

## Key Recommendations



Enhance the implementation capacity of local government actors. This will enable them to plan and implement adaptation programmes tailored to cater to local needs and conditions.



Empower climate-vulnerable women in agriculture by providing access to climate-adaptive technologies, enabling them to adopt new agricultural practices, and promoting crop diversification.



Enhance international collaboration in designing and implementing climate-related projects, integrating climate considerations into national planning, and developing climate-resilient infrastructure.

## Overcoming the Challenges of Climate Change During Bangladesh's Journey Towards a Developed Economy

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### 1. Introduction

Due to its geographic location and land characteristics, Bangladesh is particularly vulnerable to the impacts of climate change, manifested by rising sea levels, increased frequency of extreme weather events, and prolonged flooding. For the 2000-2019 period, Bangladesh was ranked the seventh most vulnerable among 180 countries in the Climate Risk Index (Eckstein et al., 2021). Between 1971 to 2020, the average mean temperature in Bangladesh has increased by 0.16 degrees Celsius per decade, with future projections indicating even higher temperatures (World Bank Group, 2024a). This gradual temperature rise will adversely affect agriculture, livelihoods, and economic growth. To address the impacts of climate change, the Government of Bangladesh (GoB) has undertaken various initiatives. Given the country's aspiration to become a developed country, it is crucial to identify further areas of collaboration for addressing the climate change-induced challenges.

Bangladesh incurs a significant loss and damage due to climate-related shocks every year. For instance, the World Bank Group (2022) estimated that, on average, Bangladesh is losing around USD 1 billion per year due to tropical cyclones. Between 2000 and 2019, Bangladesh incurred economic losses totalling USD 37.2 billion due to extreme weather events attributable to climate change (Eckstein et al., 2021). In 2020, Bangladesh suffered an estimated loss of around USD 11.3 billion due to extreme weather events (World Meteorological Organisation, 2021). To tackle the effects of climate change, Bangladesh will need at least USD 12.5 billion in the medium term, which is approximately 3 per cent of Gross Domestic Product (GDP) (World Bank Group, 2022). The GoB has outlined priority areas for climate adaptation and mitigation in national plans and policies, which have a range of estimated financing requirements from 0.8 per cent to over 5 per cent of annual GDP (World Bank Group, 2022).

Against this backdrop, this policy brief proposes a number of recommendations for enhancing collaboration for resilience and sustainability. The recommendations emphasise enhancing the implementation capacity of local government actors, facilitating women in agriculture, increasing private sector participation in developing climate resilience, promoting nature-based solutions and ecosystem-based adaptations, developing collaborative online platforms, and increasing collaboration with international development partners.

## 2. Outlook of Climate Change-related Challenges

Bangladesh is faced with multiple challenges brought on by climate change. A brief overview of the key challenges has been highlighted in this section.

### 2.1 Temperature, Precipitation and Sea Level Rise

Temperatures in Bangladesh are expected to rise consistently. The average, minimum and maximum temperatures are expected to increase from the historical reference period. For instance, between 1971 and 2020, Bangladesh's mean temperature increased by 0.16 degrees Celsius per decade, with a significantly increasing number of high heat and humidity days (World Bank Group, 2024a). Figure 1 represents the trend of increasing annual mean surface temperatures from 1901 to 2022.

Bangladesh's temperatures are homogeneously projected to increase from 25.79 degrees Celsius in 2015 to 26.40 degrees Celsius in 2039, and 26.96 in 2059, finally reaching 28.87 degrees Celsius in 2100 (Figure 2). It is alarming that temperatures have been increasing at a faster rate during the 1991 to 2020 period compared to the 1951 to 2020 period, and the 1971 to 2021 period. Such increases in temperatures are expected to have a severe impact on health, labour productivity, mental health, and overall well-being (ILO, 2019; IPCC, 2022). Besides, the agriculture sector will be affected enormously due to global

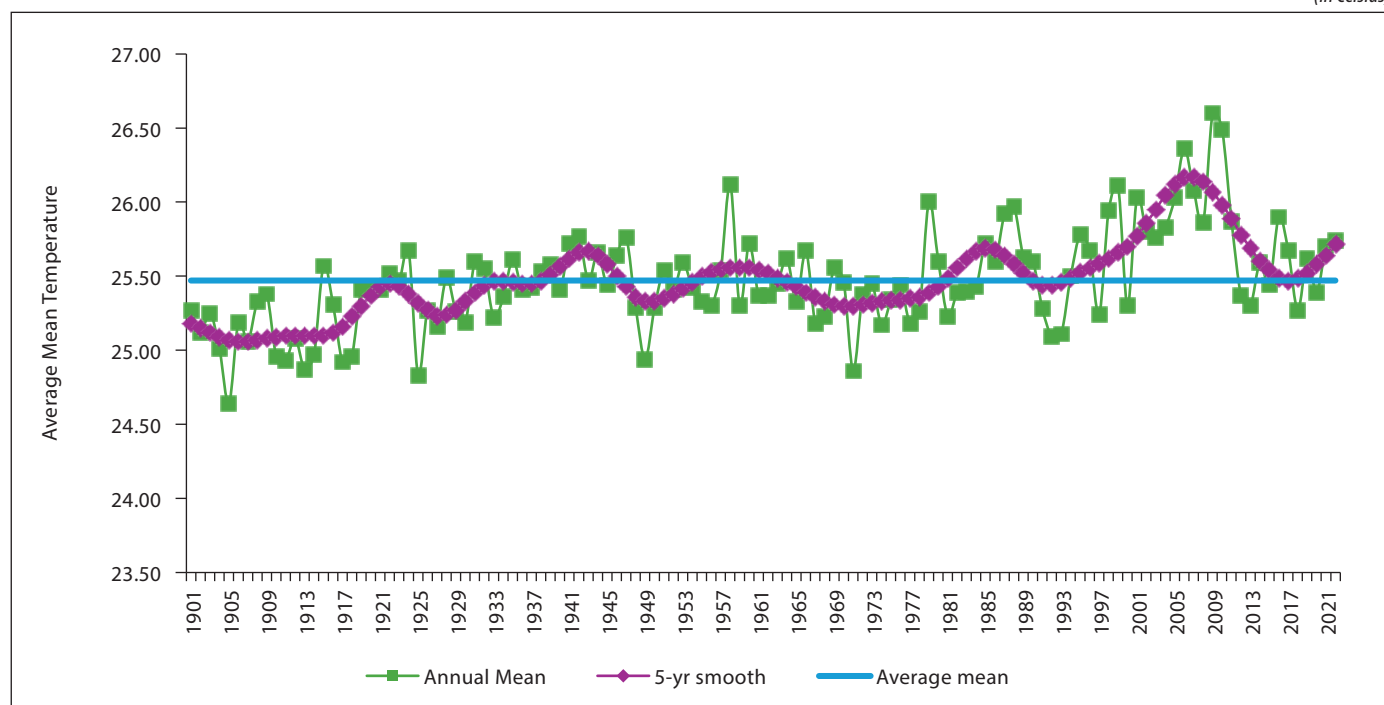
temperatures rise posing a threat to the country's food security (Anderson et al., 2020; Asseng et al., 2015; Liu et al., 2016).

By mid-century, Bangladesh is expected to face increased overall precipitation levels, with annual rainfall projected to rise under all projected scenarios with high uncertainty (Figure 3). Increased precipitation leads to an increased risk of flooding. In addition, extreme rainfall events have direct and escalating consequences for urban flooding risk (Chowdhury et al., 2020; Hossain et al., 2020). The phenomenon is exacerbated by urbanisation trends, which often reduce permeability, alter natural water flow patterns, and disrupt watersheds.

Moreover, Bangladesh's deltaic coastal zones, home to about one-third of the population, also face increasing threats from sea level rise and coastal inundation. Projections under SSP3-7.0 indicate varying sea level rise across regions: the Ganges tidal floodplain in Khulna Division may see a rise of 0.25 meters by 2050 and 0.76 meters by 2100, Cox's Bazar in Chattogram may experience a rise of 0.16 metres by 2050 and 0.57 metres by 2100, and the Meghna Floodplain in Barisal Division could face a rise of 0.44 metres by 2050 and 1.17 metres by 2100 (World Bank Group, 2024a). This significant rise in sea levels could lead to shoreline loss, destruction of mangrove forests, reduced agricultural and fishery yields, and the displacement of nearly one million people from southern divisions by 2050. Additionally, coastal flooding, saltwater intrusion, and storm

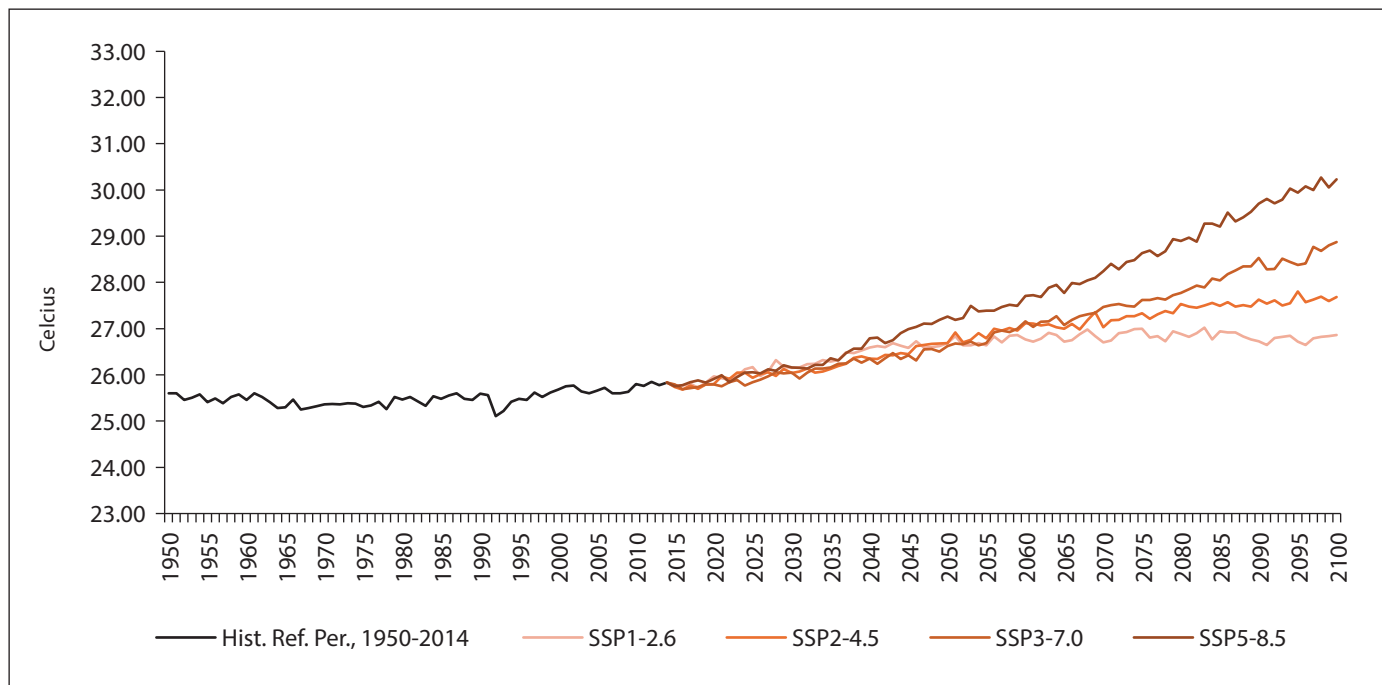
**Figure 1: Observed Annual Mean Surface Air Temperature 1901-2022**

(in Celsius)



Source: World Bank Group (2024b).

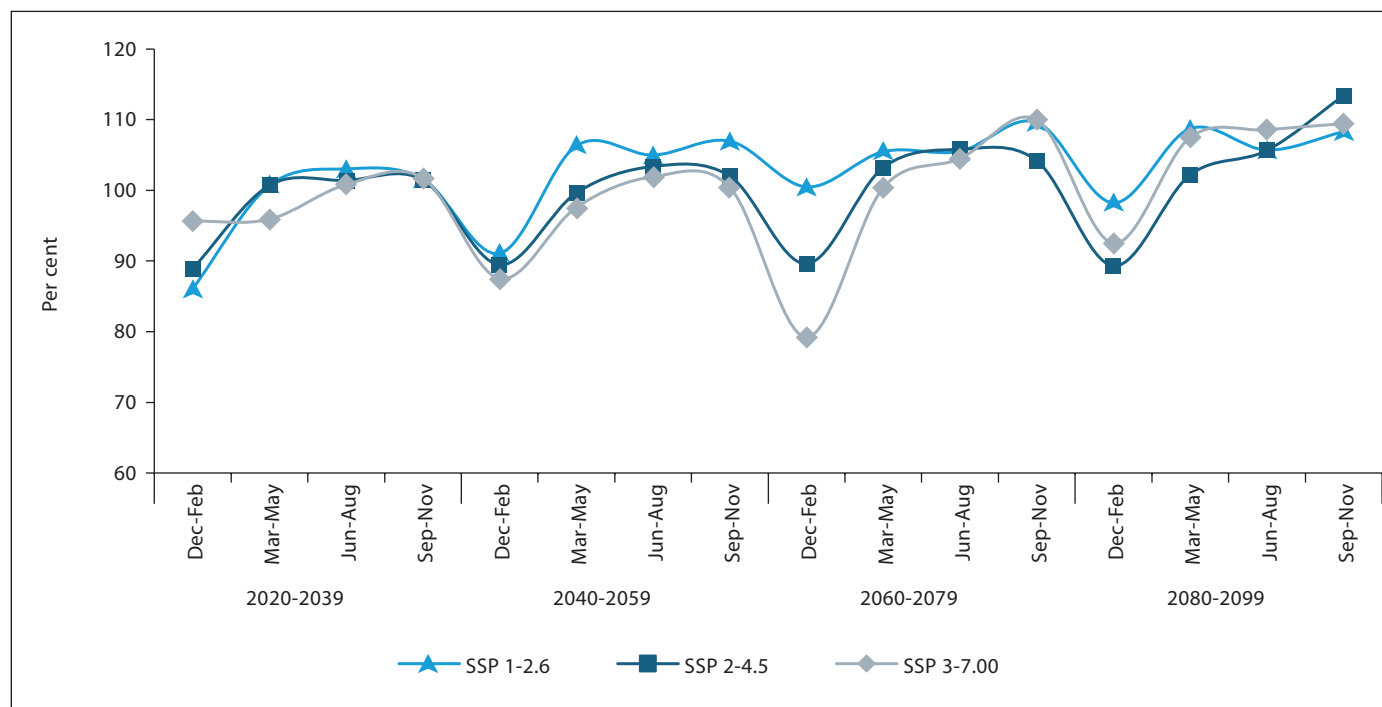
**Figure 2: Projected Mean Surface Temperature Average Under Different Scenarios**



**Source:** World Bank Group (2024b).

**Note:** The SSPs are different climate change scenarios depending on different levels of socioeconomic development. The SSPs are used to derive Greenhouse Gas Emission (GHG) scenarios with different climate policies (IPCC, 2021).

**Figure 3: Projected Change in Seasonal Precipitation as a Percentage**



**Source:** World Bank Group (2024b).

**Note:** The SSPs are different climate change scenarios depending on different levels of socioeconomic development. The SSPs are used to derive GHG scenarios with different climate policies (IPCC, 2021).

surges pose heightened risks to water resources, agriculture, fisheries, and ecosystems, particularly in the southwest (Hoque et al., 2022; Negacz et al., 2022).

## 2.2 Agriculture, Fisheries and Aquaculture

Climate change poses a significant threat to agricultural production, water supplies, and coastal ecosystems. By 2050, one-third of agricultural GDP can be lost due to climate variability and extreme events, and cropland may decrease by 18 per cent in Southern Bangladesh and 6.5 per cent nationally. This will lead to a decrease in rice production by 8 per cent, wheat production by 32 per cent, and pulse yields by 8.8 per cent by 2050 (World Bank Group, 2022). These indicate a situation of deteriorated food security, which may increase the dependency on food aid (UN ESCAP, 2024).

In southern Bangladesh, projected sea level rise can disrupt fisheries due to increased salinity, disproportionately impacting coastal communities that rely on fish as a protein source (IPCC, 2022). Several studies predict a significant decline in the potential catch of key commercial fish species, including hilsa, shad and Bombay duck, in the Bay of Bengal (Fernandes et al., 2016; Selim et al., 2021; Siddique et al., 2022). Additionally, shrimp farming in the southwest of Bangladesh is highly affected by frequent cyclones, storm surges, and extreme weather, resulting in significant economic losses and livelihood challenges for farmers (Islam et al., 2016; Kais & Islam, 2018).

## 2.3 Impacts of Climate Change in Manufacturing Industries

Climate change significantly impacts the manufacturing industry in Bangladesh, affecting production, competitiveness, and overall sector resilience (Bag et al., 2023; Nadiruzzaman et al., 2021). For instance, due to the adverse impacts of climate change, Bangladesh's apparel sector may suffer potential losses of about USD 27 billion in export earnings by 2030. The associated job loss is estimated to reach approximately 250,000 (Judd, Bauer, Kuruvilla, & Stephanie, 2023). The projections for 2050 show an even more grim picture (Table 1). These projections underscore the apparel sector's vulnerability to climate change, with substantial economic and employment impacts.

The increase in temperature often leads to excessive heat stress for the manufacturing sector workers. Such a phenomenon can ultimately affect the workers' productivity. Productivity losses due to heat stress are projected to increase significantly in Bangladesh. As can be seen from Table 2, in 1995, the country lost 4.24 per cent of total working hours due to heat stress, which is equivalent to 2.27 million full-time jobs lost. By 2030, this figure is projected to rise dramatically, with the equivalent of 3.83 million full-time jobs expected to be lost due to heat stress, indicating a substantial increase in the impact of heat on the workforce (ILO, 2019).

**Table 1: Employment and Export Projections in Different Scenarios**

Sector	Climate-adaptive scenario		High heat stress and flood scenario		Change	
	Export (USD billion)	Employment (million)	Export (USD billion)	Employment (million)	Export (USD billion)	Employment (million)
2030	122.01	4.83	95.22	4.57	-26.78	-0.25
2050	1038.22	6.31	326.90	5.04	-711.32	-1.27

Source: Judd et al. (2023).

**Table 2: Working Hours Lost Due to Heat Stress by Sector**

(in per cent)

Source	1995	2030 (projection)
Agriculture (in shade)	6.28	9.58
Industry	2.59	4.96
Construction (in shade)	6.28	9.58
Services	0.30	0.72
Total	4.24	4.84
Total (million full time jobs)	2.27	3.83

Source: ILO (2019).

### 3. Overview of National Policies

To address the impact of climate change, Bangladesh has developed several policies, plans and strategies. In the early 90s, the GOB policies focused on environmental protection.

However, from the 2000s, the focus has gradually shifted to adaptation and mitigation. A brief overview of Bangladesh's key climate and environment related plans and policies is provided in Table 3 to highlight GoB initiatives to tackle climate change.

**Table 3: Overview of National Policies**

Name	Highlights
National Adaptation Programme of Action (NAPA) (Ministry of Environment and Forests, 2005)	<ul style="list-style-type: none"> <li>▷ Introducing innovative technologies to mitigate the impacts of climate change on agriculture, fisheries, and livestock</li> <li>▷ Strengthening of disaster management systems</li> <li>▷ Emphasising poverty reduction, sustainable income generation, and gender equality</li> </ul>
Bangladesh Climate Change Strategy and Action Plan (BCCSAP) 2009 (Ministry of Environment and Forests, 2009)	<ul style="list-style-type: none"> <li>▷ Focuses on poverty eradication and achieving widespread economic and social well-being</li> <li>▷ The plan is built around six key thematic areas: 1. Food security, social protection and health; 2. Comprehensive disaster management; 3. Infrastructure; 4. Research and knowledge management; 5. Mitigation and low carbon development; 6. Capacity building and institutional strengthening</li> <li>▷ The plan is currently in the process of being updated to consider 11 key thematic areas</li> </ul>
Bangladesh Delta Plan (BDP) 2100 (General Economics Division, 2018)	<ul style="list-style-type: none"> <li>▷ Comprehensive development strategies for food and water security, economic progress, and environmental sustainability by the end of the 21st century</li> <li>▷ Aims to reduce natural disaster threats and enhance climate change resilience through a holistic, multi-dimensional approach</li> <li>▷ Evaluates the necessity of mobilising resources for an effective investment programme until 2030</li> <li>▷ Emphasises Adaptive Delta Management (ADM) to address climate change challenges such as rising temperatures, erratic rainfall, and sea level rise</li> </ul>
8th Five Year Plan (General Economics Division, 2020a)	<ul style="list-style-type: none"> <li>▷ Mobilising resources for climate change trust fund</li> <li>▷ Utilising the Green Climate Fund (GFC)</li> <li>▷ Technology transfer on adaptation and mitigation</li> <li>▷ Increased commitment to forestry and biodiversity</li> <li>▷ Improved understanding of climate change in local government</li> <li>▷ Increased partnership with NGOs and civil society actors</li> <li>▷ Developing gender inclusive climate change response framework</li> <li>▷ Addressing climate change induced migration</li> <li>▷ Governance of climate finance</li> <li>▷ Increasing disaster risk reduction to 50 per cent of the population</li> </ul>
Perspective Plan of Bangladesh 2021-2041 (General Economics Division, 2020b)	<ul style="list-style-type: none"> <li>▷ Under the plan, Bangladesh will adopt a green growth strategy</li> <li>▷ Specific policies, policies and institutional reforms include               <ol style="list-style-type: none"> <li>1. Integrating environmental costs into the macroeconomic framework</li> <li>2. Implementing the Delta Plan to build resilience and reduce vulnerability to climate change</li> <li>3. Reducing air and water pollution                   <ul style="list-style-type: none"> <li>• Removal of fossil fuel subsidies</li> <li>• Adoption of a green tax on fossil fuel consumption</li> <li>• Taxation of emissions from industrial units</li> <li>• Prevention of surface water pollution</li> <li>• Groundwater sustainability</li> <li>• Waste management</li> </ul> </li> <li>4. Ensuring sustainable management of forestry resources</li> <li>5. Strengthening environmental coordination and environmental institutions                   <ul style="list-style-type: none"> <li>• Strengthening MoEFCC</li> <li>• Decentralisation of environmental management</li> <li>• Strengthening environmental concerns in planning and budgeting</li> </ul> </li> <li>6. Strengthening climate change trust fund</li> </ol> </li> <li>▷ Developing a sound environment and climate change financing strategy</li> </ul>
Nationally Determined Contributions (NDCs) 2021 Bangladesh (Ministry of Environment, Forest and Climate Change, 2021)	<ul style="list-style-type: none"> <li>▷ Aims for a 5 per cent unconditional reduction (12 million tons) and an additional 10 per cent conditional reduction (24 million tons) in GHG emissions by 2030 from the Business as Usual (BAU) scenario</li> <li>▷ Originally focused on power, industry, and transport sectors; was expanded to include energy, industrial process and product use, agriculture, forestry and other land use, and waste sectors</li> </ul>

(Table 3 contd)

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Name	Highlights
National Adaptation Plan of Bangladesh (2023-2050) (Ministry of Environment, Forest and Climate Change, 2022a)	<ul style="list-style-type: none"> <li>▷ Objective is to reduce risks and vulnerabilities to climate changes impacts and promote sustainable growth</li> <li>▷ Focuses on 8 sectors: <ul style="list-style-type: none"> <li>1. Water resources</li> <li>2. Disaster, social safety and security</li> <li>3. Agriculture</li> <li>4. Fisheries</li> <li>5. Aquaculture and livestock</li> <li>6. Ecosystems, wetlands and biodiversity</li> <li>7. Policies and institutions</li> <li>8. Capacity development, research and innovation</li> </ul> </li> </ul>
Bangladesh Climate Change and Gender Action Plan (CCGAP) (Ministry of Environment, Forest and Climate Change, 2024)	<ul style="list-style-type: none"> <li>▷ Integrates gender equality into national climate change policies and actions.</li> <li>▷ Focuses on six areas: natural resources, livelihoods, infrastructure, leadership, financing, and capacity building.</li> <li>▷ Promotes women's participation in climate decision-making and action.</li> <li>▷ Supports climate-resilient livelihoods and gender-inclusive infrastructure.</li> <li>▷ Emphasises gender-responsive budgeting and resource allocation.</li> <li>▷ Aims to ensure inclusive, equitable, and effective climate action in Bangladesh.</li> </ul>

Source: Authors' compilation.

#### 4. Current Climate Change Adaptation Strategies

The review of national plans and policies helped to identify five strategies currently being pursued by the government to adapt to the impact of climate change (Figure 4).

The Government is currently formulating plans and policies to navigate the challenges related to climate change and sustainable development. These policies and plans are helping to shape the country's pathways for future adaptation strategies. The GoB also adopted disaster preparedness as one of the strategies to adapt to the impact of climate change.

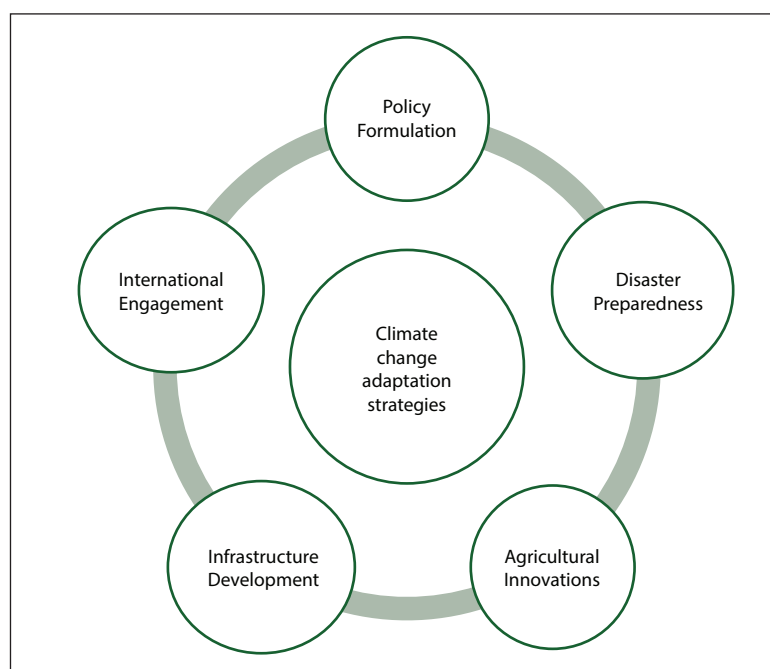
During natural calamities induced by climate change, the agricultural sector suffers significant loss and damage. To cope with these, the government has undertaken agricultural research initiatives. These include developing various stress-tolerant crops—resistant to heat, drought, salinity, and floods—and promoting innovative farming practices. These efforts are supported by organisations such as the Bangladesh Agricultural Research Institute (BARI) (Ministry of Environment, Forest and Climate Change, 2022b).

Developing climate-resilient infrastructure has been a key adaptation strategy for Bangladesh. The Bangladesh Climate Change Trust Fund (BCCTF) oversees numerous projects focused on climate adaptation and mitigation, including investments in climate-resilient infrastructure and urban resilience. As of 2022, the BCCTF had undertaken approximately 851

projects, requiring an investment of USD 490 million (Ministry of Environment, Forest and Climate Change, 2022b). These development projects rely on funding from both domestic and international sources.

However, Bangladesh cannot finance these climate-related development projects alone. Therefore, the country actively participates in global climate change forums and has

Figure 4: Current Climate Change Adaptation Strategies



Source: Authors' illustration.



established a strong legacy. Bangladesh was among the first four countries to accept the second commitment period of the Kyoto Protocol on November 13, 2013. It signed the Paris Agreement on the first day it was open for signature on April 22, 2016, and ratified it on September 21, 2016.

## 5. Recommendations on Enhancing Collaboration for Improving Resilience and Sustainability

While several strategies are currently in place, there is obvious scope for improvement that can strengthen climate resilience and increase sustainability. Given this, the following recommendations are proposed.

- ***Enhancing the implementation capacity of local government actors***

While many policies focusing on climate change mitigation and adaptation exist, it is critical to improve the implementation capacity of associated actors so that climate adaptation and mitigation efforts are effectively executed. Empowering local governments plays a crucial role in this process, enabling them to plan and implement adaptation programmes that are tailored to local needs and conditions. This decentralisation of authority will foster community resilience and ensure that adaptation measures are responsive and impactful. For instance, local governments can carry out community-based adaptations such as floating agriculture or mangrove restoration.

- ***Facilitating women in agriculture***

In Bangladesh, women play a pivotal role in agriculture since nearly 75 per cent of females are employed as agricultural, forestry and fishery workers (BBS, 2023). However, they face disproportionate vulnerabilities to climate disasters due to societal norms and limited mobility and often lack access to resources such as technical knowledge and financial services. The increased burden of women's care responsibilities during disasters further limits their ability to adapt. To address these challenges and bolster resilience against climate change, empowering women in agriculture by providing access to climate-adaptive technologies, enabling them to adopt new agricultural practices, and promoting crop diversification is essential. Interventions must reduce burdens on women rather than exacerbate them.

- ***Increasing private sector participation in developing climate resilience***

The private sector can play a crucial role in climate change adaptation by investing in climate-resilient infrastructure

and renewable energy related initiatives. Additionally, they can engage in facilitating research and development for building local capacity for climate resilience, engage in public-private partnerships and implement Corporate Social Responsibility (CSR) initiatives focused on environmental sustainability. For instance, the Sindh Wind Corridor in Pakistan demonstrates the potential of renewable energy projects led by private-public partnerships to meet energy demands sustainably.

- ***Promoting nature-based solutions and ecosystem-based adaptations***

Promoting nature-based solutions such as 'social forestry' and mangrove restoration can be crucial in climate adaptation efforts. In this case, local governments and communities can be engaged in taking this responsibility. NGOs collaborating with local governments can effectively promote such nature-based solutions. Elected representatives can also facilitate these efforts within their constituencies, as they are accountable to the local citizens, making constituency-based projects more feasible.

- ***Developing collaborative online platforms***

Another strategy would be to develop an online platform to assess climate risks and evaluate the impact of existing adaptation innovations. The Africa Agriculture Adaptation Atlas already exists, which serves investors, policymakers, and researchers by structuring data into interactive narratives to facilitate informed decision-making and support effective adaptation programmes (Africa Agriculture Adaptation Atlas, 2024). Similarly, developing a South Asia Adaptation Atlas would significantly aid Bangladesh in combating climate change. Such an atlas would facilitate informed decision-making, foster collaboration among regional actors, and support the implementation of effective adaptation measures, which are crucial for a country highly vulnerable to climate-related risks.

- ***Increasing collaboration with international development partners***

International development partners play a crucial role in offering financial assistance, technical expertise, and capacity-building support. These partners aid in designing and implementing climate-related projects, integrating climate considerations into national planning, and developing climate-resilient infrastructure, significantly enhancing a country's capacity to respond to climate challenges. Hence, collaboration with international partners should be enhanced.

- *Increasing regional collaboration*

Regional cooperation is essential to address transboundary climate challenges and share scalable solutions. Specific actions include joint renewable energy projects, such as tapping into Nepal's hydropower potential, transboundary water management agreements modelled after the Indus Water Treaty, and collaborative disaster warning systems to improve flood forecasting and preparedness. The establishment of a regional climate fund and harmonisation of policies on renewable energy and agricultural innovation would foster synergies, reduce duplication, and enhance the collective impact of climate action initiatives.

- *Prioritising adaptation rather than mitigation*

South Asian countries have traditionally focused more on mitigation rather than adaptation, for instance, dealing with flood relief instead of flood prevention. However, the focus now has to shift towards mitigation. Heatwaves have been increasing in frequency and magnitude, so adapting a Heat Action Plan like Karachi and Ahmedabad would reduce sickness and protect vulnerable populations. In addition, agricultural insurance, using digital platforms to automatically compensate farmers during disasters, reducing delays and bureaucracy.



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In today's world, technology plays a pivotal role in shaping economic activities by driving growth in both industrial and service sectors. Digital literacy has the potential to empower youth and women by providing access to education, economic opportunities, and social participation, thus fostering a more inclusive society. The question is whether Bangladesh is ready for this new digital reality and how the country will use this opportunity to empower women and youth by using technology. This policy brief examines the opportunities and challenges of adopting technology and digital literacy as a means of empowering youth and women. Given the current context, a set of recommendations is proposed for promoting digital literacy among these groups.

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**Series Editor:** *Dr Fahmida Khatun*, Executive Director, CPD.

**Disclaimer:** *This policy brief is based on research funded by (or in part by) the Gates Foundation. The findings and conclusions contained within are those of the authors and do not necessarily reflect positions or policies of the Gates Foundation.*