mapping; and research study on viable climate resilient tree species.

Responsible MDB: World Bank will assume the lead role in administering the PPCR funds.

Government Implementing Agencies: BWDB, the Forest Department (FD) and the Bangladesh Forestry Research Institute (BFRI).

Total Project estimate: \$325 million

PPCR Request: \$25 million grant

Co-Financing: Proposed \$300 million IDA credit.

Preparatory studies: Preparatory studies, including feasibility study and detailed design of the first phase investment are currently being undertaken under the Emergency Cyclone Recovery and Restoration Project (ECRRP). A detailed review of the Afforestation component of this study will be undertaken (By the WB team in consultation with Department of Forestry and Ministry of Environment and Forests) with the consultants of ECRRP study once they are mobilized. If the afforestation component turns out to be sub-optimal, additional consultants would be engaged to address this.

87. **Investment Project 3: Coastal Climate Resilient Water Supply, Sanitation, and Infrastructure Improvement**

Objective:

- **Climate Resilient Water Supply, Sanitation, and Drainage Development:** Develop water supply and drainage system in coastal districts which can provide safe drinking water and sanitation even with anticipated climate change impacts..;
- **Climate Resilient Infrastructure Improvement:** Improve connectivity (small roads, bridges, culverts, etc.) within the coastal districts in a sustainable and climate-proof way to enhance the accessibility of the rural people in the coastal districts to social services, such as health and education and economic opportunities, and to improve earnings for the rural poor including the poor women by widening the all-weather access to markets and livelihood activities;
- **Climate Resilient Small-Scale Water Resources Improvement:** Enhance agriculture productivity and sustainability, and improve rural livelihoods in subproject areas through the sustainable small-scale water resources (SSWR) management, including flood management, drainage improvement, water conservation, and command area development.

Responsible MDB: ADB will assume the lead role in administering the PPCR funds.

Government Implementing Agencies: LGED, Department of Public Health and Engineering (DPHE), Ministry of Food and Disaster Management, Water Supply and Sewerage Authority.

Total Project estimate: \$285 million

PPCR Request: \$20 million grant and \$50 million concessional financing

Co-Financing: proposed \$215 million ADB loan.

Preparatory studies: Feasibility studies for project preparation estimated to cost US\$1 million.

88. **Technical Assistance 1: Climate Change Capacity Building and Knowledge Management**

Scope of Work: The TA would involve a comprehensive assessment of existing institutional structures, policies and programs to determine the need for further strengthening to mainstream climate change in development planning and an assessment of existing knowledge products relevant to enhancing resilience to climate change. This would help identify the need for continued development of knowledge products and their dissemination to intended users and other beneficiaries. This may require commissioning analytical studies which may support climate change adaptation oriented policy reform and institutional restructuring as part of capacity building facilitated by enhanced knowledge and level of awareness. The assessment would also cover institutional structures, cross sector institutional linkages and coordination/collaboration mechanisms, vertical and horizontal integration, functions and

enforcement capabilities. It would identify gaps in the generation and dissemination of knowledge products, and challenges in mainstreaming climate change in development planning and implementation. The TA would recommend programs, measures and investments that may be needed to enhance institutional capacities with specific reference to climate change, both in public and the private sector (including NGOs and CSOs).

Responsible MDB: ADB will prepare and supervise the consultancy.

Government Counterpart: MOEF

PPCR Request: \$0.5 million grant

89. **Technical Assistance 2: Feasibility Study for a Pilot Program of Climate Resilient Housing in the Coastal Region**

Scope of Work: Under this proposal, it is proposed to pilot a new approach for providing shelter to people and livestock during cyclones and storm surges. The intention is to provide low cost, storm and cyclone proof individual housing through a home building finance program. The scope of work would include (i) a survey of the housing stock in the 12 polders showing for each polder the number and quality of houses, house and land ownership patterns, size of existing housing, whether they have any water and sanitation facilities and, if not, what they do for them, availability of electricity, income distribution patterns of the homeowners, number of family members and number of livestock owned, and other relevant details, leading to the preparation of a feasibility study; (ii) development of several modular designs for houses which meet the size, flood/cyclone proof and affordability characteristics while being amenable to minor modifications to suit owner preferences as well as requirements of geography; (iii) survey availability of building material and skills for building these houses in the vicinity of the polders; (iv) propose different scenarios for financing the house building program. Financing could entail a small initial contribution from the owner, a substantial initial Government grant and a low-interest house building loan to be repaid over a long term; (v) propose criteria for the selection of initial households for the pilot housing program; and (vi) prepare a comprehensive proposal covering all of the above aspects for a pilot project for the construction of several hundred houses in each polder. Provision of safe drinking water, sanitation facilities and a detachable solar home system for electricity for the houses would also be explored.

Responsible MDB: IFC

Government counterpart: MOFDM/LGED

PPCR Request: \$0.4 million grant

PART 2

PROPOSED INVESTMENT PROGRAM COMPONENTS FOR PPCR FINANCE

90. As mentioned before, the Investment Program Components being proposed to be partially financed under the PPCR consist of: (i) a project to Promote Climate Resilient Agriculture and Food Security and associated TA with an estimated cost of \$13.1 million. Of this amount, \$0.1 million would be spent to prepare the project and the remaining \$13.0 million for project implementation. US\$3.1 million is being requested from the PPCR grant allocation and \$10.0 million from the PPCR concessionary resources. (ii) a Coastal Embankments Improvement and Afforestation Project to be implemented by the World Bank. Estimated cost of the project is \$325 million to be financed by a \$25 million grant from the PPCR and a \$300 million credit from the World Bank; (iii) Climate Resilient Water Supply, Sanitation and Infrastructure Improvement project to be led by ADB. Total cost of the project is \$286 million of which \$1.0 million is for project preparation and \$285.0 million is project implementation. Financing of the project is proposed from \$21 million of PPCR grant, \$50 million of PPCR concessional funding and \$215.0 million of ADB loan; (iv) Technical Assistance for Climate Change Capacity Building and Knowledge Management; to be led by ADB. This is estimated to cost about \$0.5 million for which PPCR grant financing is being sought; and (v) Technical Assistance for feasibility study for a Pilot Program of Climate Resilient Housing in the Coastal Region to be led by IFC. Estimated cost of this study is about \$0.4 million for which PPCR grant assistance is being requested.

91. As required under the PPCR guidelines, detailed project concepts for the three Investment Projects and the TOR for related studies as well as the TORs for the two technical assistance proposals for which PPCR resources are being requested are presented below.

Investment Project 1: Promoting Climate Resilient Agriculture and Food Security

Background

92. Agriculture shall become one of the worst hit sectors in Bangladesh in the context of the global climate change. Climate change is resulting in an increase in global temperature, rise in sea levels and melting of the polar caps. These in turn are causing increased incidence of submergence, salinity intrusion, drought, etc. All of these drastically impact agricultural productivity and therefore food security and livelihood of millions of people in the affected regions. Bangladesh being a low-lying deltaic country is predicted to be one of the first countries to be affected. Bangladesh is only 10m above sea level. It faces the risk of losing 17% of its land mass and displacement of 20 million people as a result of climate change and rise in sea level. Agriculture is the major economic driver in Bangladesh, accounting for 20% of GDP and 65% of labor force. Already 1 million ha is affected by salinity, 2.6 million ha by flash flood, 1.63 million ha of coastal land by tidal flood and over 4.0 million ha by drought both in dry and wet season. Crop yields have dropped as low as 1 MT/ha in affected areas (average yield being 4.5MT/ha). The population is growing at 1.5%/yr whereas arable land is being lost at 1.75%/yr. By 2025 an additional 19 million mouths are to be fed by an already overburdened agriculture sector.

93. Appropriate adaptive measures along with building the coping capacity; therefore, is needed to avoid catastrophic consequences in terms of food security and livelihoods for a growing population vulnerable to the impacts of climate change.

Development Objectives

94. The objective of this project is to pilot adaptive agricultural products and practices which may help sustain agriculture in the changing agro-climatic conditions of the coastal zones and thereby create sustainable livelihood opportunities and food security for the vulnerable communities. The specific objectives are:

- To raise awareness and promote the use of stress tolerant, short duration and hybrid varieties of rice and vegetable seeds suited to the ago-climatic challenges of the areas within the polders in the coastal zones in collaboration with relevant government agencies including BARI, BRRI, DAE, BADC, BINA and interested private seed companies.
- To advise farmers, in collaboration with DAE and seed companies, on appropriate cropping cycle/patterns consisting of different crops that allows farmers' income round the year.
- To identify and promote adaptive and efficient water management technologies and practices including rain water harvesting systems, drip irrigation, low lift pumps, alternate wetting and drying technology, solar irrigation pumps etc. This intervention will be implemented in coordination with the other water management initiatives undertaken by BWDB under the PPCR.
- To develop an early warning system for farmers with regard to protecting their crops in times of natural calamities such as tidal surge, cyclone, flash flood, etc. This intervention may be done through a community information centre model and in conjunction with the other initiatives under PPCR/donor funded projects focused on Early Warning Systems for the coastal communities in collaboration with the Disaster Management Bureau.
- To identify/develop appropriate storage facilities for seed, other inputs and crops at a household as well as a community level and build awareness of the communities in this regard in collaboration with the relevant government agencies.
- To test the soil compositions in different localities, identify the specific requirement for fertilizer and additives and subsequently advise the farmers in this regard. This can be done in conjunction with SRDI and DAE.

Key indicators and baseline

| Component | Outcome | Impact |
|--|--|--------|
| Adaptive Seed Variety Promotion and Adoption | -Number of farmers adopting stress tolerant and adaptive varieties -Total area of cropped land under adaptive varieties | |

| | | |
|--|--|---|
| Appropriate cropping patterns for year round production | - Number of farmers adopting improved cropping pattern | - Increased crop yields - Increased farmers' income |
| Household and community level water management for irrigation | -Number of farming households adopting adaptive water management technologies and practices - Number of new irrigation technologies adopted tech - Increased access to irrigable water sources | |
| Early warning system for farming communities | -Number of farmers adopting protective measures due to early warning systems | -Reduction in crop loss |
| Storage solutions for inputs and crops at household and community level | -Number of farmers adopting improved storage practices | -Volume of seed appropriately stored and loss of inputs avoided -Quality of seeds or other inputs maintained |
| Soil testing in different polders and advice on specific fertilizer and micronutrients usage | -Number of farmers practicing sustainable/efficient use of inputs based on soil test recommendations | -Reduction in cost of inputs due to lower input usage -Hectares of land sustainably managed |

95. A baseline study will be conducted prior to implementation of activities for the specific target groups in the 12 polders identified in the coastal region of the country.

Anticipated components and activities

96. The key components are:

a. Development of six thematic sub-projects including partners, fund requirement, time frame, monitoring framework, implementers, fund disbursement mechanism etc. The sub-components are:

- Adaptive Seed Variety Promotion and Adoption
- Appropriate cropping patterns for year round production
- Household level water management for irrigation
- Early warning system for farming communities for field crop protection
- Storage solutions for inputs and crops at household and community level
- Soil specific fertilizer and input usage

Projects would be synergistically aligned to other PPCR project activities wherever relevant.

b. Baseline data collection.

c. Implementation of project.

d. Knowledge Management and dissemination of results.

97. Institutional arrangements:

- The grant component shall be used to develop and implement projects in collaboration with relevant government agencies including BARI, BIRRI, BINA, DAE, SRDI, etc. and the relevant private sector entities.
- It is expected that a genuine public-private collaboration model will emerge out of the project through mobilization of public and private sector resources and entities including organizations in national agricultural research system, companies, technology providers, financial institutions/intermediaries and other relevant service providers.
- The project shall undertake initiatives to develop input and output market linkages.

Risks

- Adaptive crop varieties specific to the needs of different polders (e.g. level of salinity) may not be available.
- Affordability of farmers and lack of access to finance may hinder adoption of adaptive technologies.
- Lack of coordination of relevant agencies may hamper quality and timely implementation of projects.
- Private sector may not see the adequate business potential to get engaged in adaptive initiatives.
- Relevant govt. agencies (e.g. BIRRI) may not be in a position to provide sufficient breeder/foundation seed to the private sector for multiplication in a timely manner.

Investment costing: (from PPCR resources)

| <u>Cost categories</u> | <u>Estimated Cost</u> |
|---|-----------------------|
| Surveys and Commissioned Analytical Studies | \$ 0.1 million |
| Investment Costs: | |
| Grant | \$3.0 million |
| Concessional loan | \$10.0 million |

Results and Performance Framework

98. The key results expected are:

Enhanced sustainable livelihood opportunities created for the vulnerable population in the coastal regions through-

- Increased adoption and use of stress tolerant/hybrid and short duration seed varieties.

- Reduction in input usage costs
- Reduction in crop loss due to natural calamities
- Better preservation of seeds and other inputs
- Improved crop yield
- Increased income

Terms of Reference for Promoting Climate Resilient Agriculture and Food Security Project

Introduction

99. Agriculture shall become one of the worst hit sectors in Bangladesh in the context of climate change. Increased incidence of submergence, salinity intrusion, drought, etc. resulting from climate change will drastically impact agricultural productivity, food security and livelihood of millions of people in the affected regions. Already 1 million ha is affected by salinity, 2.6 million ha by flash flood, 1.63 million ha of coastal land by tidal flood and over 4.0 million ha by drought both in dry and wet seasons. Crop yields have dropped as low as 1 MT/ha in affected areas (average yield being 4.5MT/ha). Population is growing at 1.5%/yr whereas arable land is being lost at 1.75%/yr. By 2025 an additional 19 million mouths are to be fed.

100. The Pilot Program for Climate Resilience (PPCR) is a multi-donor program to pilot and demonstrate ways to mainstream new approaches for integration of climate risk and resilience into development projects, policies and planning. Bangladesh is participating in the PPCR and intends to pilot projects to develop the resilience of the farming community to the effects of climate change through adopting adaptive agricultural practices. The government has decided that this activity will be undertaken on a pilot basis in the following 12 polders in the coastal districts of Bangladesh:

| Polder No. | Union Parishad | Upazila | District | Population (no.) |
|-------------------|---|-------------------------|-----------------|-------------------------|
| 7/1 | Padmapukur, Pratap nagar | Shaymnagar | Satkhira | 40,000 |
| 13-14/2 | Koyra, Uttar Betkashi, Batali, Moharajpur, Moheshwaripur | Koyra | Khulna | 142,000 |
| 35/3 | Dema, Mollikerber, Karapara | Bagherhat Sadar, Rampal | Bagherhat | 36,000 |
| 39/2 C | Tushkhali, Machua, Betmore, Telekhali, Ekri | Mathbaria, Bhandaria | Pirozpur | 90,000 |
| 41/5 | M. Balitali | Barguna Sadar | Barguna | 31,950 |
| 46 | Nilgonj | Kalapara | Patuakhali | 32,000 |
| 55/3 | Nurabad, Mujibnagar, char Kajal, char Biswas | Charfesson & Galachipa | Bhola | 56,000 |
| 73/1 | Char Iswar, Char King, Nalchira, Sukchar, Sonadia, Burirchar and Tamaruddin | Hatiya | Noakhali | 1,65,000 |
| 59/2 | Char Kalkini, Char Falcon, Alexander, Char Abdullah | Kamalnagar, Ramgati | Lakshmipur | 1,10,000 |

| | | | | |
|--------|---|-------------|-------------|----------|
| 60 | Charchandia, Sonagazi sadar | Sonagazi | Feni | 1,55,000 |
| 63/1 A | Brong Chara, Juidani, Bortali, Barsat, Raipur, Boirag | Anowara | Chittagong | 1,39,000 |
| 70 | Materbari and Dhalghata | Moheshkhali | Cox's Bazar | 90,200 |

Objective

101. The objective of this project is to pilot adaptive agricultural products and practices which will help sustain agriculture in the changing agro-climatic conditions of the coastal zones and thereby create sustainable livelihood opportunities for the vulnerable communities.

Scope of work

102. A study will be conducted to take stock of the current levels of stress, current agricultural practices, identify key constraints and opportunities with regard to farming, identify key private sector players in the market and to thereby propose projects geared towards supporting agriculture and agribusiness in the coastal zones. The scope of work of the assignment is depicted as under:

(i) A survey is to be carried out covering samples from the farming community in all 12 polders identified by the Government of Bangladesh for the purpose of PPCR.

103. The survey should show for each polder:

- the average number of farmers
- key agricultural activities being undertaken
- key crops being grown and identify high value crops that can be grown in coastal environment
- cash crops suitable for the coastal zones
- current cropping pattern
- current agricultural practices with regard to input use, irrigation water management, soil testing etc.
- input and output market linkages current level of damage to crops due to climatic events
- sources of crop and market related information for farmers
- sources of finance
- tools/implements/technologies currently being used
- current storage practices for inputs and crops
- average income
- major non-farm sources of income
- mapping of other government, non-government organizations and private business entities engaged in agriculture/agribusiness
- private sector investment potential

104. The scope of work for the survey will consist of, but not be limited to, the above mentioned areas.

(ii) Upon completion of the survey, the findings are to be validated through workshops and stakeholder engagements. The focal points from IFC and the Ministry of Agriculture are to be consulted throughout this process.

(iii) Based on the final findings, key elements for a project design should be proposed including, but not limited to, the following areas:

- Appropriate cropping patterns for year round production
- Household/community level water management for irrigation
- Early warning system for farming communities for field crop protection
- Storage solutions for inputs and crops at household and community level
- Soil specific fertilizer and input usage
- Input and output market solutions

Deliverables

105. A feasibility study report that should include, but not be limited to, the following:

- Relevant baseline figures
- An overview of market dynamics of agriculture and agribusiness in the selected coastal zones spelling out key constraints and opportunities and recommendation for areas of potential interventions

Implementation Arrangements

106. IFC shall be responsible for the overall supervision of the study. The hiring of consultants shall be done according to IFC's procurement policy. The report is to be finalized with inputs from both IFC and the Government focal points. Focal point agencies shall support the scoping exercise by providing the existing data and information to the Consultants undertaking the study.

107. The project is to be implemented by IFC in collaboration with nominated focal point agencies. Other Government Agencies shall be engaged, where relevant.

Investment Project 2: Coastal Embankments Improvement and Afforestation

Background

108. Bangladesh is mainly comprised of the fertile alluvial floodplains of three large rivers (Ganges, Brahmaputra and Meghna) with over 90% of their catchments situated outside the country. These three rivers combine within the country to form the world's third largest river, the Lower Meghna, which drains into the Bay of Bengal via a constantly changing network of estuaries, tidal creeks and active deltaic coastline of the Bay. More than fifty other local rivers also flow within Bangladesh and drain into the Bay. The lower part of the country adjoining the Bay of Bengal is commonly known as the "Coastal Zone". The zone varies from a moribund delta formation in the west, through a transition area to the active delta conditions of the Lower Meghna Estuary and associated islands, and then on to the narrow non-deltaic coastal plain in the east. The west zone includes the ecologically important Sundarban mangrove forest area.

109. Most of the Coastal Zone is characterized by the delicate balanced natural morphology of an evolving delta with very flat gradient so that even small changes anywhere can have wide spread consequences. Typically high rainfalls during monsoon season and full-flowing upstream rivers which flood often, coinciding with impeding high tides of the sea, results in extensive inundation on the floodplains. Cyclone storm surges often compound the situation. And all these three independently appearing natural forces, cyclone surges, high tides and river floods, are particularly significant and have caused major losses of life and property. In particular, cyclones in the coastal zone of Bangladesh accounted for several of the world's worst natural disasters of the twentieth century the last one being the Cyclone Sidr of 2007. Flooding is also a recurring phenomenon in Bangladesh and each year about 22 percent of the country is inundated.

110. Cyclone storms and surges are major features of the Coastal Zone climate of the Bangladesh. In the last 200+ years, the coastal zone was affected by at least 70 such storms, and alarmingly, recent decades have seen higher frequency, with 40 storms since 1948. The few worst ones in the past have each killed more than 100,000 people. But only a couple of thousands have been killed by the recent Cyclone Sidr in 2007 and there is clear evidence that coastal zone embankments (CZE) along with a properly functioning cyclone warning system provide an effective buffer during storm surges and wave attacks. Some embankments did not even fail when they were overtopped by the storm surge. A storm surge of raised water levels, with high waves, which is amplified as it moves up the Bay of Bengal and inland estuary channels under the cyclonic winds of up to 200+ km/hr, could have water levels rising by up to 6-7 meters (funnel effects) in extreme cases. Structural interventions in the coastal areas by CZE have significantly reduced the vulnerability to natural disasters of the poor and have created economic opportunities for them by ensuring increased agricultural production. The existing network of CZEs is large with more than 6,000 km of coastal embankments and over 120 polders, incorporating more than 7,000 hydraulic structures such as one way sluice gates and outlets, and many of them are constructed more than 30 years ago (early 1960s). The total investment on these schemes amounts to more than US\$ 2-3 billion. However, their effectiveness in most cases has been compromised by shifting coastal and river bank lines, poor maintenance and inadequate management.

111. In addition to the above, climate change poses a new threat for the communities. Climate change-induced reduced fresh water flows during dry season and increased flows during monsoons and sea level rise from downstream aggravates the spatial and temporal variation of

the flood inundation and salt water intrusion in the coastal districts. Furthermore, the intensity of tropical cyclone and storm surges is expected to increase due to climate variability and change. Cyclones and storm surges also jeopardize human lives and livestock in the coastal areas. With frequent storms recently, the CZEs have weakened and are in need of systematic restoration and upgrading.

112. Studies have indicated that in broad terms, the building and rehabilitation of coastal water management infrastructure, such as embankments, is environmentally beneficial, because they protect people, vegetation and animals against high tidal waves and cyclone surges in the area. However, establishment of the embankment systems have very important environment-related issues and a very systematic approach and study are needed to upgrade the coastal embankment system. Therefore, future design should protect against an appropriate return period and should be based on sound environmental, social and economic assessment. In addition, technical designs should be more adaptable both towards natural hazards and toward changes in land use and operational requirements.

Development Objectives

113. Undertaking a systematic rehabilitation and upgrading of the coastal embankment system is an essential first step in protecting the coastal areas from floods, tidal and storm surges, and cyclones. Given the magnitude of the task and the resources required to address them comprehensively, it is impossible to do it all within a short period or within just one or two project cycles. To resolve this, a programmatic approach which incorporates a longer term perspective, running over about fifteen to twenty years, and composed of at least 3-4 phases succeeding each other, is required. Each successive stage would be initiated on the achievement of predetermined milestones and each phase would be designed incorporating the lessons learned from the previous stage. The objective of the proposed Coastal Embankments Improvement and Afforestation Project (CEIP) would be to support the first phase of the Government of Bangladesh's long-range plans to: (i) reconstruct and modernize the coastal embankments system to make it climate resilient; (ii) to rehabilitate, build or improve all water management related structures within the embankments for improved drainage, reduced flooding and water logging and improve agriculture and fish productivity; and (iii) to improve the coastal greenbelt along the embankments and reduce the impact of tidal surges and strong winds by implementing a systematic program of afforestation/reforestation measures.

Key Indicators

114. The key indicators for measuring the achievement of project objectives will be: (a) the number of people protected within the embankments; (b) the length of embankments rehabilitated and/or improved and their height; (c) the number of water management related structures (sluice gates, flushing inlets and regulators improved and/or constructed; (d) length of drainage channels improved, etc.); and (e) the area of land covered by reforestation/afforestation.

Anticipated Components

115. The World Bank is currently funding an Emergency Cyclone Rehabilitation and Restoration Project (ECRRP). Under this project a *Coastal Embankment Improvement Strategy and Phasing Plan* will be developed to modernize and improve the embankment system of about

125 polders in the entire coastal area. The Strategy will also indicate a phased investment plan over a period of 10 to 15 years, as well as a detailed Phase 1 investment plan to cover about 25 to 30 polders. Consultants have been engaged recently to start preparing the Strategy. During the PPCR consultation process, 12 priority polders have been identified for early action and these polders are likely to be included in the Phase 1 investments. The project proposed for inclusion in the *Coastal Embankments Improvement and Afforestation Project* would consist of the following:

Component 1: Rehabilitate or build climate resilient embankments to protect human lives and assets

116. This component will finance the optimal design, rehabilitation and improvement of the embankment system in each polder identified for inclusion in Phase I with due consideration to projected population density, economic activity of the area, the value of current assets to be protected and forecast projections for the next 20-25 years, return period and frequency of flooding, cyclones and their probable direction, stability of current embankments, availability of local material for construction and maintenance, minimum and low cost operations and maintenance, impact of climate change and sea level rises.

Component 2: Rehabilitate or build all water management related structures within polders

117. This component will finance the design, rehabilitation and improvement of all water management related physical infrastructure and systems within the polders. This will include flushing inlets, sluice gates, regulators, drainage channels, etc. and will improve drainage, reduce flooding and water logging, and contribute to the improvement of agricultural and fish productivity and thereby improve food and income security and livelihoods.

Component 3: Coastal plantation along the embankments

118. Most of the polders developed in Bangladesh do not have significant greenbelt or coastal plantation. It is only in the 90's that coastal afforestation and plantation along the roadside and embankments became popular. Past climate induced disasters have shown that mangrove greenbelts or coastal forests improve climate resilience. This component will finance afforestation along the embankments as appropriate. The greenbelts will strengthen the earthen polders and ensure their longevity. Afforestation will also increase general forest cover, reduce vulnerability against storm surge and cyclones, act as a carbon sink which will contribute to greenhouse gas mitigation, improve livelihoods, and provide habitat for wildlife.

Component 4: Construction supervision, detailed designed, project management and implementation support

119. This component will finance all construction supervision contracts as well as detailed designs, bidding documents, social impact assessment and full resettlement plan, environmental assessment, environmental management plans, EIA, implementation support and project management.

Institutional Arrangements for Implementation

120. **Project** Components 1 and 2 of the project will be implemented by the BWDB's Coastal Embankment Unit in coordination with other relevant units of BWDB and representatives of local government agencies within the polders. **Project** Component 3 will be implemented by the Forest Department of the Ministry of Environment and Forests in cooperation with the local government institutions active in the polders.

Estimated Investment Cost

121. The preparation cost of the project is covered under the World Bank's ECRRP mentioned above. The capital cost of the project is expected to be about \$330 million, with a proposed PPCR Grant financing of \$30 million and a proposed IDA credit of \$300 million.

Results and Performance Framework

122. The entire population living inside the 25 to 30 polders along with their assets will be protected from cyclones and storm surges. This protection will also enable a more sustainable economic development of the coastal area.

Investment Project 3: Coastal Climate Resilient Water Supply, Sanitation, and Infrastructure Improvement

Component 1: Climate Resilient Water Supply, Sanitation, and Drainage Development

Background

123. The National Adaptation Programme of Action (NAPA) prepared in November 2005 has identified that the most damaging effects of climate change are floods, salinity intrusion and droughts, and that challenges induced by climate change include scarcity of fresh water, drainage congestion, river bank erosion and wider salinity in the surface and ground water. Based on thorough analysis, adaptation strategies have been identified, which include capacity building for integrating climate change in planning and designing infrastructure, and enhancing resilience of urban infrastructure and industries. The Government took further steps through the adoption of the Bangladesh Climate Change Strategy and Action Plan (BCCSAP) in September 2008. Improvement of urban drainage and implementation of water and sanitation program in climate vulnerable areas are among the priority actions under BCCSAP.

124. The impacts of climate change will be severe in urban areas, where drainage is already a serious problem and flooding is common in the monsoon season, especially due to higher and more intense rainfall. In addition, sea level rise could delay discharge from the drainage system in low-lying areas. Moreover, once flooded, contamination by wastewater could cause serious health risks to the communities. Major cities are increasingly vulnerable, and the drainage capacity needs to be improved to prevent water logging. Another problem in urban areas is provision for safe water supply. The increasing prevalence of droughts is affecting surface water and shallow tube-wells, and the situation may further aggravate due to change in rainfall pattern. In the coastal zones, salinity intrusion due to sea level rise might affect the availability of both surface and ground water. Municipalities in coastal area may need to take water from upstream of rivers far from the city, store fresh water in rainy season with large impounding reservoirs, and/or desalinate saline water for drinking purpose.

125. The policy and advisory technical assistance for Strengthening the Resilience of the Water Sector in Khulna to Climate Change (TA 7197-BAN) has been recently completed and confirmed that coastal towns will face substantial climate change impacts, which will require carefully-designed interventions for adaptation. For example, the mathematical models under the TA showed that water-logged areas in Khulna city will increase from 29% to 54% in 2050, if there are no investments to improve drainage. In order to keep 80% of city area free from water-logging in 2050, \$11 million of investment is required for drainage improvement. When more intensive rainfall and other climate change impacts are reflected in the simulation model, additional \$17 million will be required. For water supply system, the model concluded that the number of days river salinity will exceed the maximum allowable limit (1.0 ppt chloride) at the proposed water intake point will increase by 24 days in 2050, from the current level of 41 days per year. This will require either (i) increasing the size of the impounding reservoir (about 12 MCM by 2050) to provide non-saline water when the river water is too saline, or (ii) relocating the water intake further upstream (about 4 km by 2050). The TA focused on localized climate change impacts in Khulna City. Climate change impacts in other coastal towns will be similar in nature, but technically-feasible and cost-effective adaption measures will be different across

towns. The project will examine the expected climate change impacts and develop adaptation measures for each town in coastal area, focusing on drainage and water supply sector.

Development Objectives

126. The development objective of the proposed intervention is to make coastal towns resilient to climate change impacts. The major climate change impacts which will affect coastal towns will be (i) increased salinity intrusion in surface and ground water due to sea level rise, which will make it difficult to secure sufficient fresh water, and (ii) more frequent and intense rainfall, which will aggravate water logging and flooding. Potential climate change impacts will be identified first, and cost-effective adaptation measures will be developed for each city. The adaptation measures will include physical ones (e.g. rehabilitation / expansion of drainage) as well as non-physical ones (e.g. rationalization of land use plan and better OM system to keep drains' flow capacity).

Key Indicators

127. The key indicators to measure the project achievements include (a) the number of people with access to safe drinking water and the amount of water provided through climate-resilient water supply system, (b) the number of people and the size of areas covered under climate-resilient drainage/flood management system, and (c) the number of towns which developed long-term urban plans reflecting climate change impacts.

Anticipated Sub-Components and Activities

128. **Sub-Component 1.1: Development of climate-resilient water supply system.** Component 1 will develop water supply system in coastal towns which can provide safe water even with anticipated climate change impacts. Since both surface and groundwater will contain more salinity due to sea level rise, the main challenge is to secure sources of non-saline water. The feasibility study will identify the most cost effective sources, including surface water intake from upstream of rivers, impounding reservoirs to store fresh water, and small desalinization plants for drinking purpose. In order to exploit scale economy, multiple municipalities may share facilities, such as intake and transmission mains, in case they need to take water far a way from towns. The component will also include supports to develop municipalities' capacity to monitor the water quality and manage the sources properly.

129. **Sub-Component 1.2: Development of climate-resilient drainage.** Component 2 will rehabilitate and/or develop drains, sluice gates, pumps, river banks and other facilities for flood management. Climate change is expected to alter the intensity, frequency, and total amount of rainfall, which aggravate flooding and water logging in coastal towns. The project will first examine the expected flood damages and develop certain design standards for drainage to reflect the expected climate change impacts. Since dumping of solid waste into drains and canals often limits flow capacity, the project will include improved collection of solid wastes and awareness campaign against dumping.

130. **Sub-Component 1.3: Preparation of climate-resilient urban plans.** Long-term urban development plans will be reviewed and improved to reflect potential climate change impacts. Land use plans will be prepared to ensure cost effectiveness of physical investments in drainage

and water supply. It may involve certain relocation of industry and houses, which will require extensive consultations with the local community. Depending on local geography and urban development pattern, the urban planning may cover peripheral areas under Upazila, beyond municipal boundary.

Institutional Arrangements for Implementation

131. All sub-components will be primarily implemented by municipalities (pourashavas and city corporations) with support of the concerned central government agencies. The sub-components 1 and 3 will be supported by the Local Government Engineering Department (LGED), while the sub-component 2 will be supported by Department of Public Health and Engineering (DPHE). Local Government Division under Ministry of Local Government, Rural Development, and Cooperative will chair the steering committee which provides overall policy guidance.

132. This component will be implemented under Coastal Towns Infrastructure Improvement Project, listed in the ADB's country program. Subject to further assessments on the climate change impacts and investment needs, part of the proposed sub-components may be carried out under other projects planned in coastal towns, such as Khulna Water Supply Project and City Region Development Project.

Results and Performance Framework

133. Approximately 15 'pourashava' will have improved water supply system and drainage which are resilient to expected climate change impacts.

Component 2: Climate Resilient Infrastructure Improvement

Background

134. The rural infrastructure in Bangladesh is yet to be fully developed. Only 37% of the rural population in the country has access to all-weather roads compared with 60% in India and 61% in Pakistan. Road connectivity is weak, resulting in higher vehicle operation cost and the need for a significant upgrading of rural infrastructure. The main problems in fostering road connectivity are: (i) fast growing demand for road transport (6%); (ii) lack of funds for developing infrastructure; (iii) lack of enforcement of government's policies and regulations in road safety; (iv) inadequate maintenance funding; (v) lack of technical skills and capacity building of local government institutions; and (vi) vulnerability to extreme weather events. The absence of efficient rural transport and supporting infrastructure culminates in reduced accessibility for poor and women to resources and social services and is a serious impediment in fostering the economic and social development.

135. Bangladesh is considered to be one of the most-affected countries by the consequences of climate change. Increased risks of severe flooding, more frequent extreme weather events and a potential rise of the sea level pose new risks to the rural infrastructure, particularly to the coastal districts. Sea level, a vital issue of concern for Bangladesh, is expected to rise by 18 to 59 cm by 2100, with 'best estimates' of around 40-45 cm. Given the country's vulnerability to its impacts, climate change is now the most pressing development concern. In the recent past, the country has

experienced a rise in sea level, increased temperatures, enhanced monsoon precipitation and runoff, potentially reduced dry season precipitation, and an increase in the frequency and intensity of tropical cyclones and storm surges. These harmful climate change impacts are due to the country's vulnerable geophysical location, low deltaic floodplain, hydrological influence by erratic monsoon rainfall, and changes in regional water flow patterns. Any infrastructure investments must therefore address these new challenges.

Development and Specific Objectives

136. The project will reduce poverty and raise incomes in the coastal districts of Bangladesh through fostering road connectivity in a sustainable and “climate-proof” way. The project will enhance the accessibility of the rural people in the coastal districts to social services, such as health and education and economic opportunities. Widening the all-weather access to markets and livelihood activity will result in improved earnings for the rural poor including the poor women.

137. The project areas will be selected on the basis of vulnerability to sea level rise, connectivity and poverty concentration, and there will be greater emphasis on fostering gender equity in economic opportunities, ensuring sustainable operation and maintenance, and considering green elements in the design and implementation of the project.

Key indicators and baseline

138. Improving 100 km upazila roads, 200 km union roads and 100 km village roads with 1,500 meters of bridge/culverts and also 20 growth center/rural markets in a “climate-proof” way.

Anticipated Sub-Components and Activities

139. This component will mainstream climate risk reduction into policy formulation and infrastructure development. A key feature is climate proofing and disaster resilient designs for rural infrastructure to ensure that upgraded roads are less vulnerable to floods, storm surge, landslides and impacts of other extreme weather events. Following sub-components are envisaged: (i) improving rural infrastructure in a ‘climate-proof’ way (e.g. flood proofing of rural roads, raising the height and strength of the roads, raised platform for rural housing for sea level rise, increased height, width and strength of bridge and culverts, improved drainage structure across roads, raising of coastal embankments with concrete top to be used as roads etc.), (ii) conducting a vulnerability of mapping of coastal districts, and (iii) preparing a climate change resilient infrastructure management plan.

Institutional Arrangements for Implementation

140. The Executing Agency will be Local Government Engineering Department (LGED) in the Local Government Division of the Ministry of Local Government, Rural Development, and Cooperatives. The Project will be implemented by a suitably staffed project management office (PMO), to be established by LGED at its headquarters in Dhaka. The Chief Engineer of LGED assisted by project monitoring and evaluation unit will be responsible for overall project implementation and coordination. The PMO will be established in Dhaka with one office in

coastal districts. The LGED district offices, headed by executive engineers, will be responsible for implementing subprojects under the guidance of the PMO.

Risks

141. The project implementation related risks (including implementation delay and lack of maintenance fund) are manageable and will be largely mitigated during implementation. The major risk is the climate change related impact beyond predictable level.

Performance Targets, Anticipated Outcome and Indicators

142. Performance targets include (a) Improved Road Connectivity; (b) Upgraded Marketing Facilities; and (c) Improved Rural Infrastructure Management. Anticipated Outcome includes:

- 2 million people have all-weather access to markets and social service providers including health and education;
- Average travel time for project households to access desired markets reduced to 230,000 hours from 460,000 hours;
- Average transport cost of farm produce to preferred market reduced to Taka 0.04/kg/km from Taka 0.1/kg/km;
- Average annual farm income per household in project area increased to more than Taka 13,000 from Taka 8,720;
- Income opportunities generated for 10,000 women

143. The Performance indicators include (i) 200 km of upazila roads improved to climate resilient standards; (ii) 50 km of union roads improved to climate resilient standards; (iii) 1,200 meters of bridges/culverts on upazila and union roads constructed in a climate proof way; (iv) 20 markets improved with 15% space allocation for women; (v) Women's market section completed in 10 markets with about 100 shops; (vi) Climate change resilient rural infrastructure management plan and vulnerability mapping developed; (vii) Awareness training on climate change and mitigation measures conducted; and (viii) Sustainable road maintenance plan piloted and developed.

Component 3: Climate Resilient Small-Scale Water Resources Improvement

Background

144. About 80% of Bangladesh's population is rural and reliant on agriculture and off-farm activities. More than two-thirds of the rural population is landless or functionally landless³. The country's flat topography, frequent flooding, river erosion, and seasonal water shortages, combined with the predicted impacts of climate change, make increasing agricultural productivity for food security a key challenge. This is aggravated by inadequate water management infrastructure, limited beneficiary participation, and poor operation and maintenance (O&M) of water resources infrastructure. The project builds on lessons from previous ADB investments in the small-scale⁴ water resources sector, specifically the Small-

³ Owning less than 0.2 hectares of land.

⁴ Small-scale infrastructure has a command area of less than 1,000 hectares.

Scale Water Resources Development Sector Project, which was implemented from 1996 to 2002 and developed 280 subprojects in western Bangladesh, and the ongoing Second Small- Scale Water Resources Development Sector Project, which commenced in 2002 and is due to be completed in mid-2010 which has developed 275 subprojects in 61 of the 64 districts of Bangladesh. The Participatory Small-Scale Water Resources Project (PSSWRSP) approved by ADB in 2009 will undertake development of a further 260 new subprojects and enhance performance of 150 subprojects from earlier phases.

145. The proposed project will finance subproject investments in the small-scale water resources sector, in particular the provision of improved flood management, drainage, water conservation and access to surface water for irrigation during the dry season. The Project will climate proof and improve performance of 100 existing subprojects in coastal districts of Bangladesh.

146. Climate change is a pressing development challenge for Bangladesh. Projected impacts include an increase in temperature of over 1.0°C by 2050 and average sea level rises of 30 cm by 2050, which could make an additional 14% of the country extremely vulnerable to floods and dislocate more than 35 million people from coastal districts. With rising sea surface temperatures, the intensity and frequency of cyclones and storm surges are also likely to increase. Poor communities, which are disproportionately dependent on marginal lands including the coastal belt, will be most affected.

147. Climate change threatens the significant achievements made by Bangladesh in the last 20 years in raising incomes and reducing poverty. It also poses major threats to the achievement of the MDGs, particularly those on eliminating poverty and promoting environmental sustainability. Rising temperatures and changing rainfall patterns, along with higher flooding and rising salinity in the coastal belt are likely to reduce crop production. The Intergovernmental Panel for Climate Change estimates that by 2050 rice production in Bangladesh could have declined by 8% and wheat by 32% from 1990 levels. In southeast Bangladesh, an estimated 14,000 tons a year of grain production could be lost because of sea level rises by 2030 and 252,000 tons a year could be lost by 2075. Greater requirements for fertilizers, pesticides, and irrigation may result in higher production costs.

Development and Specific Objectives

148. The project impact will be enhanced productivity and sustainability in agriculture in subproject areas, and its outcome will be sustainable small-scale water resources management systems in subproject areas. There will be improvements in rural livelihoods through improved participatory SSWR management, including flood management, drainage improvement, water conservation, and command area development. The project will have three outputs: (i) institutional strengthening of government agencies at all levels to support small-scale water resources (SSWR) development with climate proofing as a core element of subproject planning and design; (ii) participatory subprojects that will include poor and vulnerable groups and enable WMCAs to plan, implement, operate, and maintain subprojects; and (iii) upgrading and performance enhancement of up to 100 existing SSWR subprojects⁵ to climate proof them against increased fluvial and coastal flooding.

⁵ Among subprojects completed under the first and second Small-Scale Water Resources Sector Development Projects, the average command area per subproject is 550 hectares

Key indicators and baseline

149. The project is designed to support the improvement and climate proofing of 100 subprojects in coastal districts of Bangladesh and will establish and strengthen inclusive water management cooperative associations (WMCAs). The project will contribute to enhanced agricultural productivity with an expected increase in cereal production from 212,000 t in 2009 to 292,000 t in 2017. Similarly, the increase in other crop production from 107,000 t in 2009 to 166,000 t in 2017. A total of 100 WMCAs will be further strengthened, with women as at least one third of members, and sufficiently strengthened to plan, implement, operate, and maintain small-scale water resources management systems. Subprojects will provide benefits to 87,000 hectares (ha) of cultivable land and the number of directly benefitting households is 135,000. Benefits to 440,000 people will be in the form of increased crop yields, intensification of cropping systems, and extended areas and yields of capture and culture fisheries.

Anticipated Sub-Components and Activities

150. The project will mainstream climate risk reduction into policy formulation and infrastructure development. A key feature is climate proofing and disaster resilient designs for SSWR infrastructure to ensure that investments are less vulnerable to increased fluvial and coastal flooding. Key infrastructure interventions include:

- (i) **Flood management.** Rehabilitate and construct embankments and/or sluice gates to reduce the depth and duration of flooding of farmland and ensure sufficiently climate proofed with additional freeboard and strengthening;
- (ii) **Drainage improvement.** Re-excavate drainage canals to increase the capacity of drainage systems to benefit agriculture and culture fisheries. Climate proofing to increase capacity to accommodate increased fluvial flows and predicted increase in sea level;
- (iii) **Water conservation.** Develop the water retention capacity of existing *haors*, *beels*, and canals to increase availability of irrigation water. Ensure sufficient capacity through climate proofing to accommodate increased flows

151. Additional activities would include: (i) capacity building of LGED's Integrated Water Resources Management Unit to systematically undertake climate proofing of SSWR development during planning and design stages, (ii) WMCA strengthening in O&M to ensure infrastructure is well maintained to give long term sustainability for climate change impacts, and (iii) extension support to introduce appropriate crop varieties which are submergence resistant and drought tolerant and (iv) community based vulnerability mapping for greater knowledge of potential risks and impacts of climate change.

Institutional Arrangements for Implementation

152. The Integrated Water Resources Management Unit (IWRMU) within LGED is responsible for overall development, operation and maintenance (O&M), and monitoring and evaluation (M&E) support for SSWR subprojects. A project management office (PMO) will be established within IWRMU to manage and coordinate project activities. The PMO will receive support from four specialist sections of IWRMU and from project implementation consultants. Ten regional offices of LGED, intermediary to headquarters and district levels, will provide

training, supervision, inspection and monitoring functions for completed subprojects. A steering committee will be established for overall coordination of concerned ministries and agencies. Planning and implementation committees at district and local levels will ensure smooth coordination. Local governments, LGED regional and district offices, specialist facilitators recruited from nongovernment organizations (NGOs) or firms, and local community assistants will help to form the WMCAs. Departments of Cooperatives, Agricultural Extension and Fisheries will help to build their capacity by providing extension support services. Civil works will be initiated following establishment and capacity building of WMCAs who will assume O&M responsibilities on completion of the subprojects.

Risks

153. Main risks are that infrastructure investments will not be adequately climate proofed for increased fluvial and coastal flooding. Rural communities will be unaware of ensuing maintenance costs and lack capacity to undertake requirements. IWRMU will have insufficient capacity for undertaking planning and design activities to incorporate climate change impacts and provide better post construction support for long term sustainability of investments.

Performance Targets, Anticipated Outcome and Indicators

154. Performance targets include (a) Agriculture productivity within public flood management and irrigation schemes will have increased to Tk80,000 per hectare (ha); (b) Irrigated winter paddy (*boro*) yields will be 6.0 tons (t)/ha; and (c) Communities will be more resilient to impacts of climate change on agriculture. Anticipated Outcome includes (i) increased cereal production at subproject sites from 212,000t in 2009 to 292,000 t and non-cereal production from 107,000 t in 2009 to 166,000 t; (ii) 100 WMCAs (with at least one-third female membership) demonstrate their ability to plan, implement, and operate and maintain small-scale water resources with climate proofed management systems; and (iii) IWRMU strengthened and capable of incorporating climate change in SSWR planning and design.

155. The Performance indicators against outputs under the Project component: Output 1: Institutional Strengthening for enhanced capacity and capability of government agencies at all levels that support climate proofing in SSWR development, the output performance targets are:

- Annual EME completed as scheduled with data to be disaggregated by gender and socioeconomic category
- 100 WMCAs regularly provided with institutional and technical support
- Climate change training of IWRMU staff

156. Under the Project component: Participatory Subproject Development for enhancement of subproject development process for sustainable WMCA to ensure climate resilience, the output performance targets are:

- All WMCAs registered, with at least 30% women membership in management committees
- 100 WMCAs are trained in climate change and climate proofing for sustainability
- 100 requests for climate proofing of existing SSWR systems approved
- WMCA maintenance fund sufficient for annual maintenance activities

- Timely maintenance and O&M fund replenished periodically

157. Under the Project component: Small-Scale Water Resources Infrastructure for upgrading and climate proofing of small-scale water resources subprojects in coastal districts, the performance targets are:

- 100 SSWR subprojects upgraded and climate proofed; and
- A total of command area of 55,000 ha covered by subprojects

Estimated Investment Cost for Investment Project 3

158. The feasibility study for project preparation is estimated to cost US\$1 million.

159. The estimated investment cost is \$290 million, with a proposed PPCR \$25 million grant financing and \$50 million concessional loan financing. The remaining \$215 million is to be co-financed by ADB through (i) Coastal Towns Infrastructure Improvement Project (\$100 million ADF loan), (ii) Sustainable Rural Infrastructure Improvement Project (\$60 million ADF loan), and (iii) Participatory Small-Scale Water Resources Sector Project (\$55 million ADF loan).

Total Project estimate: \$285 million

PPCR Request: \$20 million grant and \$50 million concessional loan, and \$1 million grant for project preparation

ADB co-financing: \$215 million ADF loan

Technical Assistance 1: Climate Change Capacity Building and Knowledge Management

Introduction

160. PPCR aims to help countries transform to a climate resilient development path, consistent with poverty reduction and sustainable development goals. One of the main objectives of PPCR is to strengthen capacities at the national levels to integrate climate resilience into development planning. Similarly, the immediate outcomes emphasize (a) increased capacity to integrate climate resilience into country and/or sector strategies; (b) more inclusive strategies for climate resilient growth and development; and (c) increased awareness of vulnerabilities and potential impacts of climate change among governments and non-government stakeholders, including the private sector. Obviously, given the new approaches that PPCR encompasses, especially for integration of climate risk and resilience into development policies and planning, in many cases contrary to current practices, there is significant emphasis on capacity building as enhanced capacity leads to enhanced understanding which in turn will lead to success of the PPCR.

Background and Rationale

161. Bangladesh has been quite active in addressing climate change related issues for a long time, given its vulnerabilities. In doing so, it has created various climate specific organizations, agencies, etc, and has also assigned climate change specific responsibilities to existing ministries, departments and agencies. Bangladesh launched the National Adaptation Program of Action (NAPA) in 2005 which identified 15 priority activities, including general awareness raising, capacity building, and project implementation in vulnerable regions with special focus on agriculture and water resources. NAPA was further updated in 2009 and identified 45 adaptation measures with 18 immediate and medium term adaptation measures. The National Capacity Self-Assessment (NCSA) for implementing the provisions of multilateral agreements, including the UNFCCC and UNCCD, was launched in 2007 where capacity building for climate change received high priority. The Capacity Development Action Plan (CDAP) of NCSA identified a package of 15 actions for climate change thematic area. GOB also prepared the Bangladesh Climate Change Strategy and Action Plan (BCCSAP) in 2008 and revised it in 2009. This is a comprehensive strategy to address the climate change challenges in Bangladesh and has six thematic areas: (a) food security, social protection and health; (b) comprehensive disaster management; (c) infrastructure development; (d) research and knowledge management; (e) mitigation and low-carbon development; and (f) capacity building and institutional strengthening. Forty four programs have been indentified and prioritized within these six thematic areas.

162. In the recent Bangladesh Second Poverty Reduction Strategy Paper (PRSP-2), one of the supporting strategies which touches on *caring for the environment and supporting climate change*, emphasizes mainstreaming and strengthening climate change adaptation across various sectors including improved crop production practices, watershed management, and particularly in the coastal zone it emphasizes afforestation as an adaptation and mitigation option, improvement of coastal infrastructure including cyclone shelters and embankments, improving salinity control measures, enhancing public awareness, undertaking climate change research, and data collection and dissemination. The Draft National Disaster Management Policy (2008) integrates DRR approach and climate change adaptation in all development plans, programs and policies. The Policy highlights priorities for disaster risk reduction and adaptation through

assessment of climate change risk, community based programs for risk reduction, public awareness, improving early warning and community alerting systems, integrates strategy of combining structural and non-structural measures, modern communication facilities, strengthening emergency response systems, and international cooperation for overall disaster management.

163. GOB has also initiated a number of agricultural programs such as the development and distribution of drought and saline resistant rice varieties to enhance year round production. Scientists at the Bangladesh Rice Research Institute (BRRI) have developed salinity-tolerant rice varieties, including BRRI 47 for coastal areas of the country where crop lands are susceptible to sea water intrusion. High yielding, submergence tolerant and short-duration (110-120 days) rice varieties are making a huge difference in boosting food security. BRRI is also developing drought-tolerant varieties of rice for release in the near future. However, there is a need for the dissemination of these research results to the farmers through a comprehensive program.

164. In addition to the infrastructural provision by GOB, the Bangladesh coastal community has over the years adapted community based activities to address disasters. Based on past experience, they have developed several indigenous coping techniques, such as raising the plinths of their homes, structural adjustment and specific forms of housing for long-term adaptation and developing floating gardens (locally called '*baira*') to cultivate vegetables. Their prediction of cyclones using the community radio service, cell phone broadcasts, etc. and also their ability to survive before any institutional help arrives after a cyclone hits, their indigenous knowledge and strategies for disaster management and to survive 'before', 'during' and 'after' the cyclone have helped them in building resilience against super cyclones for which they are known the world over. They are examples to the global community of a successful, home grown disaster management strategy against cyclone and flood. However, with the likely increase in intensity and frequency of these forces, a more robust program, as an element of capacity building through enhanced awareness, is needed to address the climate change impacts on these communities.

165. As evident in both the NAPA and the BCCSAP, as well as in the NCSA and the PRSP2, and other policy documents, Bangladesh recognizes the need for capacity building, with enhanced awareness of climate change as an integral element of the program, to address the challenges that constrain effective implementation of the agreed policies and strategies for mainstreaming climate change in the nation's development agenda.

166. Enhancement in the capacities of institutions – local, national, regional, global – needs to focus on enhancing awareness of climate change and its impacts while at the same time identifying options for building resilience. Capacity building programs that recognize the need for change in the mindset of decision makers for mainstreaming climate change in the development policies and practices are needed if a meaningful transformational change is to occur. This may require commissioning analytical studies and their dissemination through workshops and seminars. This would support climate change adaptation oriented policy reform and institutional restructuring as part of capacity building, in response to an intrinsic felt need facilitated by enhanced knowledge and level of awareness. Enhanced awareness among various institutional stakeholders would lead to rethinking the way the development business is undertaken, and result in changing the mindset of institutional decision makers (on policy and institutional level) to mainstream climate change in development planning and implementation.

167. In order to address the weaknesses and limitations that constrain the translation of policies to mainstream climate change into an action agenda, a significant amount of upstream work on analysis of existing policies and enforcement mechanisms, knowledge needs and gaps would be needed to promote a change in current mindset of the decision makers. In this context, it would be important to make an assessment of the level of preparedness in Bangladesh with respect to real and meaningful commitment and associated institutional policies and enforcement capacities. This should be associated with the willingness of the decision makers to be the architects of transformational change as it would take a transformational change to achieve the PPCR objectives. Having a clear understanding of the level of preparedness and the willingness of decision makers to support transformational change would be necessary to undertake a comprehensive needs assessment. Needs assessment would cover both the institutional structures, cross sector institutional linkages and coordination/collaboration mechanisms, vertical and horizontal integration, functions and enforcement capabilities, gaps in the generation and dissemination of knowledge products, and challenges in implementation of climate change adaptation programs including PPCR, and identification of measures that would enhance institutional capacities, both in public and the private sector (including NGOs and CSOs) to ensure effective delivery of goods and services that would eventually lead to transformational change. There is therefore an obvious need for technical assistance that would address these capacity constraints and facilitate knowledge management.

Scope of Technical Assistance

168. The scope of the TA would include (i) survey based needs assessment based on an assessment of current capacities, status of knowledge and knowledge management; (ii) commissioned studies on climate change adaptation related topics; (iii) identification of measures, together with cost estimates that would result in enhanced institutional capacities, both in public sector and the private sector (including NGOs and CSOs); (iv) development and dissemination of climate change associated publications (news bulletins, news-letters, research findings including the ones on climate resilient agricultural production and processing practices, quarterly reports, annual reports, and establishment of websites) to enhance awareness of potential implications of climate change and options for adaptation; (v) training workshops and seminars to discuss and disseminate information and knowledge products to relevant stakeholders; and based on the above (v) the development of a proposal to address the constraints in institutional capacities (in each sector institution including national level policy and planning institutions) together with an implementation plan, inputs needed and estimated costs of implementation to effectively mainstream climate change in development planning.

Outline Terms of Reference

169. A. Survey based assessment of current capacities, status of knowledge and knowledge management and needs to include:

- (i) A comprehensive needs assessment based on targeted survey of institutional stakeholders at various levels as well as one-on-one interviews of selected persons to determine real and meaningful commitment to mainstreaming climate change and assess willingness of decision makers to be the architects of transformational change;

- (ii) Survey of various climate change relevant institutions to determine the level of preparedness for mainstreaming climate change in development programming;
- (iii) Assessment of enforcement capacities of concerned institutions with specific reference to climate change oriented policies, strategies and programs and level of coordination and information sharing and exchange;
- (iv) An assessment of the appropriateness of existing institutional structures for every climate change relevant sector, cross sector institutional linkages and coordination/collaboration mechanisms, vertical and horizontal integration, functions and enforcement capabilities, current state of generation and dissemination of knowledge products, and challenges in mainstreaming climate change in development planning;
- (v) Documentation and classification of available climate change adaptation related data using standard classification methodologies and archiving and determination of data gaps;
- (vi) An assessment of data and information needs and the need for an institutional home for such data. The assessment would include the current status of research and studies aimed at (a) enhancing resilience to climate change; (b) mainstreaming climate change in development policy and planning and identification gaps in availability and access to current knowledge products; and (c) identification of gaps, challenges and constraints in the development and dissemination of knowledge products;
- (vii) An assessment of the current state of research and development and the state of dissemination of research and knowledge products pertaining to climate change including but not limited to climate resilient agricultural production and processing;
- (viii) An assessment of the current system of documentation and classification of available climate change adaptation related data and the development of systematic classification methodologies and archiving the data in a Data Collection and Dissemination Center to be set up in the Climate Change Cell or its successor organization;
- (ix) Determination of the need for an institutional home for climate change management at the national and sub-national level including the need for establishment of a base for knowledge management (including climate change relevant data and information) to provide a one-stop shop for readily accessible information for potential users and other beneficiaries.

170. B. Commissioned studies on specific topics, using national and international experts, to include research and studies on climate change adaptation relevant information on topics such as location specific climate change impact, economics, hydrology, climatology, social aspects, and others to address the data and/or information gaps identified under (vi) above;

171. C. Identification of measures, together with cost estimates over the proposed period of implementation, that would result in enhanced institutional capacities, both in public sector (for all sectors that would have a bearing on enhancing resilience to climate change) and the private sector (including NGOs and CSOs) for effective delivery of programs and investment projects and associated services that would eventually lead to mainstreaming climate change;

172. D. Assessment of current status of technical and non-technical knowledge products directly relevant to enhancing resilience to climate change in various sectors (agriculture, health and sanitation, social services, infrastructure design, etc) and the mechanisms for dissemination of knowledge products to potential beneficiaries for application and adoption;

173. E. Based on the above assessment and analyses, development of a comprehensive proposal to address the constraints in institutional capacities (in each sector institution including national level policy and planning institutions) together with an implementation plan, inputs needed and estimated costs of implementation to ensure that climate change is effectively mainstreamed in development planning and climate change resilience programs and projects are effectively implemented.

174. F. Training workshops and seminars would be held at regular intervals to discuss the findings and secure feedback on conclusions and options to address climate change challenges and disseminate information and knowledge products to relevant stakeholders; and

175. G. Establishment of an easily accessible website for use by various institutional and non-institutional stakeholders; the website would also act as an outlet for knowledge products, disseminate results of research and development and obtain feedback.

Outputs:

- (i) Results of survey based assessment of current capacities, and the status of knowledge and knowledge management;
- (ii) Commissioned studies on specific topics, using national and international experts to be presented in workshops and seminars and add to the database;
- (iii) Proceedings of workshops and seminars;
- (iv) Based on the above, development of a comprehensive proposal to mainstream climate change in development planning and programming. The proposal, among other things, would include (a) measures that would result in enhanced institutional capacities, both in public sector (for all sectors justification; (b) sector based investment options and a time frame for implementation; (c) recommendations regarding training workshops and seminars as the means to enhance awareness; and (c) establishment of data analysis, compilation, and dissemination centers;
- (v) The proposal would include recommendations regarding the feasibility and appropriateness for setting up of an independent institution such as a Department of Climate Change (or strengthening the existing Climate Change Cell) with the requisite capacities aimed at enhancing resilience to climate change, including web-based information exchange capability; and cost estimates over the proposed period of implementation; and
- (vi) A Design and Monitoring Framework showing, among other things, reportable verifiable and measurable indicators, risks and assumptions, and activities.

Benefits

176. The capacity building programs will enhance awareness of climate change and its implications, adaptation and mitigation options, the need for change of mindset for pooling resources, integrating development strategies with programs that address climate change, and promulgation of policies and even institutional restructuring, if necessary, not on account of external pressures but on account of felt need, resulting from enhanced awareness.

177. Capacity building measures which result from enhanced awareness and felt need will result in transformational change, demonstrated by (i) mainstreaming *programmatic* approaches to upstream climate resilience in development planning, core development policies, and strategies; (ii) formalizing participatory approach towards *development of a broad-based strategy to achieving climate resilience* at the national level in the *medium and long-term*; (iii) establishing an enabling policy environment for participation of the private sector in climate resilient development and investments in adaptation to climate change; and (iv) institutionalizing linkages between development of adaptation strategies and programs through adequately funded R&D and dissemination of such knowledge and learning to the field level.

Implementation Arrangements

178. The TA will be executed by ADB and implemented by the Ministry of Environment and Forest (MOEF). There would be a need for appropriately qualified international and national experts to undertake the tasks outlined above and make appropriate recommendations. Consultants would be engaged in accordance with ADB's Guidelines, whereas procurement of materials and equipment would be carried out in accordance with ADB's Procurement guidelines.

Cost Estimates (PPCR Resources)

| <u>Cost categories</u> | <u>Estimated Cost (US\$)</u> |
|---|------------------------------|
| Consultants (National and International) | 250,000 |
| Surveys and Analysis | 60,000 |
| Commissioned Research and Analytical Studies | 50,000 |
| Materials & Equipment for Data Collection, Analysis and Dissemination | 60,000 |
| Workshops and Seminars | 30,000 |
| Contingencies 10% of the above inputs | 50,000 |
| Total Cost | 500,000 |

Technical Assistance 2: Feasibility Study for a Pilot Program of Climate Resilient Housing in the Coastal Region

Introduction and Background

179. In Bangladesh cyclone storms and surges are major features of the Coastal Zone climate. In the last 200 years, the coastal zone was affected by at least 70 storms and recent decades have seen even higher frequency, with 40 storms since 1948. The worst ones have killed more than 100,000 people and a couple of thousands have been killed by the recent Cyclone Sidr in 2007 and Cyclone Aila in 2009. While the Government has built several thousand cyclone shelters, more are needed. The proper maintenance of the existing ones and the sustainability of the cyclone shelter program also remains an issue.

180. The Pilot Program for Climate Resilience (PPCR) is a multi-donor program to pilot and demonstrate ways to mainstream new approaches for integration of climate risk and resilience into development policies and planning. Bangladesh is participating in the PPCR and intends to pilot a new approach for providing shelter to people and livestock during cyclones and storm surges. The intention is to provide low cost, storm and cyclone proof individual housing for the coastal population and their livestock through a home building finance program which utilizes the well known micro-finance approaches for which Bangladesh is famous. The government has decided that this activity will be undertaken on a pilot basis in the following 12 polders in the coastal districts of Bangladesh:

| Polder No. | Union Parishad | Upazila | District | Population (no.) |
|-------------------|---|-------------------------|-----------------|-------------------------|
| 7/1 | Padmapukur, Pratap nagar | Shaymnagar | Satkhira | 40,000 |
| 13-14/2 | Koyra, Uttar Betkashi, Batali, Moharajpur, Moheshwaripur | Koyra | Khulna | 142,000 |
| 35/3 | Dema, Mollikerber, Karapara | Bagherhat sadar, Rampal | Bagherhat | 36,000 |
| 39/2 C | Tushkhali, Machua, Betmore, Telekhali, Ekri | Mathbaria, Bhandaria | Pirozpur | 90,000 |
| 41/5 | M. Balitali | Barguna Sadar | Barguna | 31,950 |
| 46 | Nilgonj | Kalapara | Patuakhali | 32,000 |
| 55/3 | Nurabad, Mujibnagar, char Kajal, char Biswas | Charfesson & Galachipa | Bhola | 56,000 |
| 73/1 | Char Iswar, Char King, Nalchira, Sukchar, Sonadia, Burirchar and Tamaruddin | Hatiya | Noakhali | 1,65,000 |
| 59/2 | Char Kalkini, Char Falcon, Alexander, Char Abdullah | Kamalnagar, Ramgati | Lakshmipur | 1,10,000 |
| 60 | Charchandia, Sonagazi sadar | Sonagazi | Feni | 1,55,000 |
| 63/1 A | Brong Chara, Juidani, Bortali, Barsat, Raipur, Boirag | Anowara | Chittagong | 1,39,000 |
| 70 | Materbari and Dhalghata | Moheshkhali | Cox's Bazar | 90,200 |

Consulting services are being sought to assist the Government to prepare this program.

Development and specific objectives

181. The objective is to develop a comprehensive pilot program for building climate resilient and individually owned houses in the selected coastal zones to supplement the traditional cyclone shelters. This initiative is expected to reduce the pressure on the existing cyclone shelters thereby creating more space for accommodation of the hard core poor segment of the coastal population during natural calamities.

Current Situation in Bangladesh

182. With the increased instances of cyclones, people in the coastal areas are becoming increasingly vulnerable to loss of lives and economic assets. The only protection in these areas is offered by the existing embankments which were built in the 1960s and are now in serious need of rehabilitation and/or upgrading. Also projections made at the time of their creation no longer hold true as the rate of change of climatic conditions have been greatly accelerated in recent times.

183. With the polders failing to mitigate the issue, the only adaptive option open to the people living in coastal areas is to seek shelter at cyclone shelters. While the cyclone shelters offer protection to the occupants during the storm, the arrangement has several limitations including:

- Displacement of people: Cyclone Shelters are located in places that are not always in close proximity to dwellings. This means that significant time and effort is often required to arrive at a shelter. Its success is therefore limited by the notice time available and is subject to the availability of access which is often restricted by flooding/inundation.
- Does not protect provisions, property and livestock: As storms approach, people have to leave behind most of their economic assets which are almost always lost in the course of the storm. The result is that people find themselves poorer with each successive storm. With incomes already under stress, people increasingly find their wealth marginalized. Increased loss of human lives: In their desperate need to save assets families often don't respond to early warnings resulting in more loss of human lives since many families get trapped with no escape route available

184. Cyclone prone areas of Bangladesh pose several challenges which may broadly be classified into pre, during and post disaster challenges. Most rural housing alternatives provide inadequate protection during cyclonic conditions including strong winds, tidal surges and flash floods.

185. In pre-storm conditions, the challenges are in getting people to accept the idea that they need to protect their own lives more than their assets which becomes a difficult proposition, because people often opt to brave the storm with their assets rather than lose them resulting in loss of lives.

186. During a cyclone, conditions within the cyclone shelters are often below acceptable standards, particularly if the weather fails to improve within short timeframes. There are issues of sanitation and given that a large number of people arrive at these shelters, it is often too crowded to be healthy.

187. The post-storm conditions are probably the most challenging because the immediate result is a huge loss of economic assets including, in majority of cases, loss of dwelling, livestock and provisions; no access to drinking water and electricity, etc. Incidence of water borne diseases increase and healthcare also becomes a serious issue.

Anticipated components and activities

188. A solution that adequately addresses the situation described above requires the following features:

- Protect households including provisions and livestock, in-situ, minimizing the need to leave the area. Protection to economic assets such that the need to start from scratch is minimized.
- Have built-in mechanisms that harvest and preserve rain water for drinkin
- Provide electricity through solar home systems which are already used widely in Bangladesh

189. The anticipated components required are:

- The availability of protected environments within the coastal areas through the building of suitable embankments. This will, reduce the impact of tidal surges and cyclones on the inhabitants of these protected areas on the coast, while allowing quick drainage of accumulated water which will minimize the impact of flash floods and prevent long term flooding of the areas.
- Availability of means of livelihood such as climate resilient adaptive agriculture, fishing, etc. This will serve to minimize the loss of incomes associated with climate events.
- The availability of low cost area specific housing options that will address all the features highlighted above while creating opportunities for people to own houses that contribute towards further economic uplifting by protecting what's available and thereby allowing incremental accumulation, including expansion of the house itself through additional construction.

Anticipated Activity Plan:

190. In order to design an intervention that provides the housing solution outlined above, a feasibility study needs to be initiated. The study should include local and international expertise (4-5 local and 1 international experts), cost around US\$200K and deliver the following:

1. Modular home designs including expansion options
2. Criteria for selection of beneficiary
3. Physical delivery mechanisms for the house
4. Institutional delivery mechanism
5. Financial models

Institutional Arrangements

191. IFC will take the lead in implementing the feasibility study project in coordination with the LGED and BDM. Consultants will be procured by IFC following IFC's procurement policy.

192. **Risks**

- Effective protection from tidal surges and efficient drainage of accumulated rain water may not be guaranteed.
- MFIs may not take adequate interest to participate in the project
- Borrower households may not have sustainable income sources to repay the loan
- Any attempt at elite capture has to be prevented through appropriate project design

Cost Estimates

Cost categories

Estimated Cost

Financed by PPCR Grant

Consultants (National and International)

Surveys

Commissioned Analytical Studies

Total PPCR Investment Cost:

\$0.4 million

Results and Performance Framework

193. Below are some of the suggested indicators to measure the results. A detailed results measurement framework will be worked out as part of the feasibility study.

- Number of climate resilient houses built
- Reduction in loss of human life, livestock and other economic assets due to natural calamities
- Reduction in post-calamity rehabilitation time
- Continued access to drinking water and power sources
- Reduction in deterioration of post-calamity health and sanitation conditions

Summary Terms of Reference

Scope of Work

194. The scope of work will consist of, but not be limited to, the following:

Carry out a survey of the housing stock in the 12 polders showing for each polder:

- the number and quality of houses
- house and land ownership patterns
- size of existing housing and availability of water and sanitation facilities
- if these facilities are unavailable, what are the present options
- availability of electricity
- sources of income and income distribution patterns of the homeowners, number of family members, number and kind of livestock owned, home ownership patterns
- home ownership among the two lower quintile family income groups whether they own any land to build a home
- Based on the survey results, prepare a feasibility study for developing a housing program with the following characteristics:
 - Relatively inexpensive housing (Tk.250000 to Tk.400000), with brick walls and roofing and designed to be flood and cyclone proof, with an average area of about 400-500 ft² including a small area for storing grain and fodder, etc. which can be converted into a safe area for livestock in the event of a cyclone or any other adverse climate event.
 - Provision of safe drinking water, sanitation facilities and a detachable solar home system for electricity for the houses should also be explored.
 - Develop several modular designs for houses which meet the size, flood/cyclone proof and affordability characteristics while being amenable to minor modifications to suit owner preferences as well as requirements of geography.
 - Survey availability of building material and skills for building these houses in the vicinity of the polders.
 - Propose different scenarios for financing the house building program. Financing could entail a small initial contribution from the owner, a substantial initial Government grant and a low-interest house building loan to be repaid over a long term.
 - Explore various institutional arrangements for the implementation of the physical as well as the financial aspects of the program. While planning and physical implementation can be undertaken under the overall supervision of some relevant Government agency (e.g. LGED, DMB, etc.), the financing aspects could be managed by reputable micro-finance organizations with substantial presence in the areas of activity (e.g. BRAC, Grameen Bank, ASA, etc.), in cooperation with the Ministry of Finance and/or Bangladesh Bank.
 - Propose criteria for the selection of initial households for the pilot housing program.
 - Prepare a comprehensive proposal covering all of the above aspects for a pilot project for the construction of several hundred houses in each polder.
 - Propose an appropriate results measurement framework

PART 3

REQUEST FOR PROJECT PREPARATION FUNDING

195. The Government of Bangladesh, based on a widespread consultation among its agencies involved in climate change related activities at various levels, Development Partners, a broad set of NGOs, CSOs, technical experts and academicians has prepared this SPCR. The SPCR proposes a comprehensive package of infrastructure projects and technical assistance and capacity development activities to be partially financed under the PPCR particularly in the coastal zone. These are (i) a project to Promote Climate Resilient Agriculture and Food Security and associated TA, to be implemented by IFC; (ii) a Coastal Embankment Improvement and Afforestation project to be implemented by the World Bank; (iii) Coastal Water Supply and Infrastructure Improvement project to be implemented by the ADB; (iv) Technical Assistance for Capacity Building for Mainstreaming Resilience to Climate Change and Knowledge Management to be implemented by ADB; and (v) Technical Assistance for preparation of feasibility study for a Pilot Program of Climate Resilient Individual Family Housing to be implemented by IFC.

196. The Government of Bangladesh is requesting for US\$59.8 million PPCR grant financing (including \$1.8 million for project preparation and TA) and US\$60 million PPCR highly concessional loan financing. As required under the PPCR guidelines, detailed project concepts for the three projects and the TOR for related studies and the TORs for the two technical assistance proposals, their cost estimates, financing plan, implementation arrangements, and the specific requests for grants and concessional finance from the PPCR have been provided in Part 2 of this document. A summary of the project costs, financing plan and specific requests for grants and concessional funding from the PPCR are summarized in the following table.

| Proposed Investments & Technical Assistance | Estimated Cost of Preparation Funds for Feasibility Studies & TA | Estimated Cost of Proposed Project | Corresponding MDB Program/Project & Lead Agency | Financing/Co-financing for Investment Project(s) (\$ Millions) | | |
|--|--|------------------------------------|---|--|-------|------------|
| | | | | PPCR | | MDB |
| | | | | Grant | Loan | |
| | \$'000 | \$ Millions | | | | |
| Investment Project 1: Promoting Climate Resilient Agriculture and Food Security | 100 | 13.0 | MOA and IFC | 3.10 | 10.0 | TBD |
| Investment Project 2: Coastal Embankments Improvement and Afforestation | - | 325.00 | WB: Coastal Embankment Improvement Project | 25.00 | 0.00 | 300.00 |
| Investment Project 3: Coastal Climate Resilient Water Supply, Sanitation, and Infrastructure Improvement | 1,000 | 285.00 | ADB: (i) Coastal Towns Infrastructure Improvement Project, (ii) Sustainable Rural Infrastructure | 21.00 | 50.00 | 215.00 |

| | | | | | | |
|--|--------------|---------------|---|---------------|--------------|---------------|
| | | | Improvement Project, and (iii) Participatory Small-Scale Water Resources Sector Project | | | |
| Technical Assistance 1: Climate Change Capacity Building and Knowledge Management; | 500 | | ADB: ADB TA: Supporting implementation of Bangladesh Climate Change Strategy and Action Plan | 0.5 | - | - |
| Technical Assistance 2: Feasibility Study for a Pilot Program of Climate Resilient Housing in the Coastal Region | 400 | | IFC | 0.4 | - | - |
| TOTAL: | 2,200 | 633.00 | | 50.-00 | 60.00 | 515.00 |

Annex 1: Development Partners Assistance to Climate Change Adaptation

Asian Development Bank

1. In Bangladesh, ADB has integrated climate change considerations into its Country Partnership Strategies (CPS) and Country Operations Business Plan (COBP) to streamline climate change adaptation and mitigation into country operations and project portfolio. ADB has developed a Climate Change Implementation Plan (CCIP) to streamline climate change adaptation and/or mitigation into project design and implementation and to assist the country in becoming more climate resilient.

2. ADB is implementing a \$2 million capacity development TA *Supporting Implementation of Bangladesh Climate Change Strategy and Action Plan* to assist the MOEF and technical line agencies in implementing the BCCSAP. The TA particularly focuses on building capacity for project preparation, implementation, and policy formulation. The TA outputs include institutional strengthening and capacity building; preparation of program and project guidelines; formulation of sector-specific programs and projects; program for clean development mechanisms; and knowledge management. The TA on *Strengthening the Resilience of the Water Sector in Khulna to Climate Change*, which was approved in 2008 for \$600,000, assessed the potential impact of climate change in 2030 and 2050 on urban drainage and water supply system in Khulan, and proposed climate proofing options for planned future investment projects. In South Asian countries including Bangladesh, ADB is undertaking a comprehensive study on *Regional Economics of Climate Change in South Asia (RECCSA)* to improve the understanding of the economics of climate change to enable policy makers in the region to adopt necessary actions for climate change adaptation. The *Second Crop Diversification Project*, approved in June 2010, will test and disseminate climate resilient crop varieties and cropping patterns and technology to help farmers adapt to climate change. The recently approved *Participatory Small-Scale Water Resources Sector Project* will enhance agriculture productivity and sustainability through interventions in flood management, drainage improvement, water conservation, and command area development. ADB's project on '*Emergency Disaster Damage Rehabilitation*' is addressing the devastating cyclone and flood that affected the country in 2007. Other projects in the pipeline including Coastal Towns Infrastructure Improvement Project, Khulna Water Supply Project, City Regional Development Project, and Sustainable Rural Infrastructure Improvement will also contribute to climate change adaptation in the water and sanitation, agriculture, natural resources, and rural development sectors.

World Bank Group

3. The World Bank Group has drafted its own climate change strategy -The South Asia: Shared Views on Development and Climate Change recently which articulates the guiding principles for the World Bank's climate-related work in the region. It builds upon the World Bank's *Strategic Framework for Development and Climate Change* that defines the pillars and priorities for climate challenge. In Bangladesh, WB is implementing programs on adaptation in the areas of disaster management and rehabilitation, adaptation in agriculture, TA on coastal risks and defenses, water and sanitation program in vulnerable areas, infrastructure design, clean air initiatives in urban areas and strengthening human resources and institutional capacity.

4. The World Bank included "Climate Change and Environmental Degradation" as one of the four pillars in its Country Assistance Strategy for 2010-2014 and is presently implementing several projects that are relevant to adaptation. Notable among them are: Clean Air and Sustainable Environment Project (CASE; \$62.2m), Dhaka Water Supply and Sanitation Project (DWSS; \$149 m), Emergency Cyclone Recovery and Restoration Project (ECRRP; \$109m and the recently approved \$75 m in additional financing), Water Management Improvement Project (WMI \$102.26 m), and Rural Electrification and Renewable Energy Development (RERED; \$130m). Under the ECRRP, the World Bank has recently launched a national study for the Proposed Coastal Embankment Improvement Project. CASE is an innovative project that aims at integrating environment and transport concerns towards a common objective of improving Dhaka's air quality. DWSS is designed to improve sustainable delivery of storm water drainage, wastewater, and water services in Dhaka. This will be achieved through rehabilitation, repair, and expansion of the city's sewerage network and treatment plants, and installation of storm water pumping stations and rehabilitation of canals to help improve drainage and minimize urban flooding. The project will also support DWASA's pilot expansion of water and sanitation services into some of Dhaka's slum areas and finance training to improve hygiene practice in the slums. ECRRP will cover restoration of the agricultural sector in the cyclone affected areas, and reconstruction of public infrastructure, including reconstruction and improvement of multi-purpose shelters and rehabilitation of coastal embankments with better designs. The project will also build new disaster shelters, strengthen disaster risk reduction and management, and provide training to strengthen future emergency response and preparedness. Most importantly it will support the preparation and initial implementation of the first phase of a fifteen year program for long-term disaster risk reduction. The Gorai River Restoration Project is expected to mitigate the environmental problems caused by declining rivers flow in the Gorai River. The WMI project objective is to improve national water resources management by involving the local communities to play an expanded role in all stages of management. The project will also enhance institutional performance of the country's principal water institutions, particularly BWDB and WARPO.

5. Fourth Fisheries Project (60.8 m) closed in 1999 and initiated community based management of inland open-water fisheries and development and management of coastal shrimp aquaculture, supported management and assessment of freshwater ecosystems' sustainability and institutional strengthening of the Department of Fisheries and BWDB. Other notable completed projects include: Emergency Flood Recovery Project (\$200m), Arsenic Mitigation Water Supply (\$32.4m), Coastal Embankment Rehabilitation (\$53m), Forest Resources Management Project (49.6) and Mangrove Afforestation Project (\$11 m). Some of the planned projects relevant to environment are: Dhaka Environment and Water Program and Chittagong Water Supply Improvement and Sanitation Project.

6. IFC has also undertaken a number of Advisory Services initiatives focused on climate change and environmental sustainability. These initiatives are: a. Adoption of stress tolerant seed varieties involving the private sector, b. Waste to energy project in poultry sector, c. Promotion of cleaner production in textile industry geared towards reduced usage of inputs including electricity, chemicals and water, d. Sustainable energy finance through partner financial institutions, e. Increased environmental protection through EPZs.

Japan International Cooperation Agency (JICA)

7. JICA's support to Bangladesh for climate adaptation is focused on agriculture and rural development, disaster management, water and sanitation, etc. Major ongoing projects are: Emergency Disaster Damage Rehabilitation Project (JPY 6.9 billion), Grant for Disaster Prevention and Construction of Multipurpose Cyclone Shelters in the cyclone Sidr affected areas (JPY 960 million), Flood forecast/warning system (JPY 260 m), Small Scale Water Resource Development Project (JPY 7.5 billion), Model Project for Community-Health Improvement through Total Sanitary and Hygiene Education at Primary School, etc. The Emergency Disaster Damage Rehabilitation Project is supporting rehabilitation of Sidr affected area in road reconstruction, embankment reconstruction, etc. Some of the relevant completed activities include: Project for improvement of the Meteorological Radar System at Cox's Bazar and Khepupara, Project for Construction of Multipurpose Cyclone Shelters Phase V, Study on the Solid Waste Management in Dhaka City, Integrated Approach for Mitigation of the Arsenic Contamination of drinking Water in Bangladesh, Strengthening water examination system in Bangladesh. DPHE's Central Laboratory for strengthening water quality examination system in Bangladesh was established under a Grant Assistance project in 2006. The project includes upgrading of two laboratories in Jhenaida and Noakhali to strengthen the overall water quality examination system of the country with special emphasis on arsenic analysis and promote arsenic mitigation activities in Bangladesh. JICA has proposed to provide Tk. 490 crore as budgetary support during the next three years, to cope with the environment related disasters.

European Commission (EC)

8. The EC is committed to assist Bangladesh to cope with the many challenges ahead in the climate change area and specifically to assist the most vulnerable communities in the framework of the Bangladesh Climate Change Strategy and Action Plan (BCCSAP).

9. The EC's Country Strategy Paper (2007-2013, €385m) for Bangladesh concentrates its commitments on three focal areas and two non-focal areas. Environment & disaster management (€40m) and food security (€44m) are the two non-focal areas. In addition, part of the funds from EC thematic budget lines (like the Environment and Natural Resources Thematic Programme, the Food Security Thematic Programme and the Non-State Actors Programme) target climate change as well.

10. ECHO (EC's Humanitarian Aid and Civil Protection Department) responds rapidly to humanitarian crises caused regularly by natural disasters in Bangladesh. In the case of cyclone Sidr that hit Bangladesh in November 2007, ECHO mobilised substantial relief support and the EC mobilized an additional €13m under its Instrument for Stability to help local communities to rehabilitate their livelihoods. ECHO was as well the biggest responder to cyclone AILA (€9m), followed recently by an additional €5m allocation from the Instrument for Stability.

11. Current EC assistance is not limited to humanitarian responses once disasters have occurred. Long-term strengthening of disaster preparedness and dissemination of warnings to the most vulnerable groups is a critical adjunct to such support and the EC has made a contribution of €13m to GoB's Comprehensive Disaster Management Programme 2010-2014.

12. In addition, EC is co-funding NGO-projects on community-based Disaster Risk Reduction: A project to improve cyclone preparedness in communities living around cyclone shelters (BCDPC) ended in March 2010. A project reducing erosion of haor-villages and improving their livelihoods (HISAL) and a project dealing with alleviation of poverty through Disaster Risk Reduction in flash/monsoon flood prone areas in North-West Bangladesh are ongoing and made good progress in 2010. Three new projects started in 2010 and are still in preparatory stage: Improved food and livelihood security in Bagherhat district in the context of increased disaster risk and climate change; Empowerment of Local Authorities and Non State Actors in responding to economic development opportunities and climate change and disaster vulnerabilities; and the Integrated Community-Based Arsenic Mitigation Project.

13. The EC in collaboration with the GoB, World Bank, UK, Denmark and Sweden is finalizing the modalities of the Bangladesh Climate Change Resilience Fund which aims to support GOB to implement the BCCSAP. The EC has reserved €8.5m from the Global Climate Change Alliance as its contribution to the Fund.

14. The upcoming EC funded Sundarbans Environmental And Livelihood Security (SEALS, €10.4m) project will contribute to maintaining and/or improving ecosystem productivity, food security of the vulnerable coastal community and the environment and social integrity of the Sundarbans Reserve Forest (SRF) including coastal areas of the Bay of Bengal.

15. Besides these, all EC interventions in Bangladesh are screened for their resilience to the effects of climate change during the programming phase. The EC will ensure that environment, climate change, food security and disaster management are given proper consideration throughout its program, including education, trade and governance.

United Nations Development Program (UNDP)

16. UNDP has adopted its own Climate Change Strategy – “*Climate Change at UNDP: Scaling Up to Meet the Challenge*” in 2008. The strategy presents a framework for UNDP’s ongoing work, in close collaboration with UN agencies and other partners, to support the efforts of developing countries for scaling up mitigation and adaptation actions to address the climate change challenge and to achieve the MDGs. UNDP’s climate change work falls into four main areas: help the poor to adapt, make sure developing countries have the knowledge and skills they need, make carbon finance markets work for the poor, energize and climate-proof the MDGs. UNDP’s umbrella project, ‘*Capacity Development for Policy Makers to Address Climate Change*’ is a ground breaking effort to strengthen the capacity of developing countries to assess climate change policy options across different sectors and economic activities. Currently, 19 countries including Bangladesh are participating in this project.

17. UNDP Bangladesh is currently implementing NAPA priority projects on ‘*Community based adaptation to climate change through coastal afforestation*’ (\$ 5.6 m). The project will enhance the resilience of coastal communities and protective ecosystems through community-led adaptation. *Second National Communication to the UNFCCC* is also ongoing with support from GEF. Climate Risk Management under *Comprehensive Disaster Management Program (CDMP)* was completed in 2009. *CDMP Phase-II*, with a budget of \$50 million started recently. A project titled ‘*Poverty- Environment -Climate Mainstreaming*’ (\$3 million) is ongoing and aims to improve environmental outcomes for poor people through mainstreaming pro-poor environment

and climate change issues in the design and implementation of national development processes, budgets and economic decision-making, sector strategies and local level planning. Another project title '*Coastal and Wetland Biodiversity Management at Cox' Bazar and Hakaluki Haor*' supported by GEF was recently completed. The project aimed at demonstration of a management system to ensure conservation and sustainable use of biodiversity with the participation of local communities, local government, local administration and other stakeholders. GOB prepared the *National Adaptation Program of Action (NAPA)* for climate change in 2005 and *Bangladesh Capacity Development Action Plan for Sustainable Environment Governance 2007* with UNDP-GEF support. UNDP also completed 'Sustainable Environmental Management Program (SEMP \$26.4 m), Empowerment of Coastal Fishing Communities (ECFC), and the First National Communication to UNFCCC that had adaptation components. Projects titled 'Development of Sustainable Grid-connected Wind Electricity Generation', and 'Climate Resilient Sustainable Cities Initiative' are in the pipeline.

Department for International Development (DFID)

18. Poverty alleviation and climate change is one of the four pillars of DFID's Country Action Plan (CAP) for 2007-2013. DFID has mainstreamed climate change activities into its development programs and now providing direct support for programs that reduce vulnerability to climate variability and change. DFID in association with Institute of Development Studies (IDS) developed 'ORCHID' (Opportunities and Risks of Climate Change and Disasters) -- a systematic climate risk management methodology to assess the relevance of climate change and disaster risks to its portfolio of development projects. DFID already supports disaster risk reduction and climate change adaptation initiatives through targeted interventions such as the Comprehensive Disaster Management Program (CDMP). Other mainstream interventions also contribute to reducing climate-related vulnerability.

19. DFID supported government for the preparation of BCCSAP. Government of UK launched a £75 million program to support the creation of the MDTF. DFID contributed about £6 million for assisting CDMP mainly to support to the Climate Change Cell (CCC) in the MOEF. Current support focuses on adaptation and includes work on modeling, research, cross-ministerial coordination and inputs to community risk assessment processes being carried out by the CDMP. DFID contribution for the CDMP is £12m. DFID is also planning to invest £30 million to implement the '*Climate Change Program –Climate and Life*' during 2009 – 2014. In addition DFID is going to launch a program to fund NGOs targeting the extreme poor – to help them lift themselves out of poverty. Climate Change adaptation measures will be fully integrated in this program. Current and future climate risks are being already managed by existing activities of the '*Chars Livelihoods Program (CLP)*'. A variety of screening recommendations have been integrated within DFID interventions. Reducing vulnerability to climate variability and change is a key criterion for the *Economic Empowerment of the Poorest (EEP)* challenge fund. The second phase of the '*Rural Infrastructure Improvement Project (RIIP2)*' has included disaster risk assessment procedures as part of best practice in social and environment impact assessment procedures necessary for the envisaged infrastructure works.

United States Agency for International Development (USAID)

20. USAID Bangladesh environment sector's past and present programs have created a good foundation of experience in community based natural resource management that has

demonstrated success in protecting and restoring natural forests and wetlands. This achievement has resulted in improved livelihoods of local communities through enhanced quantity and quality of fish resources and an expanding participatory tourism industry. In addition, these programs have contained further environmental degradation through a range of successful community capacity building and awareness projects that have provided essential training, micro-credit/financing programs, and direct funding for Alternative Income Generating (AIG) activities.

21. USAID's present Integrated Protected Area Co-management (IPAC) project works with the communities and the government through a co-management model for natural resources management. The five-year project was launched in 2008 with a funding of \$12.7 million.

22. Previous USAID projects -- Nishorgo Support Project (NSP) with \$7.1 million and Management of Aquatic Ecosystems through Community Husbandry (MACH- I and II) with \$6 million and \$3.1 million -- successfully implemented this model of co-management in freshwater ecosystems and forests and IPAC seeks to bring the model to larger and more challenging protected areas of Bangladesh. IPAC also promotes eco-friendly job development through training, AIG activities and community-based eco-tourism for expanding livelihoods opportunities for people in and around forest areas. Due to IPAC interventions, over 183,000 hectares of forest and wetlands were brought under improved natural resources management till date. In 2009, through the project's alternative livelihoods and income generating activities, some 245,190 people were benefitted, half of them women. The project also aims to bring an additional 350,000 hectares of land under sustainable co-management by 2012. In addition, IPAC is working with the Ministry of Environment and Forests and the Forest Department to develop their capacity for preparing carbon sequestration projects to help the government to tap into the global carbon business, including the United Nation's Reduced Emissions from Deforestation and Degradation (REDD) mechanism.

23. In addition, USAID supports the Arannayk Foundation (AF), also known as the Bangladesh Tropical Forest Conservation Foundation. It is a not-for-profit company, which was established in 2003 pursuant to the Tropical Forest Conservation Act (TFCA) of 1998. The goal of the AF is to facilitate the conservation, protection, restoration and sustainable use of tropical forests in Bangladesh by providing financial grants or other support to qualified organizations or entities.

24. To better address the climate change adaptation issues, USAID is in the design process of a new project that will focus on developing community-driven sustainable landscapes. This project will also link up with the U.S. Government's new global climate change initiative titled "Support Services for Low Emission Development (SSLED)." Bangladesh has been selected as a priority country under the initiative, which will support development of Low Emission Strategies (LEDS) in 30 countries across the world by 2013.

25. In addition, as part of its Feed the Future initiative, USAID is scaling up its agriculture and food security programs in Bangladesh with a substantial increase in funds. The agency is also holding discussions with the Government of Bangladesh (GoB) and other donors in support of the GoB-owned Country Investment Plan (CIP). The planned activities under the program will improve agricultural productivity and production through improved management of inputs, such

as, seeds, fertilizer and irrigation; research, better farm management, and mitigating effects of climate change.

Danish International Development Agency (DANIDA)

26. The Danish Government is strongly committed to assist program countries on climate change and Disaster Risk Reduction issues and has initiated pilot activities in a number of countries. DANIDA is currently playing a prominent role in climate change adaptation in Bangladesh. DANIDA has launched a program in 2008 with a project title '*Agricultural Sector Program Support*, (ASPC Phase II) with an amount of \$103 million and Water Supply and Sanitation Sector Program Support, (WSSPS Phase II) with an investment of \$ 68 million to implement a Climate Management Plan for the water and agricultural sector for the country. Through its bilateral development assistance, DANIDA has supported flood related Disaster Risk Reduction (DRR) activities since 1995 through '*Support to National Flood Forecasting and Warning Services*' (DKK 6 million). In March 2008 it provided assistance to a two-year project on climate change adaptation and DRR in Bangladesh in order to meet the future climate challenges. The project is implemented by the two Bangladeshi institutions FFWC and the Institute of Water Modeling (IWM) and directly contributing to accurate early warnings through the strengthening of FFWC. Bangladesh has been one of the pilot countries in the Danish Climate and Development Action Program. *Community Based Climate Change Adaptation and Disaster Risk reduction* (DKK 8 million) is currently implemented by Action Aid Bangladesh with support from DANIDA. The project will identify adaptation options and alternative livelihoods for sustainability of the communities. In response to a request from the GOB, Denmark jointly with DFID supported the enhancement of Bangladesh's capacity to participate in the climate change negotiations at the UN Climate Change Conference in Copenhagen in December (CoP15). The total Danish contribution to this initiative was DKK 1.14 million. DANIDA supported the development and implementation of 2 CDM projects on solar irrigation and composting of organic household waste in Bangladesh. DANIDA has been a long-time player in the rural water supply sector. They are currently preparing some TV programs (DKK 0.5 million) for mass awareness on climate change. DANIDA's recent *Hygiene, Sanitation and Water Services* (HYSAWA) fund (\$30 million) attempts to develop and demonstrate sustainable hygiene, sanitation and water supply service delivery through local governments. National Integrated Pest Management Policy was a direct output of the Danish supported Integrated Pest Management project. Danish interventions also contributed in the formulation of other agricultural policies and strategies in the country through the 'Agriculture Sector Program Support Phase I (ASPS I). DANIDA-assisted Water Supply and Sanitation Sector Program (WSSP) supported the GOB in implementation of the 'National Policy on Safe Water Supply and Sanitation 1998'.

Canadian International Development Agency (CIDA)

27. CIDA supported ongoing project title '*Bangladesh Environmental Institutional Strengthening Project* (BEISP \$5 m)' aims to strengthen the capacity of the DOE to implement their strategic plan and capacity of civil society and private sector for environmental management. Another operational project title '*Environmental Technology Verification - Arsenic Mitigation - Phase II* (\$14.65 m)' aims to provide arsenic-safe water to people in Bangladesh. CIDA supported a community based adaptation project title '*Reducing Vulnerability to Climate Change*' (RVCC) which is claimed as the first adaptation project of the country. The project

focused on reducing vulnerabilities through community based adaptation, capacity building and advocacy. The *Bangladesh Environmental Management Project* (BEMP; CAN\$12 m) was a five-year project designed to help DOE to fully and demonstrably implement its mandate. In particular, the project aimed to strengthen DOE's capacities to undertake strategic change, to think and operate in a policy context, to stretch its planning horizons beyond the current year and current set of projects, to continuously address its organizational mandate and to develop program frameworks. CIDA has contributed \$10.2 million to the ADB project title '*Emergency Disaster Damage Rehabilitation Project*'.

Swedish International Development Cooperation Agency (SIDA)

28. During the period 2009-2011 SIDA was commissioned by the Swedish government to increase Swedish support to climate change adaptation in partner countries. Among the focus countries are Bangladesh and Cambodia. SIDA in Bangladesh specifically works in the education and health sectors which constitute some 80% of its total cooperation program. Climate Change and Environment are small components and will be addressed under those two sectors as sub-components. In monetary terms Swedish annual assistance is currently in the order of some \$30 million. The Swedish Government is planning to contribute to the MDTF for Climate Change to support long-term projects and programs for adaptation to climate change. The Swedish contribution is planned to be 50 MSEK for 2009 and 2010, and 40 MSEK for 2011. In Bangladesh, SIDA entered into an agreement with UNICEF for the project 'UNICEF post cyclone response' in December 2007. With a total cost of SEK 24.3 million, the project will help strengthen UNICEF's ongoing efforts to restore cyclone-affected children.

Government of the Netherlands

29. The Netherlands Development Cooperation in Bangladesh has a long tradition for its involvement in water sector including coastal zone management. Three Dutch projects in Bangladesh are linked to environment and climate change aspects: Water, Sanitation and Hygiene Program (WASH) implemented by BRAC; Integrated Planning of Sustainable Water Management Project (IPSWAM) by the BWDB; and the Southeast Asia Integrated Water Resource Management Project (Southeast-IWRM), and Char Development and Settlement Project (CDSP I-III). The WASH project explicitly addresses health and sanitation issues. The project invested an amount of € 57 million for ensuring rural water supply, sanitation and hygiene. IPSWAM project are supporting in various activities dealing with improving rural water management infrastructure in participatory approach with active portfolio of about \$300 million. CDSP-III projects are supporting various projects on vulnerable coastal zone development and management with an amount of €10 million. Netherland Climate Assistance Program (NCAP) implemented by IUCN Bangladesh, created enabling conditions in the country for promoting adaptation to climate change and variability in the coastal areas.

Swiss Agency for Development and Cooperation's (SDC)

30. The Swiss Agency for Development and Cooperation's (SDC) *Cooperation Strategy Bangladesh* (2008-2012) focuses on the two thematic areas: employment and income generation and local governance. SDC's thematic areas on disaster risk reduction and humanitarian aid includes disaster preparedness and prevention measures in its program. SDC's humanitarian aid provides expertise and funds in case of emergencies exceeding the government's capacities, such

as for post-flood or post-cyclone rehabilitation activities. It is mainstreaming Disaster Risk Reduction (DRR) and Climate Change Adaptation (CCA) in its program and project portfolio. SDC has already supported a phase of the Flood Risk Reduction Activities project (FRRAS) in Sunamganj since the devastating floods of 2004 that affected the whole country. A new phase of FRRAS project with support of CHF 2 million is ongoing since December 2006. SDC provided \$ 5.5 million for emergency assistance for cyclone Sidr and for post flood rehabilitation and is also planning for construction multi-purpose cyclone shelters and strengthening disaster awareness / preparedness among the rural community.

NGOs, Research Institutes and other Partners

31. Some national and international NGOs and civil society are very active in the area of climate change adaptation. They have some research and pilot programs in the vulnerable regions of the country. Namely Bangladesh Centre for Advanced Studies (BCAS), Centre for Natural Resource Management (CNRS), IUCN Bangladesh, Action Aid Bangladesh, CARE Bangladesh, Oxfam Bangladesh, Practical Action Bangladesh, Bangladesh Red Crescent Society, Concern Worldwide, Christian Aid, Caritas, etc. are prominent in the area of climate adaptation. Besides, some of the research institutions namely Center for Environment and Geographic Information System (CEGIS), Institute of Water Modeling (IWM), Bangladesh University of Engineering and Technology (BUET), Khulna University, Dhaka University, Chittagong University, Bangladesh Agriculture University, etc. are also working in many areas relating to climate adaptation.

Annex 2: Areas for PPCR Intervention

1. It is evident that there is a limited envelope of funding available under PPCR. It has been therefore, necessary to prioritize the areas in which PPCR would intervene. One of the challenges in dealing with climate change is that it cuts across sectors and the key areas of impact of climate change fall under the authority of a number of different line ministries. A key strategic objective for GOB is to ensure that all these ministries mainstream the impacts of climate change in their everyday functioning. It is therefore proposed that PPCR funding be used to ‘pilot’ comprehensive approaches to building resilience. In particular, specific geographical sites have been selected where the proposed PPCR intervention would address the key climate concerns.

2. The geographical areas of intervention were selected on the basis of consultation with stakeholders. Many studies have found that coastal areas of Bangladesh are the most vulnerable to extreme climate events including the ICZMP (2005), NAPA (2005), Bangladesh Climate Change Strategy and Action Plan (BCCSAP), 2009. Super Cyclone ‘SIDR’ in November 2007 and Cyclone ‘AILA’ in May 2009 are recent examples of the extreme events that claimed thousands of lives and destroyed livelihood options for millions of coastal people. Consultation with stakeholders confirmed that the following twelve coastal districts should be the focus for PPCR intervention: Barguna, Satkhira, Khulna, Pirojpur, Patuakhali, Bagerhat, Bhola, Noakhali, Lakhshimpur, Feni, Chittagong, and Cox’s Bazaar.

Polder assessment

3. Given the relatively limited funds available under the PPCR, it was also decided that one polder would be selected in each one of these districts for PPCR related activities. Polders were identified using the following criteria developed on the basis of desk study, field visits, discussion with District officials and interactions with local communities:

- Polders with sea facing or river facing embankments
- Polder embankment length up to approximately 90 km
- Current embankment height of 2-5 meters
- Polders receiving limited funding to date
- Polders representing a broad variety of economic activities traditional for the coastal zone

4. Based on the above criteria, the following 12 polders were selected.

Polders Selected for PPCR Activities

| Polder No. | Union Parishad | Upazila | District | Population (no.) | Length of Embankment (km) | Area covered (ha) |
|------------|--|------------|----------|------------------|---------------------------|-------------------|
| 7/1 | Padmapukur, Pratap nagar | Shaymnagar | Satkhira | 40,000 | 39.92 | 5,635 |
| 13-14/2 | Koyra, Uttar Betkashi, Moharajpur, Moheshwaripur, Batali | Koyra | Khulna | 142,000 | 91.77 | 17,864 |

| | | | | | | |
|--------|---|--------------------------------|-------------|----------|-------|--------|
| 35/3 | Dema, Mollikerber, Karapara | Bagherhat sadar & Rampal | Bagherhat | 36,000 | 40.35 | 6790 |
| 39/2 C | Tushkhali, Machua, Betmore, | Mathbaria, | Pirozpur | 90,000 | 56.00 | 10,285 |
| | Telekhali, Ekri | Bhandaria | | | | |
| 41/5 | M. Balitali | Barguna Sadar | Barguna | 31,950 | 50.00 | 3,880 |
| 46 | Nilgonj | Kalapara | Patuakhali | 32,000 | 39.92 | 5,635 |
| 55/3 | Nurabad, Mujibnagar, char Kajal, char Biswas | Charfesson & Galachipa | Bhola | 56,000 | 54.87 | 9,845 |
| 73/1 | Char Iswar, Char King, Nalchira, Sukchar, Sonadia, Burirchar and Tamaruddin | Hatiya | Noakhali | 1,65,000 | 70.22 | 15,334 |
| 59/2 | Char Kalkini, Char Falcon | Kamalnagar | Lakshmipur | 1,10,000 | 22.00 | 4,500 |
| | Alexander, Char Abdullah | Ramgati | | | | |
| 60 | Charchandia, Sonagazi sadar | Sonagazi | Feni | 1,55,000 | 39.00 | 17,500 |
| 63/1 A | Brong Chara, Juidani, Bortali, Barsat, Raipur, Boirag | Anowara | Chittagong | 1,39,000 | 48.00 | 6,560 |
| 70 | Materbari and Dhalghata | Moheshkhali | Cox's Bazar | 90,201 | 32.32 | 3,023 |

5. The polders identified for PPCR intervention were mostly constructed in the 1960's and 70's for sea facing or river facing land primarily to control and manage flooding and drainage. Existing embankments were generally made with earthen materials (mud) with top width, crest level and side slope dimensions that enabled breaking off daily and seasonal tides and surges. However, with increasing climate variability and change, polders are critically vulnerable to storm surge, sea level rise, salinity intrusion and cyclone. A moderate wind surge could damage houses and other infrastructure.

6. In the polders visited, sizeable lengths of embankments had been overtopped and washed away during the two cyclonic events in 2007 and 2009 resulting in sea water intrusion and flooding of agricultural lands and increased salinity of drinking water. In many cases, inhabitants were living on the top of these embankments.

7. Intrusion of saline water into surface water and aquifers is increasingly limiting access to water for drinking and irrigation and heightening the spread of vector borne diseases especially in the dry season. Interactions with the locals informed that after Cyclone Aila, more than 95% drinking water sources were submerged through overflow of saline water and these are yet to be repaired. Water shortage is becoming more acute in the dry season to the extent that people have to walk long distances to fetch safe drinking water. On average, households spend about Tk. 20-30 per day for safe drinking water brought in from

distant places. In extreme cases the poor people of the cyclone-stricken areas resort to using muddy, dirty and saline water from ponds, rivers, canals and ditches increasing the prevalence of water-borne diseases like diarrhea, dysentery, stomach ailments and skin diseases. The Department of Public Health and Engineering (DPHE) is working to restore tube-wells, and rainwater harvesters, and may repair pond sand filters with support from various development partners.

8. Considering the vulnerabilities in the twelve selected polders, it is likely that the physical interventions under the PPCR would include some combination of (a) rehabilitating and raising the height of the earthen embankments; (b) afforestation of embankments on the crest and slopes; (c) improving the drainage and irrigation systems within the polders with sluices and regulators for better water management for agriculture and fisheries; (d) improve shelter for cyclone affected people and livestock; (e) ensuring availability of clean and safe drinking water supply and electricity; and (f) improving internal connectivity (roads, small bridges and culverts) to support livelihood related activities.

Polder Details

9. Some physical, social and engineering information on the 12 selected polders are as follows:

Physical Information on Selected Polders in the Twelve Districts

| Polder No. | District | Bridges | Culverts | Cyclone shelter | Hospital | School | Road Length (km) | Houses |
|------------|-------------|---------|----------|-----------------|----------|--------|------------------|--------|
| 7/1 | Satkhira | | | | | | | |
| 13-14/2 | Khulna | | 11 | 12 | | | 66.86 | 385 |
| 35/3 | Bagherhat | 3 | 4 | 2 | | 20 | 23.31 | 162 |
| 39/2 C | Pirozpur | | | | | | | |
| 41/5 | Barguna | | | 2 | | 9 | 35.97 | 86 |
| 46 | Patuakhali | | 13 | 8 | | 12 | 12.44 | 195 |
| 55/3 | Bhola | | | 9 | | 7 | 35.32 | 443 |
| 73/1 | Noakhali | | | 58 | 1 | 57 | 236.18 | 610 |
| 59/2 | Lakshmipur | 2 | 21 | 72 | 3 | 52 | 293.62 | 2289 |
| 60 | Feni | | | | | | | |
| 63/1 A | Chittagong | 3 | 28 | 45 | 5 | 56 | 59.80 | 333 |
| 70 | Cox's Bazar | | | | | | | |

Engineering Information on Selected Polders in the Twelve Districts

| Polder No. | District | Length of Embankment | Status of Existing Embankment (Note: R/S – River Side, C/S – Country Side) |
|------------|-------------|--|--|
| 7/1 | Satkhira | 39.92 km (9.00 km breached) | Existing Embankment:-Top Width = 4.27 m Crest level = (+) 4.30 m Side slope = 1:3 (R/S); 1:2 (C/S) |
| 13-14/2 | Khulna | 91.77 km (16.00 km breached) | Existing Embankment:-Top Width = 4.27 m Crest level = (+) 4.30 m Side slope = 1:3 (R/S); 1:2 (C/S) |
| 35/3 | Bagherhat | 40.35 km | Existing Embankment:-Top Width = 4.27 m Crest level = (+) 3.40 m Side slope = 1:3 (R/S); 1:2 (C/S) |
| 39/2 C | Pirozpur | 56.00 km (unprotected) | - |
| 41/5 | Barguna | 50.00 km | Sea Dyke:-Top Width = 4.27 m Crest level = (+) 5.18 m Side slope = 1:5 (R/S); 1:2 (C/S) Interior Dyke :-Top Width = 4.27 m Crest level = (+) 4.87 m Side slope = 1:3 (R/S); 1:2 (C/S) |
| 46 | Patuakhali | 39.92 km | Sea Dyke:-Top Width = 4.30 m Crest level = (+) 5.18 m Side slope = 1:5 (R/S); 1:2 (C/S) Interior Dyke :-Top Width = 4.30 m Crest level = (+) 4.88 m Side slope = 1:3 (R/S); 1:2 (C/S) |
| 55/3 | Bhola | 54.87 km | Sea Dyke:-Top Width = 4.27 m Crest level = (+) 4.92 m Side slope = 1:5 (R/S); 1:2 (C/S) Interior Dyke :-Top Width = 5.00 m Crest level = (+) 5.00 m Side slope = 1:3 (R/S); 1:2 (C/S) |
| 73/1 | Noakhali | 70.22 km Sea dyke: Re-sectioning = 8.47 km Rebuild = 10.10 km Marginal Dyke: Re-sectioning = 12.17 km Rebuild = 31.60 km | Sea Dyke:-Top Width = 4.27 m Crest level = (+) 6.00 m Side slope = 1:5 (R/S); 1:2 (C/S) Interior Dyke :-Top Width = 4.27 m Crest level = (+) 6.00 m Side slope = 1:3 (R/S); 1:2 (C/S) |
| 59/2 | Lakshmipur | 22.00 km (9.00 km breached) | Interior Dyke :-Top Width = 4.27 m Crest level = (+) 6.75 m Side slope = 1:3 (R/S); 1:2 (C/S) |
| 60 | Feni | 39.00 km | Existing Embankment:-Top Width = 4.27 m Crest level = (+) 4.80 m Side slope = 1:3 (R/S); 1:2 (C/S) |
| 63/1 A | Chittagong | 48.00 km Sea-Dyke = 15.00 km Interior Dyke = 33.00 km | Sea Dyke:-Top Width = 4.27 m Crest level = (+) 6.00 m Side slope = 1:5 (R/S); 1:2 (C/S) Interior Dyke :-Top Width = 4.27 m Crest level = (+) 5.50 m Side slope = 1:3 (R/S); 1:2 (C/S) |
| 70 | Cox's Bazar | 32.32 km Sea-Dyke = 24.28 km Interior Dyke = 8.04 km | Sea Dyke:-Top Width = 4.27 m Crest level = (+) 4.88 m Side slope = 1:5 (R/S); 1:2 (C/S) Interior Dyke :-Top Width = 4.27 m Crest level = (+) 4.50 m Side slope = 1:3 (R/S); 1:2 (C/S) |

Annex 3: Bangladesh National Adaptation Program of Action (NAPA) and Bangladesh Climate Change Strategy & Action Plan (BCCSAP)

National Adaptation Program of Action (NAPA)

1. The National Adaptation Program of Action (NAPA) was prepared in 2005 (and updated in 2009) in response to the decision of the Seventh Session of the Conference of the Parties (COP7) of the United Nations Framework Convention on Climate Change (UNFCCC). The NAPA draws upon the understanding gathered through discussion with relevant stakeholders in sub-national and national workshops and background papers prepared by six Sector Working Groups (SWG) i.e. (a) Agriculture, Fisheries and Livestock coordinated by Bangladesh Agricultural Research Council (BARC); (b) Forestry, Biodiversity and Land-use coordinated by IUCN, Bangladesh; (c) Water, Coastal Zone, Natural Disaster and Health coordinated by Water Resources Planning organization (WARPO); (d) Livelihood, Gender, Local Governance and Food Security coordinated by Bangladesh Institute for Development Studies (BIDS); (e) Industry and Infrastructure coordinated by Department of Environment (DOE); and (f) Policies and Institutes coordinated by Bangladesh Centre for Advanced Studies (BCAS).

2. NAPA identified most damaging effects of climate change are floods, salinity intrusion, and droughts that are found to drastically affect crop productivity almost every year. Climate change induced challenges are: (1) scarcity of fresh water due to less rain and higher evapo-transpiration in the dry season, (2) drainage congestion due to higher water levels in the confluence with the rise of sea level, (3) river bank erosion, (4) frequent floods and prolonged and widespread drought, (5) wider salinity in the surface, ground and soil in the coastal zone.

3. Following 15 adaptation strategies were identified in the NAPA:

- a. Community based adaptation to climate change through coastal afforestation.
- b. Drinking water for coastal communities to combat enhanced salinity due to sea level rise.
- c. Capacity building for integrating climate change in planning, designing of infrastructure, conflict management and land water zoning for water management institutions.
- d. Climate change and adaptation information dissemination to vulnerable communities for emergency preparedness measures and raising awareness about climatic disasters.
- e. Construction of flood shelter, and information and assistance centre to cope with enhanced recurrent floods in major floodplains.
- f. Mainstreaming adaptation to climate change into policies and programs in different sectors (focusing on disaster management, water, agriculture, health and industry).
- g. Inclusion of climate change issues in curriculum at secondary and tertiary educational institutions.
- h. Enhancing resilience of urban infrastructure and industries to impacts of climate change.
- i. Development of eco-specific adaptive knowledge (including indigenous knowledge) on adaptation to climate variability to enhance adaptive capacity for future climate change.
- j. Promotion of research on drought, flood and saline tolerant varieties of crops to facilitate adaptation in future.
- k. Promoting adaptation to coastal crop agriculture to combat increased salinity.

- l. Adaptation to agriculture systems in areas prone to enhanced flash flooding in North East and Central Region.
 - m. Adaptation to fisheries in areas prone to enhanced flooding in North East and Central Region through adaptive and diversified fish culture practices.
 - n. Promoting adaptation to coastal fisheries through culture of salt tolerant fish special in coastal areas of Bangladesh.
 - o. Exploring options for insurance and other emergency preparedness measures to cope with enhanced climatic disasters.
4. NAPA was updated in 2009 and identified 45 adaptation measures under six themes: (1) food security and pro-poor social safety nets; (2) comprehensive disaster management; (3) climate resilient infrastructure; (4) mainstreaming climate change; (5) capacity and knowledge enhancement; and (6) strategic natural resource management. From these 45 adaptation measures, 9 short and 9 medium term projects have been developed for implementation by relevant ministries and line agencies. It is estimated that these short and medium term adaptation measures would require around US\$4 billion for implementation during the next five years.

Bangladesh Climate Change Strategy & Action Plan (BCCSAP)

5. The Climate Change Strategy and Action Plan 2009 built on and expanded the NAPA. **Climate Change Strategy and Action Plan** is built around the following six themes:
- **Food security, social protection and health** to ensure that the poorest and most vulnerable in society, including women and children, are protected from climate change and that all programs focus on the needs of this group for food security, safe housing, employment and access to basic services, including health.
 - **Comprehensive disaster management** to further strengthen the country's already proven disaster management systems to deal with increasingly frequent and severe natural calamities.
 - **Infrastructure** to ensure that existing assets (e.g., coastal and river embankments) are well-maintained and fit-for-purpose and that urgently needed infrastructure (e.g. cyclone shelters and urban drainage) is put in place to deal with the likely impacts of climate change.
 - **Research and knowledge management** to predict the likely scale and timing of climate change impacts on different sectors of the economy and socioeconomic groups; to underpin future investment strategies; and to ensure that Bangladesh is networked into the latest global thinking on climate change.
 - **Mitigation and low carbon development** to evolve low carbon development options and implement these as the country's economy grows over the coming decades.
 - **Capacity building and institutional strengthening** to enhance the capacity of government ministries, agencies, civil society and private sector to meet the challenge of climate change.

Climate Change Action Plan (CCAP) in the BCCSAP

6. There are forty-four specific programs proposed in the BCCSAP under the six themes as follows:

Theme 1: Food Security, Social Protection and Health

- P1. Institutional capacity for research towards climate resilient cultivars and their dissemination
- P2. Development of climate resilient cropping systems
- P3. Adaptation against drought, salinity submergence and heat
- P4. Adaptation in fisheries sector
- P5. Adaptation in livestock sector
- P6. Adaptation in health sector
- P7. Water and sanitation program in climate vulnerable areas
- P8. Livelihood protection in ecologically fragile areas
- P9. Livelihood protection of vulnerable socio-economic groups (including women)

Theme 2: Comprehensive Disaster Management

- P1. Improvement of flood forecasting and early warning systems
- P2. Improvement of cyclone and storm surge warning
- P3. Awareness raising and public education towards climate resilience
- P4. Risk management against loss on income and property

Theme 3: Infrastructure

- P1. Repair and maintenance of existing flood embankments
- P2. Repair and maintenance of cyclone shelters
- P3. Repair and maintenance of existing coastal polders
- P4. Improvement of urban drainage
- P5. Adaptation against floods
- P6. Adaptation against tropical cyclones and storm surges
- P7. Planning and design of river training works
- P8. Planning, design and implementation of resuscitation of river and *khals* through dredging and de-siltation works

Theme 4: Research and Knowledge Management

- P1. Establishment of a centre for knowledge management and training on climate change
- P2. Climate change modeling at national and sub-national levels
- P3. Preparatory studies for adaptation against sea level rise and its impacts
- P4. Monitoring of ecosystem and biodiversity changes and their impacts
- P5. Macroeconomic and sectoral economic impact of climate change
- P6. Monitoring of internal and external migration of adversely impacted population and providing support to them for rehabilitation;
- P7. Monitoring of impacts on various issues related to management of tourism in Bangladesh and implementation in priority action plan

Theme 5: Mitigation and Low Carbon Development

- P1. Improved energy efficiency in production and consumption of energy
- P2. Gas exploration and reservoir management
- P3. Development of coal mines and coal fired power stations
- P4. Renewable energy development
- P5. Lower emission from agricultural land
- P6. Management of urban waste
- P7. Afforestation and reforestation program
- P8. Rapid expansion of energy saving devices, e.g. Compact Fluorescent Light (CFL)
- P9. Energy and water efficiency in built environment
- P10. Improvement in energy consumption pattern in transport sector and options for mitigation

Theme 6: Capacity Building and Institutional Strengthening

- P1. Revision of sector policies for climate resilience
- P2. Mainstreaming climate change in national, sector and spatial development programs
- P3. Strengthening human resource capacity
- P4. Strengthening gender consideration in climate change management
- P5. Strengthening institutional capacity for climate change management
- P6. Mainstreaming Climate Change in the Media

Annex 4: A Strategy to Engage the Private Sector in Climate Change Adaptation in Bangladesh

*Prepared by Asian Tiger Capital Partners for the International Finance Corporation
(The full report will be made available on the PPCR website)*

1. As noted in the Bangladesh Climate Change Strategy and Action Plan, the combination of frequent natural disasters, high population density, poor infrastructure and low resilience to economic shocks, makes Bangladesh especially vulnerable to climatic risks. The high incidence of poverty and heavy reliance of poor people on agriculture and natural resources increases their vulnerability to climate change.
2. The Government of Bangladesh (GOB) with the support of the major donor agencies has outlined a comprehensive strategy on tackling climate change. The effort has been spear-headed by a climate change cell set up within the Ministry of Environment and Forests.
3. On a global basis, while Adaptation is still seen as more of a public sector focus than mitigation, some increased focus has been evident. The private sector should also be seen as a “supplier of innovative goods and services”. There is a clear need to meet the adaptation priorities of developing countries with expertise in technology and service delivery.
4. The private sector has particular competencies which can make a unique contribution to adaptation, through innovative technology, design of resilient infrastructure, development and implementation of improved information systems and the management of major projects.
5. There are future investment opportunities in adaptation in water resources, agriculture and environmental services. In agriculture, investment may be needed for developing irrigation equipment and technologies as well as fertilizers. Provision of clean water is another opportunity, requiring investment in water purification and treatment technologies such as desalination, and wastewater treatment technologies. Environmental services such as weather derivatives are also a possible area for investment
6. Fewer than 5 per cent of households and businesses in developing countries have insurance coverage for catastrophe risks. Instead, such risks are dealt with by a mix of social networks and informal post-event credit. The absence of insurance stunts development because smallholders cannot risk investing in fixed capital or concentrating on profitable activities and crops for fear of losing them, and falling into debt. Thus, a critical task for the public sector will be to support the private sector in creating financial risk sharing and management approaches and mechanisms that can be accessed by people in developing countries, especially LDCs, SIDS and countries in Africa, and help to reduce their vulnerability to the impacts of climate change. The greater involvement of the private sector is critical for both the challenges and opportunities of climate change. Relatively few companies in Bangladesh have yet considered both the impact of climate change on their existing activities, and perhaps as importantly, the new commercial opportunities that will emerge both domestically and globally.
7. One important constraint in private sector engagement in Climate Change projects, for both mitigation and adaptation, is the lack of capacity of financial institutions in both public

and private sectors to evaluate projects. This lack of understanding of specific types of climate change investments and their risk profiles means that banks often find it difficult to develop and structure appropriate financial products. Most of the commercial banks in Bangladesh rely on short term deposits, and an asset-liability mismatch also limits their ability and willingness to structure financial products with the longer tenure that is typically needed for climate change investments.

8. In terms of the initial feedback from different private sector stakeholders, a consensus theme was a concern that the bulk of climate change funding would be administered by the government with a lot of the implementation done by Non-Government Organisations (NGOs). Hence there was little incentive or motivation for companies to commit scarce and valuable senior management time to consider opportunities in tackling Climate Change. However, in that context, there was strong support for the IFC project to come up with a specific strategy and modalities to more effectively engage the private sector in the PPCR program.

Overcoming Information Gaps: One -on--one consulting and Technical assistance can be far more effective. A Climate Change Cell or strategy unit should be set up in leading corporations to develop capacity and expertise in addressing opportunities.

Regional and Global Success Stories: Another important potential tool to motivate the private sector is be more aware of successful and commercially viable investments and initiatives by other corporate in the region and indeed globally.

Changing the Economics of Climate Change Investments: This can be done on a number of fronts including the tax regime, low cost debt financing, equity investments and even sharing of R& D costs.

9. The IFC, as the commercial lending arm of the World Bank Group, is naturally one of the more private sector focused organizations among the development partners. In Bangladesh, they play an addition relevant role in managing the Bangladesh Investment Climate Fund (BICF) as well as the South Asia Enterprise Development Fund (SEDF).

10. Going forward, IFC is well positioned to convene and mobilize the wider private sector response. From an advisory perspective, the primary focus will be upon on the identification of sustainable business models that provide or encourage adaptive capacity, and encouraging commercial companies into the market through the provision of finance and capacity. It will also, however, involve supporting governments to create the correct regulatory environment for businesses to enter the market for adaptation services, much in the same way that IFC has addressed climate mitigation policy for the private sector. IFC is able to assess how climate change impacts upon business planning and investment cycles, and how to mobilize finance and knowledge for both large corporations and for those reliant on micro-finance scale solutions.

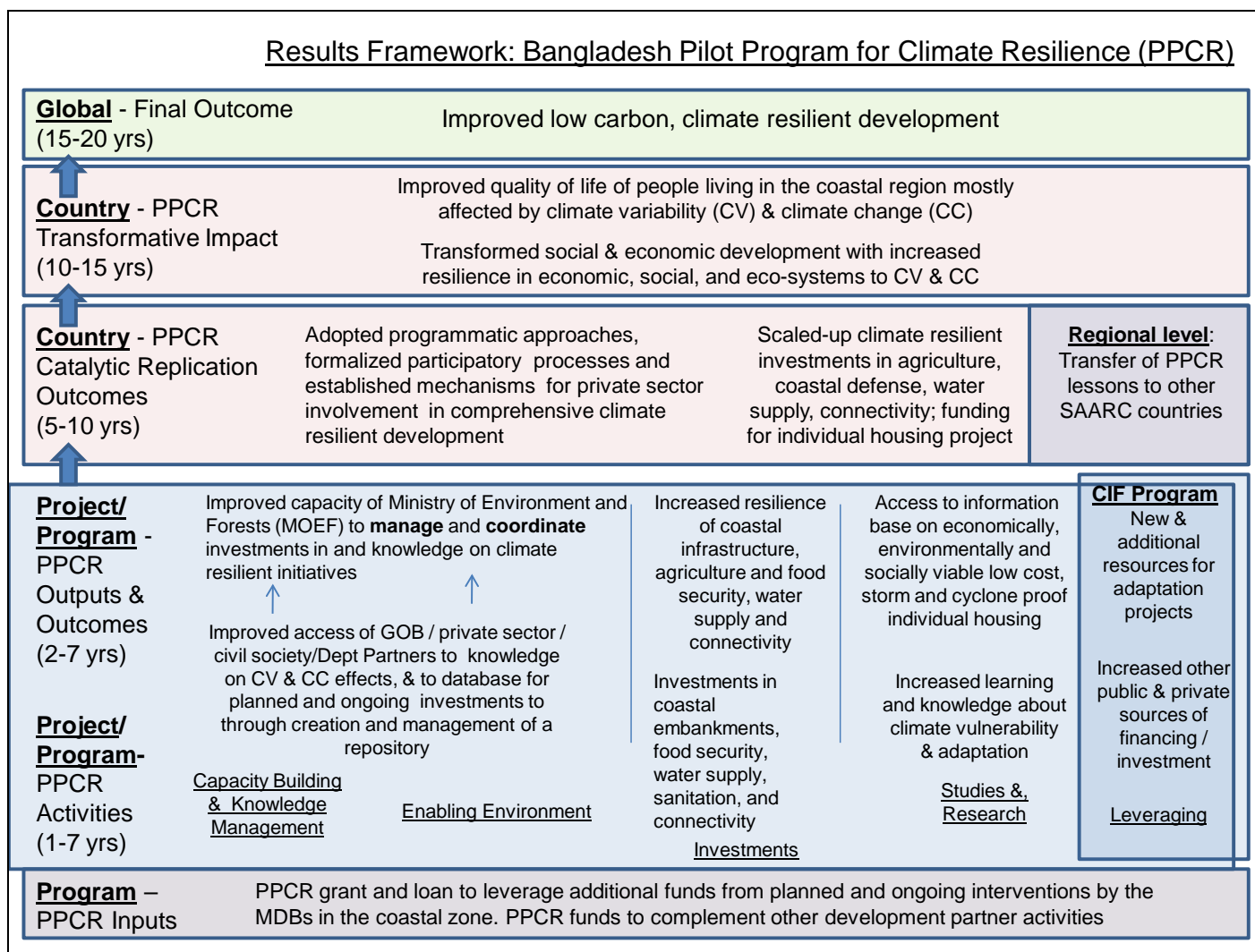
11. There is little doubt that that the initiatives such as PPCR can play an important role in engaging the private sector across the areas of knowledge building, shared R& D and concessional finance. However, one very clear piece of feedback that came back from the stakeholder meetings was a concern from corporates that if Climate Change funding was administered by a government ministry then the bureaucratic procedures would make the operational of funds and the process of obtaining either loans or grants unwieldy. They

highlighted the fact that the much vaunted PPP program announced by the Honorable Finance Minister in the June 09 Budget, had yet to be operationalized more than 12 months later.

12. In this context, it seems sensible to ear market and ring-fence separate funding for Climate Change Adaptation projects for the private separate distinct from broader public sector funding. Within a \$ 100bn economy where the private sector is the major player, we believe an initial \$ 10-12 m investment fund should be set up within PPCR, administered by the IFC. This might expanded as the project portfolio increases much as the IPFF energy refinancing has recently been increased as it gained greater demand and traction. They would offer concessional debt financing and potentially equity for private sector project proposals in the area of Climate Change Adaptation. This will need additional technical assistance in the area of project development. A Climate Change Business Incubator service should also be established, possibly in conjunction with a leading research centre at BUET to facilitate the commercializing of primary science and new innovations in Climate Change in Bangladesh.

13. The IFC clearly has the potential to play an important catalytic role in the objective of engaging the private sector in Climate Change Adaptation by both managing a private sector focused fund as a sub-component of the PPCR as well as providing the critical technical assistance and project finance/development/management skills that will be important in ensuring funds are effectively utilized.

Annex 5: Results Framework for Bangladesh PPCR



Government of the People's Republic of Bangladesh
Ministry of Finance
Economic Relations Division

No. 09.214.0.14.05.04.007.2009- 666

October 14, 2010

Ms. Patricia Bliss-Guest
Program Manager
Administrative Unit, Climate Investment Funds
CIF Administrative Unit
1818 H Street NW, Washington, DC, 20433 USA

Subject: Submission of Bangladesh Strategic Program for Climate Resilience (SPCR)

Dear Ms Bliss-Guest ,

It is my pleasure to send you the Bangladesh Strategic Program for Climate Resilience (SPCR). We request that this is placed before the PPCR Board for review and consideration of the strategic program to be held in November 2010 at Washington DC.

Should you need any further information or clarification, please do not hesitate to contact us. You are aware that Mr. Arastoo Khan, Additional Secretary, ERD, Ministry of Finance and Dr Nasir Uddin, Joint Secretary, Ministry of Environment and Forests are planning to join the CIF meetings.

We look forward to being the first PPCR country with an approved SPCR, and to starting implementation of the program on the ground.

Thanking you,
With kind regards,



(Musrat Meh Jabin)
Senior Assistant Chief, Economic Relations Division,
Ministry of Finance
Government of Bangladesh