Climate and Disaster Risk Screening Report for General Project in Bangladesh: Hypothetical Education Project [1]

[1] This is the output report from applying the World Bank Group's Climate and Disaster Risk Screening Project Level Tool(Global website: climatescreeninghelpdesk@worldbankgroup.org; World Bank users: wbclimatescreeningtools.worldbank.org). The findings, interpretations, and conclusions expressed from applying this tool are those of the individual that applied the tool and should be in no way attributed to the World Bank, to its affiliated institutions, to the Executive Directors of The World Bank or the governments they represent. The World Bank does not guarantee the accuracy of the information included in the screening and this associated output report and accepts no liability for any consequence of its use.

1. Introduction

Building resilience to climate and geophysical hazards is a vital step in the fight against poverty and for sustainable development. Screening for risks from these hazards improves the likelihood and longevity of a project's success. The project level **Climate and Disaster Risks Screening Tool** provides due diligence on climate and disaster risks at an early concept stage. The tool uses an **exposure – sensitivity –adaptive capacity framework** to consider and characterize risks from climate and geophysical hazards, based on key components of a project and its broader development context (Annex 1).

This report summarizes the results of the screening process for the Hypothetical Education Project /Bangladesh, which was applied to the following selected sub-sectors/components:

- [ ] Multi-Modal and Transit
- [ ] Rail
- [ ] Aviation
- [ ] Marine Transportation
- [ ] River Transportation
- [ ] ICT Sector
- [ ] Mining and Metals
- [ ] Solid Waste
- [ ] Industry
- [ ] Fisheries / Aquaculture
- [ ] Forestry
- [ ] Biodiversity
- [ ] Urban Development
- [x] Education
- [ ] Finance
- [ ] Community Development
- [ ] Social Development
- [ ] Other

This early stage due diligence can be used to strengthen the consideration of climate and disaster considerations in key components of the project design, including the physical (i.e. farm irrigation, water storage) and non-physical aspects (i.e. capacity building of farmers, institutional strengthening at community level, early warning systems, etc.). The broader sectoral (i.e. appropriate policies on crop prices, water tariffs, risk insurance schemes for agriculture production) and development sectors conditions (i.e. access to technology for enhanced productivity, climate-related early warning systems) could help modulate the risks, or enhance the risks to the delivery of the outcome/service level.

The results of the screening are presented below, with supporting narrative to guide their interpretation.

2. Climate and Disaster Risk Screening Results Summary

2.1 Project Information Summary

Table 1 below provides key project information including the location and key project development objectives. This information is provided by the task team. The activities within the components are important as their sensitivity to the climate and geophysical hazards will determine the level of potential impact from these hazards.

Table 1: Project Information

Project Information	
Title	Hypothetical Education Project
Number	Hypothetical
Region	South Asia
Country	Bangladesh
Type of Assessment	General Projects
Purpose of Screening	Screen a Project at the Concept Stage
Current Project Phase	Concept (Identification)
Funding Source	IDA
Keyword	Education
Sub Sectors	Education
Location	The project will be implemented all over Bangladesh. Many of the schools built through the project will purposefully be located in disaster-prone coastal regions where they will also serve as shelters during cyclone and natural calamities. The final locations will be decided after site verification by the implementing agency, in consultation with the task team.
GPS Coordinates	The locations will be across the country, so GPS coordinates are not needed.
Physical Components	The major physical investments are the schools that will be built through the project, which will also serve as emergency disaster shelters during natural calamities, such as tropical cyclones and earthquakes.
Education	Given the nature of these shelters to be constructed along the coast, and their dual purpose to serve as shelters during emergencies, there is high potential impact from climate and disaster risks on these physical components.
Outcome / Service Delivery	This project aims to build and improve primary education schools throughout Bangladesh which will also serve as disaster shelters in the coastal areas during emergency response situations, and to facilitate changes to the primary school curriculum.

* Please note that this is based on user inputs and the coverage may not be comprehensive.

2.2 Summary of Exposure to Climate and Geophysical Hazards

Table 2 presents a summary description of exposure to climate and geophysical hazards at the project location for the Historical/Current and Future time frames[1] . Exposure to climate hazards is evaluated in two time frames, because past records are not necessarily indicative of future conditions.

The descriptions provide a summary of the key characteristics and some indication of the trends in exposure from each hazard, drawing on global, quality controlled data sets from the Climate Change Knowledge Portal (CCKP). It is useful, for example to understand the temperature range and the rate of annual or decadal increase in a region; or precipitation patterns for historical and future time frames and seasonality shifts. Understanding the trends of hazards is important as they act individually and collectively on components/sub-sectors of the project. Because geophysical hazards (such as earthquakes, tsunamis, landslides, and volcano eruptions) do not have associated future projections, exposure for those hazards is assessed only in the Historical/Current time frame.

Table 2: Summary of Exposure to Climate and Geophysical Hazards at Project Location

Hazard	Time Frame	Description of hazards for your location
Extreme Temperature	Current	Average monsoon-season maximum and minimum temperatures show an increasing trend annually at the rate of 0.05°C and 0.03°C, respectively. An increasing trend of about 1°C in May and 0.5°C in November during the 14-year period from 1985 to 1998 has been observed.
	Future	The temperature is projected to increase with greatest warming (Dec-Feb) projected to be 1.4°C by 2050 and 2.4°C by 2100.
Extreme Precipitation and Flooding	Current	The erratic nature of rainfall and temperature has increased in Bangladesh. Bangladesh is frequently inundated with seasonal floods and flash floods. In the coastal area tidal flooding happens twice in a day. The flood prone areas, and recently the northern areas, experience floods twice in a year. According to the local community, the duration of flash floods has increased.
	Future	According to the Intergovernmental Panel on Climate Change's Third Assessment Report, there is evidence that the precipitation rates may increase by 20% to 30% (IPCC 2001). It remains difficult, however, to project rainfall changes for the Ganges River flood plain, with some models projecting wetter and others projecting drier conditions.
Drought	Current	The north and west part of the country is drier compared to other parts of the country. Seasonal droughts in Bangladesh most commonly affect the northwestern region, as it receives lower rainfall than the rest of the country. These droughts have a devastating impact on crops thereby also affecting the food security of subsistence farmers.
	Future	It is difficult to project rainfall changes for the GangesRiver flood plain, with some model projecting wetter and others projecting drier conditions.

[1]The Future time frame is based on changes projected to occur between the 1980-1999 average and a future average. This future average is most likely the 2040-2059 average (i.e., the default in the Climate Change Knowledge Portal - CCKP). Users can choose to select another time frame, or choose to use national/local data sets, but if so, this should be reflected in the notes section of the tool (and summarized in Annex 2). The CCKP draws on global, quality-controlled datasets and is continually updated as new data become available. In some cases, the CCKP is supplemented with other sources of information. For more detail on the data used in this step, please refer to the Data Annex. Climate Change Knowledge Portal (http://climateknowledgeportal.worldbank.org).

Hazard	Time Frame	Description of hazards for your location
Sea Level Rise	Current	Bangladesh is located in a low-lying delta, formed by the dense network of the distributaries of the mighty Ganges, the Brahmaputra and the Meghna, between the Himalayas and the Bay of Bengal. In many cases, tidal flooding happens twice in a day in these low-lying areas.
	Future	Sea level rise is projected for Bangladesh, although there is disagreement on what the degree of sea level will be. One study suggests an increase of 30-100 cm by 2100, while the IPCC Third Assessment gives a global average range with a slightly lower values of 9 to 88 cm.
Strong Winds	Current	The extreme wind speed is observed during tropical cyclones, which the country is highly susceptible to.
	Future	The maximum wind speed from tropical cyclones is expected to increase, but estimates are highly uncertain. The frequency of tropical cyclones in the Bay of Bengal may increase and, according to the Intergovernmental Panel on Climate Change's Third Assessment Report, there is " evidence that the peak intensity may increase by 5% to 10% and precipitation rates may increase by 20% to 30%" (IPCC 2001). Cyclone-induced storm surges are likely to be exacerbated by a potential rise in sea level of over 27 cm by 2050.
Earthquake	Current	Bangladesh is located in a seismically active and high-risk region. The northern and eastern regions of the country are particularly susceptible to earthquakes.

Insufficient Understanding	Not Exposed No Potential Impact No Risk	Slightly Exposed Low Potential Impact Low Risk	Moderately Exposed Moderate Potential Impact Moderate Risk	Highly Exposed High Potential Impact High Risk

Please note that the colors shown in Table 2 are only for exposure at the project's location. Overall risk to project's outcome/service delivery, taking into account sensitivity of physical investments and adaptive capacity(non-physical components and development context), is depicted in Tables 3A and 3B.

2.3 Summary of Overall Project Risk

Tables 3A and 3B present the same results, with Table 3A highlighting the impact ratings on the project’s components/subsectors, and the overall risk to the outcome/service level for both Historical/Current and Future time frames. Table 3B draws attention to how the climate impacts and risks shift from the Historical/Current to the Future time frame.

The ratings are derived on the basis of the hazard information, subject matter expertise, contextual understanding of the project, and modulated on the basis of adaptive capacity and the larger development context of the sector/subsector and country. The results indicate what components are most at risk. The actual ratings themselves, while instructive, should inform further consultations, dialogue, and future planning processes. Keep in mind that the greatest value of the tool is that it provides a structured and systematic process for understanding climate and disaster risks.

2.3.1 Results Summary - by Component

Table 3A provides a characterization of risks caused by climate and geophysical hazard on project subsector/components for both Historical/Current and Future time frames.

The results indicate where risks may exist within one or multiple components and where further work may be required to reduce or manage these climate and geophysical risks. An ongoing process of monitoring risks, refining climate and other information, and regular impact assessment may also be appropriate.

The potential impact on key component(s) due to exposure from hazards is modulated by the project's non-physical components (enabling and capacity building activities). The right kind of capacity building measures could increase preparedness and longer-term resilience and reduced the risks. An understanding of larger sector and development context with respect to key modulating factors helps to assess the climate risks in terms of adaptive capacity. For example, in the education sector, incorporating climate change into curriculum reforms may help reduce risks; while gender disparities and access may aggravate the risks.

Table 3A: Results Summary - by Component

Potential Impact → Contribution of Adaptive Capacity to Impact → Project Risk

Sector / Subsector	Project Components				Development Context				Outcome / Service Delivery	
	Potential Impact		Non-Physical Components		Selected Sector / Subsector		Broader Context			
Time Frame	Current	Future	Current	Future	Current	Future	Current	Future	Current	Future
Education			Maintenance and operations Significantly Reduces Impact Capacity Building and Training Significantly Reduces Impact Emergency planning Significantly Reduces Impact Overall Slightly Reduces Impact		Education Slightly Reduces Impact		Access to technology Slightly Reduces Impact Conflict Slightly Increases Impact Political instability Slightly Increases Impact Overall Slightly Reduces Impact			

2.3.2 Results Summary -by Time Frame

The results in Table 3B display the results by time frame. Potential impacts to the components are evaluated separately for the Historical/Current and Future time frames to capture changes in the exposure from climate hazards over time.

For investments with long operational lifetimes, such as physical infrastructure, considering future climate variability and change is critical to avoid “locking in” designs and features that are only suited to current climate. For example, rail track can be subject to buckling in the future if the materials are not designed to withstand extreme temperatures greater than recent or historical. Buildings may be damaged if they are located in areas that will be more exposed to sea level rise and storm surge, or if they are not designed to withstand more frequent or severe flooding.

Table 3B: Results Summary - by Time Frame

Sector / Subsector	Current					Future				
	Potential Impact	Non-Physical Components	Development Context		Outcome / Service Delivery	Potential Impact	Non-Physical Components	Development Context		Outcome / Service Delivery
			Selected Sector / Subsector	Broader Context				Selected Sector / Subsector	Broader Context	
Education	(orange)	Maintenance and operations: Significantly Reduces Impact Capacity Building and Training: Significantly Reduces Impact Emergency planning: Significantly Reduces Impact Overall: Slightly Reduces Impact	Education: Slightly Reduces Impact	Access to technology: Slightly Reduces Impact Conflict: Slightly Increases Impact Political instability: Slightly Increases Impact Overall: Slightly Reduces Impact	(yellow)	(red)	Maintenance and operations: Significantly Reduces Impact Capacity Building and Training: Significantly Reduces Impact Emergency planning: Significantly Reduces Impact Overall: Slightly Reduces Impact	Education: Slightly Reduces Impact	Access to technology: Slightly Reduces Impact Conflict: Slightly Increases Impact Political instability: Slightly Increases Impact Overall: Slightly Reduces Impact	(orange)

Insufficient Understanding	Not Exposed No Potential Impact No Risk	Slightly Exposed Low Potential Impact Low Risk	Moderately Exposed Moderate Potential Impact Moderate Risk	Highly Exposed High Potential Impact High Risk

2.4 Key Drivers of Risks

Based on the results above, Table 4 highlights the key drivers of risk for each project component/subsector ratings, in terms of hazards that are likely to pose the greatest challenge.

The ratings for the potential impact for each component/subsector reflect the aggregate rating across multiple hazards, drawing on all of the exposure information and their own expert judgment. For example, the combined impacts of increased temperature and drought on forests can be greater than the individual effects of each hazard – higher temperatures can increase the extent, intensity, and frequency of insect outbreaks, while drought can weaken trees and make them more susceptible to insect infestation.

Specific consideration should be given to those hazards which have high ratings, or are moving from moderate to high ratings over time. For example, sea-level rise may not be a key risk driver in the Historical/Current time frame; but may emerge as a key driver across multiple sectors in the future time frame. Understanding which hazards are key drivers may help flag follow-on work to manage climate risks within the design and delivery of the project.

Table 4: Key Drivers of Risk

	Historical/Current Drivers	Future Drivers
Hazards and Location	Drought Sea Level Rise Storm Surge Earthquake Extreme Precipitation and Flooding Strong Winds	Extreme Temperature Drought Extreme Precipitation and Flooding Sea Level Rise Storm Surge Strong Winds
Physical Components	Education	Education
Outcome / Service Delivery	*	Education

Key:	High Risk	Moderate Risk

* If a cell is blank it implies there is 'No high or moderate risks' identified for this aspect of the project.

- Overall, the Non-physical Components : **Slightly Reduces Impact**
- The Selected Sector/ Subsector is expected to : **Slightly Reduces Impact**
- Overall, the Broader Development Context : **Slightly Reduces Impact**

3. Next Steps

By understanding which of your project components is most at risk from climate change and other natural hazards on the basis of the screening, you can begin to take measures to avoid their impacts by:

- Enhancing the consideration of climate and disaster risks early in the design stage of the project.
- Using your risk screening analysis to inform follow-up feasibility studies and technical assessments.
- Encourage local stakeholder consultations and dialogues to enhance resilience measures and overall success of the project.

Table 5A provides some general guidance based on the risk ratings for the Outcome/Service Delivery, and Table 5B lists some climate risk management measures for your consideration. Visit the "Next steps" page of the tool on the website for guidance and a list of useful resources.

Note: Please recall that that this is a high-level due diligence tool, and the characterization of risks should be complemented with more detailed work.

Table 5A: General Guidance Based on Risk Ratings for Outcome/Service Delivery

Insufficient Understanding	Gather more information to improve your understanding of climate and geophysical hazards and their relationship to your project.
No Risk	If you are confident that climate and geophysical hazards pose no risk to the project, continue with project development. However, keep in mind that this is a high-level risk screening at an early stage of project development. Therefore, you are encouraged to monitor the level of climate and geophysical risks to the project as it is developed and implemented.
Low Risk	If you are confident that climate and geophysical hazards pose low risk to the project, continue with project development. However, keep in mind that this is a high-level risk screening at an early stage of project development. Therefore, you are encouraged to monitor the level of climate and geophysical risks to the project as it is developed and implemented. You may also consider gathering additional information to increase your level of confidence in your rating.
Moderate Risk	For areas of Moderate Risk, you are encouraged to build on this screening through additional studies, consultation, and dialogue. This initial screening may be supplemented with a more detailed risk assessment to better understand the nature of the risk to the project.
High Risk	For areas of High Risk, you are strongly encouraged to conduct a more detailed risk assessment and to explore measures to manage or reduce those risks.

Table 5B: Types of Climate Risk Management Measures for typical General Projects

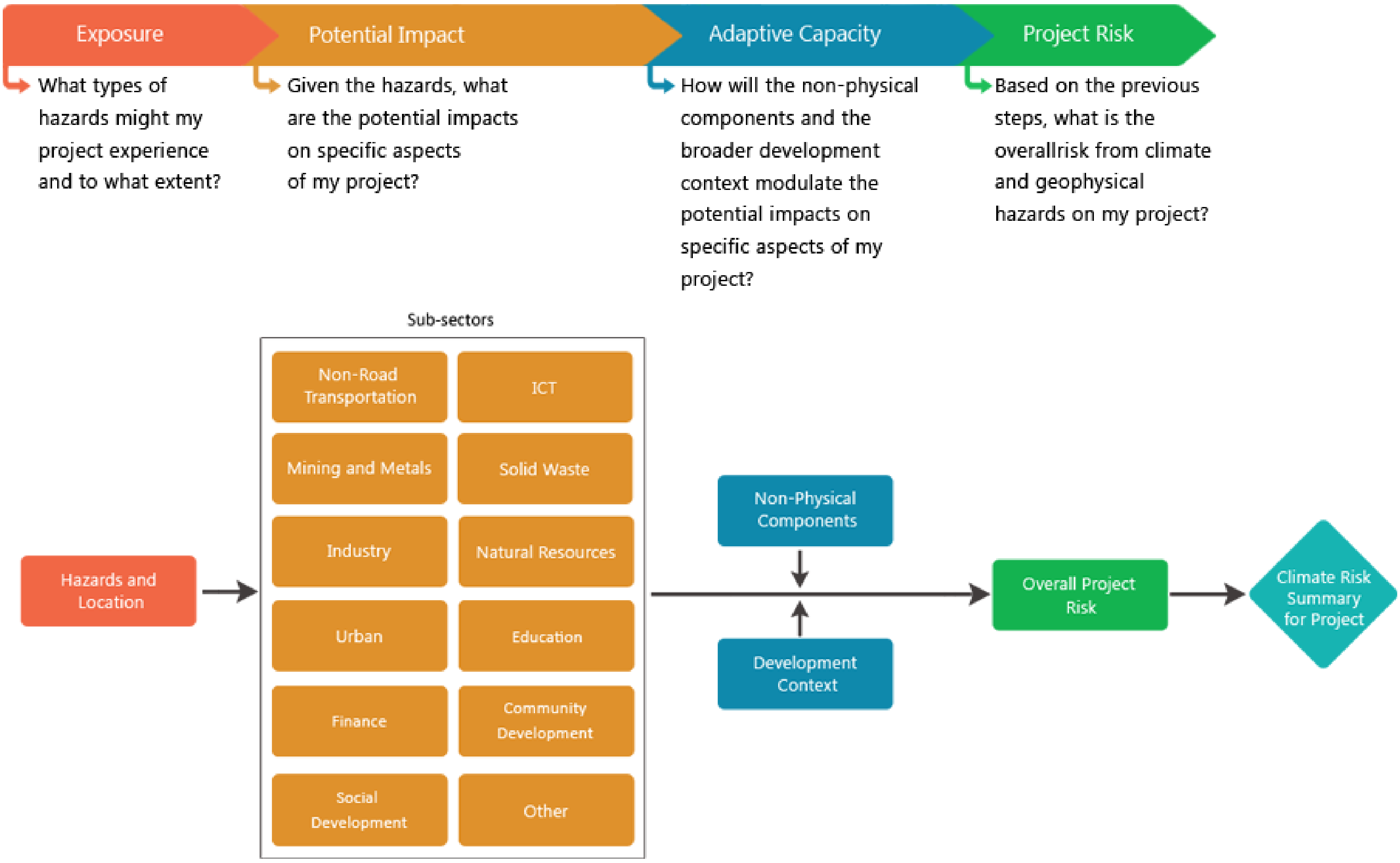
CATEGORY	PROS	CONS	EXAMPLES
Accommodate and Manage	• Flexible • Typically low-cost • Useful when risk is low, but projected to rise in the future	• Temporary solution • Can be insufficient in preventing losses	• Increasing operations and maintenance budget • Modifying management practices • Conduct monitoring through data collection and analysis
Protect and Harden	• Can be used for existing and new assets • Responds to immediate risks	• High cost • Inflexible • Effectiveness may decrease over time	• Elevating key infrastructure • Expanding drainage capacity • Implementing wind protection measures
Retreat and Relocate	• Long-term solution • Responds to immediate risk	• High cost • Inflexible	• Relocating project • Moving infrastructure further inland or on higher ground

Annex 1: Tool Approach

Tool Approach

The framework below describes the approach taken to screen the project. Climate and natural hazards information used to screen the project is most likely obtained from the World Bank's Climate Change Knowledge Portal, which houses numerous global data sets with historical records and future projections as well as country-specific adaptation profiles.

Figure A1: Project Level Climate and Disaster Risk Screening Tool: Approach for General projects



Annex 2: Notes

Table A2-1 summarizes the sub-national locations of high risk noted during the assessment, if the user entered these sub-national locations. Table A2-2 summarizes all the notes entered by user for each section while completing the assessment, if the user elected to enter notes. These notes can help shed light on specific ratings as well as considerations and limitations of the user's expertise.

Table A2-2 Summary of Comments by Section

Section		Notes
Hazards and Location	Extreme Temperature	The increase to 1.4°C is significant, especially during the winter months. Our team should start to consider how these temperature increases might affect the populations this project will serve (e.g., increased student absences due to higher rates of infections).
	Extreme Precipitation and Flooding	Despite the uncertainty in exact projections, the recent trends are indicating that extreme preciptation and flooding have been and will likely continue to be a problem in these Bangladesh - especially around the coasts. We should proceed with caution and assume that flooding will persist into the future, if not worsen.
	Drought	With the trend of increasing droughts in recent years and groundwater depletion in the northwest, scarcity of drinking water may be an issue for the school children of those areas.
	Sea Level Rise	Many of the schools are to be built in the disaster-prone coastal regions where they will also serve as shelters during cyclone and natural calamities.
	Strong Winds	There are links between this hazard and sea-level rise/storm surge due to the threat of tropical cyclones. Cyclone-induced storm surges are likely to be exacerbated by a potential rise in sea level of over 27 cm by 2050.
	Geophysical Hazards	The implementing agency will be following Bangldesh National Building Code in the construction of new buildings and the extension of buildings to address the earthquake hazards and weather/climate related hazards.
Sectors or Subsectors	Education	Given the nature of these shelters to be constructed along the coast, and their dual purpose to serve as shelters during emergencies, there is high potential impact from climate and disaster risks on these physical components.
Non-physical Components	Maintenance and operations	After the initial construction, the schools will require regular maintenance for maintaining the infrastructure quality and ensuring that they are upgraded to the most resilient extent feasible.
	Capacity Building and Training	The project includes a component that will updated the curriculum of the primary education system. Through these changes, and the associated teacher trainings, the team will explore how to integrate climate change knowledge and awareness into these changes and trainings. This presents a significant opportunity to decrease vulnerability and increase resilience across the board in Bangladesh.
	Emergency planning	The use of the shelters as emergency locations will be augemented by upgrading the emergency response plans with the appropriate agencies, and designing evacuation plans for each of the schools. This will help reduce impacts.
	Non-physical Components Overall	Despite the very high exposure and sensitivity of the physical investments, the project's non-physical components will help reduce the potential impacts.

Section		Notes
Outcome / Service Delivery	Education	The moderate and high ratings from potential impact (hazard/exposure) is modulated downward by a notch in the end due to the non-physical components and development context. The project will take into account climate and disaster risks when siting the new schools. Because many will be built near the coast, serving as emergency weather shelters, the team will move forward in the appraisal phase in ensuring that the proper resilience enhancing measures are incorporated into the buidling designs and associated emergency evacuation plans. Also, the team will explore the opportunity to incorporate climate change into the updated curriculm portion of the project to improve overall adaptive capacity throughout the country.