Chapter 2
Adaptation Efforts and Policy Guidelines for Bangladesh at Global Warming of 1.5°C, 2°C, and 4°C:
Adaptation Efforts and Policy Guidelines for Bangladesh at Specific Warming Levels

Sujit Kumar Bala
Bangladesh University of Engineering and Technology, Bangladesh

GM Tarekul Islam
Bangladesh University of Engineering and Technology, Bangladesh

A.K.M. Saiful Islam
Bangladesh University of Engineering and Technology, Bangladesh

Motahar Hosen
Bangladesh University of Engineering and Technology, Bangladesh

ABSTRACT

Bangladesh is going to be the worst-hit country from the climate change. The impacts of climate change at specific warming levels (SWLs) of 1.5°C, 2°C, and 4°C upon the natural and social systems of Bangladesh are assessed. Eleven regional climate models' findings show that the average Bangladesh summer temperature is likely to rise from 3.24°C to 5.77°C while the mean annual precipitation is likely to increase up to 25% by the end of the century. The yield trends of Bangladesh in terms of Boro and Aman rice are projected to gradually decrease from 2-15% at a specific warming level of 1.5°C, 5-20% at a specific warming level of 2°C, and 5-25% at a specific warming level of 4°C. A few adaptation options are proposed for different SWLs and sea-level rise. Managing climate for SWLs could be for 'short term' up to 2020, 'medium term' up to 2050, and 'long term' up to 2080. The end goal is a sustainable, resilient, and transformed Bangladesh, where additional policy documents, strategies, and action plans to mainstream adaptation to combat climate change are necessary.

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INTRODUCTION

Industrialisation, population growth, and depletion of natural resources as a result of development are threatening our ecosystem over the globe. Climate change is the result of these developmental activities. Climate change impacts every aspect of our life – food security, supply of fish, forest, and all-natural systems. Climate change is now considered one of the most burning global issues of our planet (El Sioufi, 2010). The US National Academy of Sciences, in a review (NAS, 2010), concludes that "the Earth system is warming and that much of this warming is very likely due to human activities" and mentioned it as a "settled fact." More new studies confirmed higher levels of GHG emissions for the last decade (Peters et al., 2011). The researches at the global and regional levels demonstrated higher impacts of climate change on key production systems, natural resources, and communities (Ravindranth et al., 2012). The IPCC has projected a global average temperature rise of between 3.5°C and 6°C relative to pre-industrial times, under a high emissions scenario by the end of the 21st century (IPCC, 2013). Approximately 1.1°C of global warming has already occurred (Arias et al., 2021). All these new and ongoing studies, observations, and models suggest more threats from climate change and are thought to happen much earlier and severer than it was thought to be. The latest IPCC agreement in Paris has committed to strengthening the global response to restricting warming levels to below 2°C and aiming for 1.5°C above pre-industrial levels (UNFCC, 2015). Therefore, there is a current need to assess the impacts between 1.5°C, 2°C, or even 4°C worlds and develop appropriate adaptation options and policy guidelines considering these specific warming levels.

Climate change imbalances a country and its natural ecosystems, i.e., forests, river basins, sea level, and socio-economic systems, through agriculture, fisheries, irrigation, and power projects. Such changes come through the changing temperature patterns, rising sea levels, and the intensification of natural disasters, affecting livelihood systems concerned with agriculture, water resources, and sanitation, forests, and biodiversity. It is a well-accepted fact that the poorest are the most affected and are the least able to adapt (Parry et al., 2007; Black et al., 2011). This is due to their direct reliance on natural resources and their livelihoods. A developing country like Bangladesh is to suffer more for severe vulnerability to its nature as well as a socio-economic system due to disruption of livelihoods as a result of climate change. Victims are supposed to be the poor of the country, as the country is not developed enough in all respects. Patnaik and Narayanan (2005) focused that socio-economic systems "typically are more vulnerable in developing countries where economic and institutional circumstances are less favourable."

Bangladesh is not an exception and is one of the most vulnerable countries to climate change. Due to physiographical location, this country is going to be the worst-hit place on the planet from extreme climate events such as droughts, floods, heavy rainfall, tropical cyclones, and storm surges (Rawlani & Sovacool, 2011). There is growing evidence and feel that Bangladesh is already undergoing the effects of climate change (Rahman et al., 2009). The densely populated delta of the Ganges-Brahmaputra-Meghna rivers is highly prone to hydroclimatic extremes such as river floods and storm surges. As per climatic predictions, climate change is very likely to affect the hydrology in the region (Gain et al., 2011; Ghosh and Dutta, 2011), and as the country embraces the confluence of the Ganges-Brahmaputra-Meghna (GBM) basin, so increase in flood hazards is also very likely to occur (Olsen et al., 2015). Climate change is generally expected to lead to a greater risk of fluvial (and pluvial) flooding in Bangladesh, but possibly also in more drought situations. This is a major societal concern as more than 40 million people live in flood-prone areas. The impacts of climate change are already evident worldwide, but the extent depends mostly on development factors like poverty, social stratification, political perplexity, etc. (Ayers et al.,