

BANGLADESH



Linking Climate Science to Climate Policy and Practice

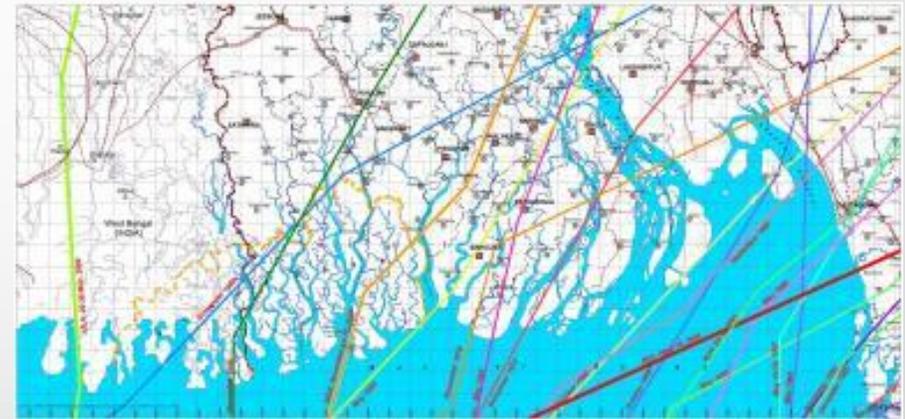
**Ministry of Environment & Forests and
Ministry of Finance
Government of the People's Republic of Bangladesh**

**May 2018
Manila, Philippines**

Highly Vulnerable to Climate Change

Bangladesh is categorized as the most climate vulnerable country in the world (Harmeling, 2012).

- Entire coastline vulnerable.
- 65% of the country is less than 5 meters above sea level, increasing susceptibility to floods, storm surges, and sea level rise.
- A low lying delta, farmlands are susceptible to daily and seasonal flooding.
- About 21% of current population of 160 million live below the poverty line.
- Increasing frequency and intensity of natural climate related disasters including cyclone (Severe tropical cyclone every 3 years on avg.) and salt water intrusion.



Simulation of Historical Cyclones

Major Cyclones: Bangladesh Coast (1965-2017)

Month/Year	Maximum Wind speed (km/hr)	Storm Surge height (m)	Death Toll
May 11, 1965	161	3.7-7.6	19,279
November 12, 1970	224	6.0-10.0	300,000
April 30, 1991	225	6.0-7.6	138,882
November 15, 2007 (Sidr)	223	3.5-6.0	3,363
May 23, 2009 (Aila)	92	--	190
May 16, 2013 (Mahasen)	95	--	24
May 2016 (Roanu)	83	1.2	26
May 2017 (Mora)	135	--	6

Source: Bangladesh Meteorological Department (BMD) 2017 and Government of Bangladesh (GoB) 2008



Country Context

- Cyclone Sidr (2007) killed over 3,000 people, and caused an economic loss of US\$1.7 billion, as well as consecutive monsoon floods which caused damage of US\$1.1 billion.
- For 2010 it was estimated that the loss of life attributed solely to climate change was 15,000 (DARA, 2012).
- These major disasters prompted debate about the link to climate change, followed by efforts to tackle long-term adverse climate change impacts.



Country Context

The key challenges in tackling climate change are

- Food security, social protection and health
- Comprehensive disaster management
- Infrastructure development
- Research and knowledge management
- Mitigation and low carbon development
- Capacity building and institutional development.

Bangladesh's growing vulnerability to climate change makes it a suitable candidate for PPCR finance.



PPCR in Bangladesh

PPCR Leveraging Potential

- The PPCR is leveraging substantial climate financing from the World Bank, ADB, and other bilateral and multilateral development agencies.
- A total of US\$95.4 million of PPCR support (US\$ 45.4 million grant and US\$ 50 million concessional loan) has attracted US\$ 523.4 in co-financing from WB, ADB, KFW (Germany), IFAD, and GoB with possible additional support from other partners.

Specific Investments (Projects)

Geographical Focus: Coastal Zone of Bangladesh

Investment Project 1: Coastal Embankment Improvement Project Phase-I

Investment Project 2: Coastal Towns Infrastructure Improvement Project

Investment Project 3: Coastal Climate Resilient Infrastructure Project



PPCR Interventions

Investment Project 1: Coastal Embankment Improvement Project (CEIP) Phase-I

Objective: The project development objectives are to

- (a) increase the area protected in selected polders from tidal flooding and frequent storm surges, which are expected to worsen due to climate change;
- (b) improve agricultural production by reducing saline water intrusion in selected polders; and
- (c) improve the Government of Bangladesh's capacity to respond promptly and effectively to an eligible crisis or emergency.

Responsible MDB: The World Bank

Total Project Financing: US\$ 400 million (IDA Credit: US\$ 375 million + PPCR Grant: US\$ 25 million)

Implementing Agency: Bangladesh Water Development Board (BWDB)

Project Components:

- A. Rehabilitation and improvement of Polders
- B. Implementation of social and environmental management framework and plans
- C. Construction supervision, project monitoring and evaluation and coastal zone monitoring
- D. Project management, technical assistance, training and strategic studies
- E. Contingent emergency response



PPCR Interventions

Investment Project 1: Coastal Embankment Improvement Project (CEIP) Phase-I

Key Results:

- **17 Polders** will be rehabilitated to protect against tidal flooding and storm surge in **6 coastal districts**.
- **760,000** people will be supported by the PPCR to cope with the effects of climate change.
- **380,000** females will be supported by the PPCR to cope with the effects of climate change.
- About **8.5 million people** will be benefitted from agricultural development, employment, and increased food security.
- A **Comprehensive Analysis** will be undertaken to better understand the coastal dynamics to increase climate resilience in the coastal area.



PPCR Interventions

Investment Project 1: Coastal Embankment Improvement Project (CEIP) Phase-I

Use of Climate data and Climate Projections in Project Design:

- **Stimulation of 19 well documented major cyclones** (that have occurred from 1960 to 2009) under the maximum tide level.
- **Spatio-temporal hydrodynamic cyclone and storm surge model** of the Bay of Bengal for different return periods (i.e., 10, 25, 50 and 100 years).
- **Precipitation:** A 20 percent increase in extreme precipitation by 2050.
- **Sea Level Rise:** 0.5m SLR by 2050 assuming a liner progression over time for the 1.0 m SLR by 2100.
- **Land Subsidence:** A potential subsidence of land by 9.55 mm per year as per the measurement of Dhaka University.
- **Cyclone Intensification:** An increase of 10 percent tropical cyclone intensities for a rise in sea surface temperature of 2°C.

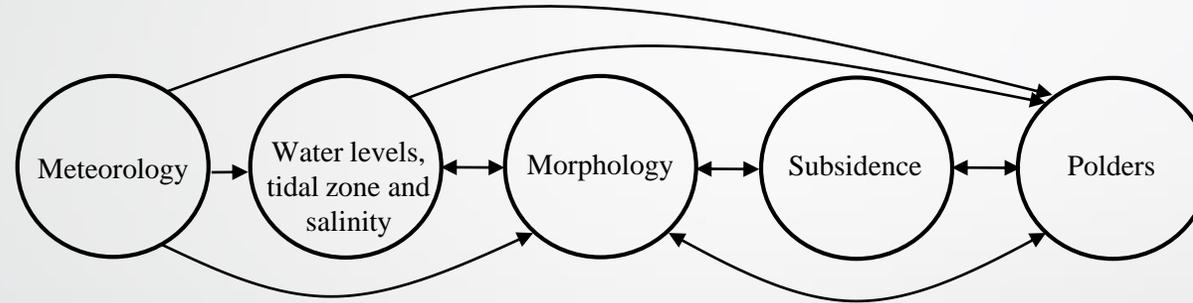


PPCR Interventions

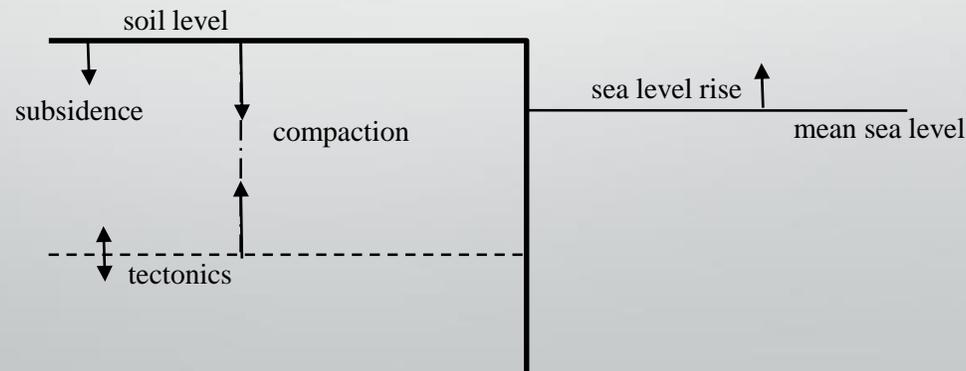
Investment Project 1: Coastal Embankment Improvement Project (CEIP) Phase-I

Use of Climate data and Climate Projections in Project Design: Long Term Monitoring, Research and Analysis of Bangladesh Coastal Zone (Sustainable Polders Adapted to Coastal Dynamics)

Create a framework for polder design, based on understanding of the long term and large scale dynamics of the delta.



Relations between physical processes and polders



Key elements of subsidence

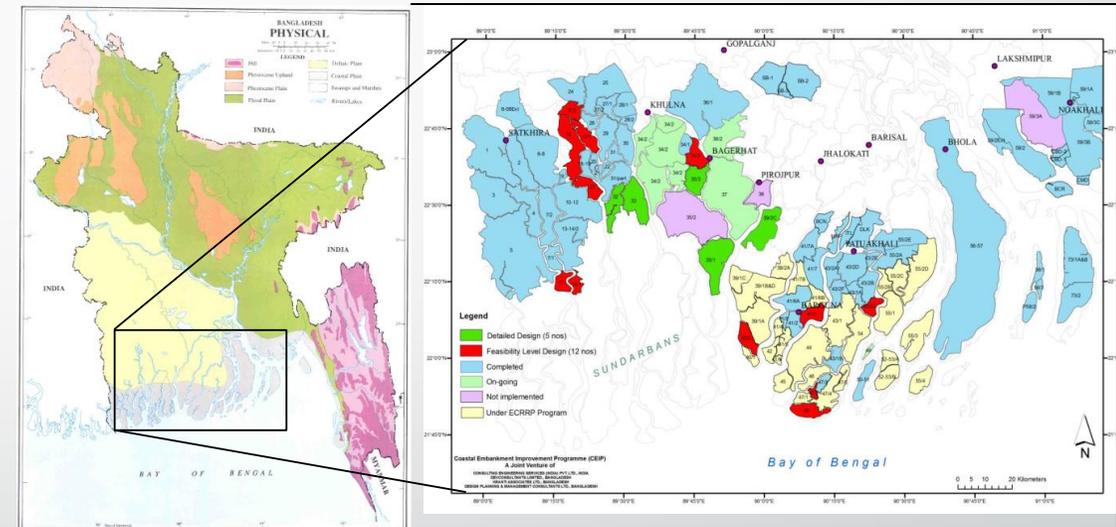


PPCR Interventions

Investment Project 1: Coastal Embankment Improvement Project (CEIP) Phase-I

Use of Climate data and Climate Projections in Project Design:

- Present an **overview of values of relevant parameters** at locations in the polder area, now and in the future, as boundary conditions for polder design and management.
- Ability to **evolve and be responsive** to institutional capacities and **climate vulnerability**.
- **Develop a long term investment plan for Polders** based on climate data and projections.
- **Build the analytical foundation and technical capacity** of BWDB & partners to engage in data driven decision making on tidal flood, storm surges and drought hazards in the coastal region of Bangladesh.



Coastal zone of Bangladesh and Polders in CEIP-I Project

PPCR Interventions – cont'd

Investment Project 2: Coastal Towns Infrastructure Improvement Project

Objective: The project will strengthen climate resilience and disaster preparedness in eight vulnerable coastal pourashavas (secondary towns) of Bangladesh. The project takes a holistic and integrated approach to urban development and will

- (i) provide climate-resilient municipal infrastructure; and
- (ii) strengthen institutional capacity, local governance, and public awareness for improved urban planning and service delivery considering climate change and disaster risks. Key infrastructure investments include (a) drainage; (b) water supply;
- (iii) sanitation;
- (iv) cyclone shelters; and
- (v) other municipal infrastructure including emergency access roads and bridges, solid waste management, bus terminals, slum improvements, boat landings, and markets. Investments will benefit the poor and women.

Responsible MDB: Asian Development Bank

Total Project Financing: Total \$117.1m: PPCR: \$40.4 (30 m concessional loan+ \$10.4 m grant); ADB: \$ 52m; Government of Bangladesh: \$23.1m and BMGF: \$1.6m

Implementing Agency: Local Government Engineering Department (LGED)

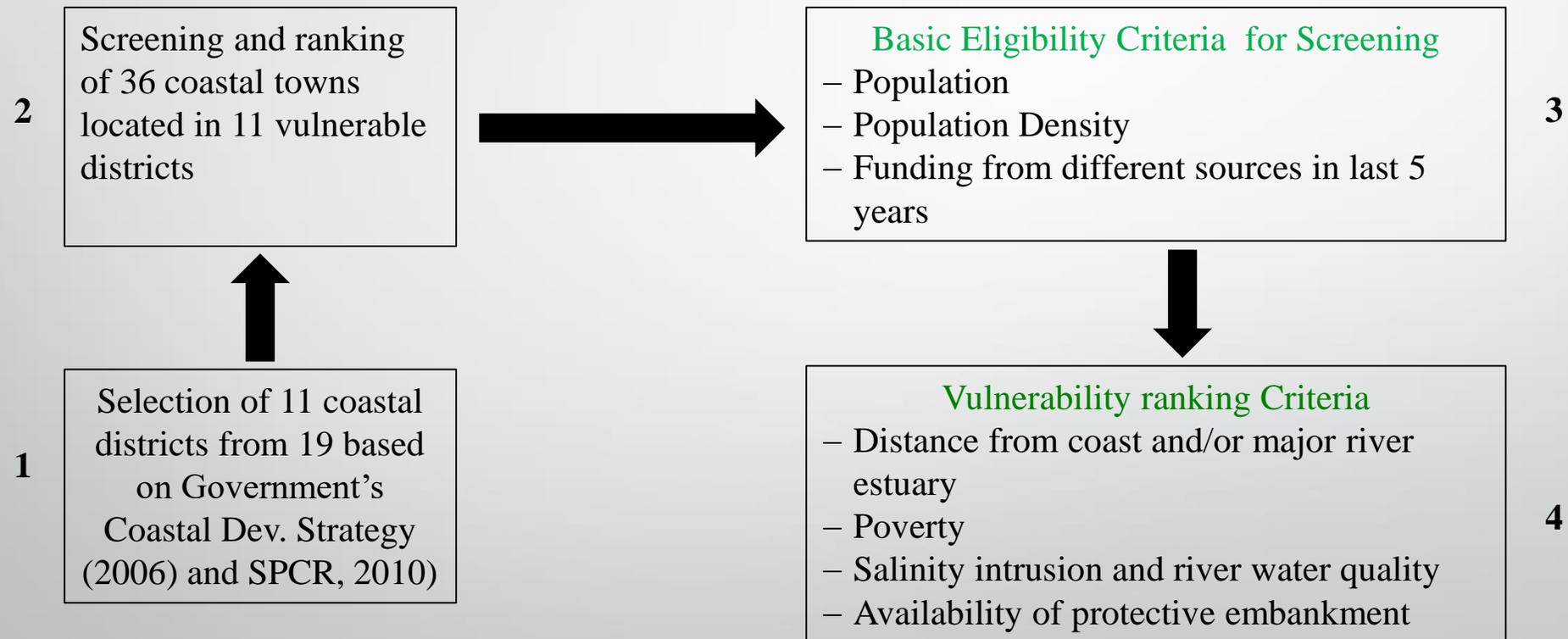


PPCR Interventions – cont'd

Investment Project 2: Coastal Towns Environmental Infrastructure Project

Use of Climate data and Climate Projections in Project Design:

- Local Level Climate Resilience Vulnerability Assessment for selection and designing of Infrastructure Subprojects



PPCR Interventions – cont’d

Investment Project 2: Coastal Towns Infrastructure Improvement Project

Use of Climate data and Climate Projections in Project Design:

- Master Plan for the municipalities/ townships are being updated incorporating climate data and climate projections.

Town Vision and Master Plan

1	2	3	4
Rapid Urban CC Assessment (RUCCA)	Climate Resilient Integrated Urban Plan (CRIUP)	Identification of Infra. Subprojects to Strengthen Resilience	Detailed Engineering Design (DED)

- Infrastructures is designed considering climate change projections for the year 2040.
- Depending on the type of infrastructure, the incremental adaptation costs ranged from around 15%-30%.



PPCR Interventions – cont'd

Investment Project 3: Coastal Climate Resilient Infrastructure Project

Objective: The Climate Resilient Infrastructure Improvement in Coastal Zone Project will improve livelihoods in the rural coastal districts vulnerable to climate variability and change.

Responsible MDB: Asian Development Bank

Expected Outputs:

- Improved road connectivity
- Improved market services
- Enhanced climate change adaptation capacity

Total Project Financing: Total \$150.00 m: PPCR fund: \$30.0 m (\$10.0 m grant+\$20.0 m concessional loan): ADB: \$20.0 m; KfW: \$8.8m; IFAD: \$60.0 m; and Government of Bangladesh: \$31.2m.

Implementing Agency: Local Government Engineering Department (LGED)



PPCR Interventions – cont'd

Investment Project 3: Coastal Climate Resilient Infrastructure Project

Use of Climate data and Climate Projections in Project Design:

- By 2050, climate change impact could make an additional 14% of the country extremely vulnerable to flooding and dislocate more than 35 million people in the coastal districts.
- Vulnerable rural infrastructure as a result of sea level rise, increased wet season rainfall; increased annual temperatures and increased frequency of severe cyclones.
- Low-lying river char areas where crop intensity is low (some areas produce only one crop per year) due to climate change.
- Culmination of these impacts will be a rapid deterioration of rural infrastructure.
- Climate-proofing of rural infrastructure (enhancing longevity and sustainability) in 12 rural coastal districts vulnerable to climate change.



Overall Expectations

Improved quality of life in the coastal zone as well as transformed development that is climate resilient

- Increased resilience of coastal infrastructure to climate induced seasonal and natural disasters.
- Reduced water and soil salinity and improvements in agricultural and fisheries production.
- Improved capacity of BWDB/ LGED to manage and coordinate investments in and knowledge on climate resilient initiatives.
- Improved leveraging of public financing for climate resilient development.



Using Climate Data and Projections in Project Design

Barriers:

To improve and manage the Coastal Zone of Bangladesh successfully in the coming decades, it is important to have a clear understanding the climate data and projections as well as the ever changing boundary conditions due to the dynamics of the environment.

Issues	Questions
(River) floods & storm surges	Where and when are the largest problems with these issues now? How well do we understand these issues?
Drought & salinity	
Erosion & sedimentation (morphology)	Is there a clear trend and what are the drivers?
Compaction & tectonics (subsidence)	What will the situation be 25, 50 or 100 years from now?

Using Climate Data and Projections in Project Design

Opportunities:

- Knowledge exchange and collaboration across BWDB, LGED and other relevant stakeholders will build ownership and support for the planning and investment selection process.
- Regional collaboration and South-South Knowledge exchange: Leveraging lesson learned in using climate data and projections from large scale investments in Bangladesh will be beneficial for countries vulnerable to climate changes.
- Approaches for integration of climate risk and resilience into development policies and increased capacity to integrate climate resilience into Bangladesh's disaster risk management strategies.
- Scaled-up climate resilient investments linked and leveraged funds at scale through formal MDB collaboration in agriculture, coastal defense, water supply, connectivity; housing.
- Shaping investment plans and priorities based on their experiences and evidence with current climate variability and impacts.
- Enhancing resilience for urban climate impacts such as flooding/ water logging in Dhaka.



PPCR Interventions – cont'd

Investment Project 4: Climate Resilient Agriculture and Food Security

Responsible MDB: IFC

Expected Outputs:

- Increase farmer and agribusiness firm revenues through adoption of sustainable climate-smart agriculture technologies and practices;
- Demonstrate business model for climate-smart agriculture technologies, products and services

Total Project Financing: \$ 13.1 Million (\$ 100.00 project preparation grant, \$3 million advisory services, \$10 million concessional loan)

Implementing Agency: : Private sector (Agribusinesses, financial institutions/intermediaries)



Using Climate Data and Projections in Project Design

Progress:

- The projects pilot phase ended in August 2017 where a total of 9000 farmers were trained on CSAgri-practices based on 12 CSA developed.
- Cooperation Agreement signed with Supreme Ltd for 30,000 Farmers to be benefited through 850 events on climate smart agri-practices. Activities to begin in May 2018.
- 5 training programs on Harvest & Post-Harvest, Business Edge Training Program, Production Training, six demonstration plots and a farmers field day organized by Seba Ltd for their potato supply in South activities.
- 17 Small and Growing Businesses (SGBs) were selected and completed a rigorous 3-week long boot camp as part of the ScaleUP Bangladesh accelerator project with BetterStories Ltd.
- mPower has purchased AWS device and will have it set up by May 2018. They have also set up a Farmers Query System (FQS) across 3 districts Barisal, Khulna, Shatkhira, 1200 farmers have been registered.



Using Climate Data and Projections in Project Design

Challenges:

- Developing a commercially viable model in polder areas is challenging due to remoteness, scalability, and new technologies under pilot.
- Companies hesitant to penetrate high risk markets with low farmer awareness.
- Overall lack of knowledge on climate change adaptation, resilience, and climate smart agriculture amongst private sector and farming communities.



PPCR Interventions – cont'd

Investment Project 5: Feasibility Study on Climate Resilient Housing for Low-Income Communities (Technical Assistance)

Responsible MDB: IFC

Expected Outputs:

- Develop a pilot program for building climate resilient and individually owned houses to supplement traditional cyclone shelters;
- Establish a viable business model to induce private sector involvement in the lower income housing market; and
- Safe, yet affordable, shelter that can reduce pressure on existing cyclone shelters, outcomes include a study and training for selected financial institutions and real estate developers

Total Project Financing: \$0.4 million

Implementing Agency: N/A



Using Climate Data and Projections in Project Design

Progress:

- Feasibility study on climate resilient housing finance completed in Nepal and Bangladesh
- Basic climate resilient housing microfinance model designed for Bangladesh
- Market scoping completed and agreement signed with pilot partner, BRAC MFI.



Using Climate Data and Projections in Project Design

Status:

- Procurement process for relevant experts (engineering expert, housing loan expert, market research expert) in climate resilient housing finance is currently ongoing.
- Targeting and market selection in southern coastal regions is currently ongoing.



Questions?
Comments?
Thank you!

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