# PROJECT CLIMATE RISK ASSESSMENT AND MANAGEMENT REPORT

## I. Basic Project Information

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|---|---|
| Project Name | BAN 50192-002: Supporting Fourth Primary Education Development Program |
| ADB Financing | $500 million |
| Location | Nationwide |
| Sector/Sub-sector | Education/Pre-primary and primary |
| Theme | Inclusive economic growth |

**Brief Description of Project**

The Fourth Primary Education Development Program is the government's flagship initiative in the education sector for FY2019–FY2023. It aims to provide quality education to all children from pre-primary to grade 5 through an efficient, inclusive, and equitable education system. ADB and other development partners will jointly support the government's priorities of improving quality and equity of primary education for all children from pre-primary to grade 5 through a sector-wide approach. The program will also address the equitable access and participation through provision of need-based infrastructure including water, sanitation, and hygiene facilities; out-of-school children; special education; education in emergencies; and communication and social mobilization.

The proposed results-based lending program will provide support to (i) address infrastructure shortfall and recruit and deploy more teachers; (ii) transform the current in-service teacher training to continuous professional development; (iii) revise curriculum with enriched teaching and learning resources, including through information and communication technology; (iv) establish a Primary Education Board to take charge of reforming examinations and assessments; (v) ensure disaster resilience for all new constructions; (vi) scale up out-of-school children education service; and (vii) strengthen autonomy and capacity of schools and upazilas with performance-linked incentives. It will reinforce mainstreaming of gender equity and inclusive education initiatives and monitoring the system with sex-disaggregated data (including social categories).

Bangladesh is exposed to various types of natural hazards such as cyclones and monsoon rains, including flooding, landslides, wind storms, lightning, fires, heat waves, and cold spells. Climate change is expected to aggravate the intensity, frequency, and unpredictability of extreme weather events. The program through its target outputs will address the need for new constructions and major retrofitting of school facilities, which will meet disaster resilience requirements to ensure safety and continuity of primary education especially in high risk districts. Disparities in school access and participation are substantially noted in the wetland (*haor*) areas, river island (*char*) areas, coastal zone, and northern-western districts.

## II. Summary of Climate Risk Screening and Assessment

**A. Sensitivity of Project Components to Climate/Weather Conditions**

| *Project Components* | *Sensitivity to Climate/Weather Conditions* |
|---|---|
| (i) Construction of classrooms conforming to the infrastructure planning standard<br>(ii) Provision of gender-segregated sanitation facilities<br>(iii) Provision of safe water sources to school | The location and design of the physical infrastructure of the program need to focus on the current/observed effects of weather/climate variability as well as on the effects of changing climate conditions in the future, such as increased intensity and frequency of precipitation and extreme flooding. Bangladesh has inland and coastal hazards that may affect the integrity of these components enumerated on the left-hand side. Materials used will also define the sensitivity. For example, wooden buildings are more vulnerable to floods and cyclones than cement-based structures. |

**B. Climate Risk Screening**

| **Climate Risk** | **Temperature** | **Precipitation** | **Extreme Events (heavy rainfall, wind, and storms/cyclones)** | **Sea Level Rise and Storm Surge (see Appendix 1)** |
|---|---|---|---|---|
| 1. School building | Low | Low | Medium | High in coastal |

| | | | | |
|---|---|---|---|---|
| | | | | areas |
| 2. Sanitation facilities | Low | Low | Medium | High in coastal areas |
| 3. Clean water supply | Low | Low | Medium in coastal areas | High in coastal areas |

**C. Climate Risk Assessment**

While some types of infrastructure are routinely upgraded and replaced, major infrastructure projects—such as bridges, sewer systems, and public buildings (e.g., schools)—are significant investments that can take many years to plan and build. Once constructed, these systems are often in service for decades and frequently guide local and regional development patterns. As a result, the infrastructure decisions made today may affect several generations.

Extreme events (heavy rainfall, wind, and storms/cyclones) can damage building foundation and facade rendering it more susceptible to ground movement and subsidence, associated with earthquakes, which Bangladesh has among the many natural hazards present in the country.

Sea level rise can cause saltwater intrusion of freshwater aquifers thus rendering this source risky and unsuitable for use by students and school staff. Temperature increase and prolonged dry period could affect water quality and may pose health risks.

**D. Climate Risk Classification:** Medium for the physical infrastructure and water supply components.

## III. Climate Risk Management Response within the Project

- The management has recognized that natural disaster occurrence in Bangladesh is one of the risks the project could face, which may delay the progress of infrastructure constructions (Design and monitoring framework section in the Report and Recommendation of the President). This could be resolved by having the project scheduled in such a way that available working season is efficiently used.
- Ensure that the Bangladesh infrastructure planning guideline is factored in the potential effects of changing seasonal weather and sea level conditions and other hazards that may increase disaster potential (see attached appendixes for more details).
- Options to make disaster-resilient buildings could include structural changes to how an infrastructure system is designed, built, renovated, or protected. Protect and harden strategies include actions such as upgrading design standards (e.g., using stronger building materials) and reinforcing or fortifying existing structures (e.g., incorporating extra foundational supports and erecting protective barriers).
- School buildings and other associated facilities (sanitation and water supply) could be located/relocated to more protected areas (and away from coasts).
- In order to reduce flood risks, design measures have to factor in projected rainfall intensity, frequency, and duration estimates.
- Considering the service life of the physical facilities, regular checkup and maintenance are needed, including planning of costs.

## Appendixes: Information Used during the Assessment

**Appendix 1: Hazards Profile in Bangladesh[a]**

a. Earthquake zones

b. Cyclones (high winds)

c. Floods, droughts, and river bank erosion

d. River bank erosion

e. Sea level rise: coastal areas. "The coastal zone of Bangladesh is the most vulnerable to climate change because of its geographic location, flat topography, high population density, high levels of poverty, and resilience of many livelihoods on climate sensitive sectors particularly agriculture, fisheries, and water resources. The average elevation of the southwest coastal zone ranges from 1–2 m and in the southeast coastal zone, it is 4–5 m. The low elevation, active delta, and dynamic morphology play a significant part in its vulnerability to sea level change. Sea level rise affects the coastal zone and its geometry in a number of ways including inundation, erosion, and salt water intrusion into the water table. The risks from adverse climate change-induced sea level rise will increase the risks of the already vulnerable population along the coast of Bangladesh." (Government of Bangladesh, Department of Environment, Ministry of Environment and Forests. 2016. *Assessment of Sea Level Rise on Bangladesh Coast through Trend Analysis*. Dhaka.)

**Appendix 2: Changes and Trends in Climate (including variability and extremes)[a]**

a. Temperature and precipitation changes

Using the Intergovernmental Panel on Climate Change Special Report on Emission Scenarios A1B, the following are the projected changes in South Asia climate, including Bangladesh.

(i) During December, January, and February, warming is expected to be at its greatest and associated with a decrease in precipitation whilst the consensus of regional models is that summer rainfall will increase.
(ii) Extreme weather events are projected to increase in frequency in South Asia, including heat waves and high rainfall. Tropical cyclone intensity is also expected to rise by 10%–20% as sea surface temperature (SST) rises by 2°C –4°C.
(iii) Glacial and sea-ice melt and the expansion of the oceans with increased temperature mean that a rise in sea level is certain. The minimum change, suggested by the most conservative climate change models, is for a 40 cm rise by the end of the century.

The magnitude of these changes in climate may appear to be very small. However, when taken into the context of existing climatic variability and extreme events (such as floods, droughts, and cyclones), these could substantially increase the intensity and frequency of these events. As an example, a 10% increase in precipitation may increase run-off depth by one-fifth and the probability of an extreme wet year by 700%.

b. Cyclones and storm surges

Roughly 3 to 7 cyclones hit the Bangladesh coast each decade. Some studies indicate that regional frequency of tropical cyclones may change but none shows that their locations will. There is also evidence that peak intensity may increase by 5% to 10%, which would contribute to enhanced storm surges and coastal flooding. Much may actually depend on the rise of SST. If at present the maximum wind speed as observed during the 1991 cyclone is 225 km per hour, for a $2^0$C rise in SST, the velocity shall rise by 10% to 248 kph and for a $40^0$C rise by 22% to 275 kph with consequent destructive power. For a situation without sea level rise, the present maximum storm surge is 7.6 m. For a $2^0$C rise in temperature and sea level rise of 1 m, the storm surge shall be 10.6 m high, i.e., the coastal defenses are likely to be easily overtopped.

[a] Government of Bangladesh, Ministry of Environment and Forests. 2012. *Second National Communications of Bangladesh to the United Nations Framework Convention on Climate Change.* Dhaka.