



## Adaptations to Climate Change in Bangladesh: Development of a National Inventory

**A national inventory of implemented climate change adaptations is useful for: informed decision-making, drawing upon experiences from successful adaptations as well as barriers to adaptations; ensuring effectiveness and future contribution of small to large scale interventions; facilitating improvements and upscaling of adaptations in response to changing climatic threats and socio-economic pressures; and ensuring institutional coordination and better utilization of fund.**

### Summary

A national inventory was prepared with documented climate change adaptations in Bangladesh. A first cut analysis was performed based on the inventory. The analyses found that most of the adaptations took place in coastal districts. Disaster risk reduction, water resource management, infrastructure and agriculture are the major sectors of adaptations in terms of number. Government of Bangladesh was the major provider (87%) followed by nongovernmental organizations (11%). Chronic stresses like salinity, waterlogging, drought, etc., were the focus of majority of adaptations while sudden shocks like cyclone and large flood were addressed in community level as well as national level. Major trait has been reactive than anticipatory. Information on specific stress/shock factors addressed and the spatial/population coverage of adaptations were often lacking due to inadequate documentation. The inventory is a step towards proper documentation aiding proper evaluation of practiced adaptations that may inspire policy makers to devise effective adaptation measures to combat climate change in Bangladesh. The inventory is a living document; new entries as well as updating of the previous entries will take place whenever a new literature is available.

### Background

Bangladesh has made substantial progress in climate change adaptation planning and practices in different sectors, via a combination of governmental, non-governmental and community initiatives. While adaptations in different forms have been observed for several decades, 'climate change adaptation' received explicit attention in recent years and has gained momentum, especially since the formulation of Bangladesh Climate Change Strategy Action Plan (BCCSAP) in 2009. The aim has been to undertake adaptation initiatives in alignment with the BCCSAP.

To this end, i.e. to help informed decision making, there is a need for documentation on implemented adaptations, including geographical and sectoral arrangement of practices, involvement of institutions, timing of adaptations, and their drivers. Proper knowledge of adaptation practices in the whole country can ensure efficacy of present actions and improved responsiveness, institutional coordination, effective upscaling of measures, and better utilization of fund. It can also lessen policy-planning gaps.

In the "DEltas, Vulnerability and Climate Change: Migration and Adaptation (DECCMA)" study, we derived this information by creating an inventory of

implemented adaptation measures. We have prepared an adaptation inventory for the delta region (i.e. the coastal zone), as well as an inventory for the whole country. In this policy brief, we principally present the latter.

### Methods

The protocol for creating the inventory was adapted from a previously developed protocol by Tompkins et al. (2009). The source documents for the inventory included published reports, journal papers, conference proceedings, project documents and institutional reports. Most of the documents were collected from several online sources, while hard copy reports were collected from different international and national academic and research institutes, international development agencies, national government agencies, and international and national non-governmental organizations.

Collected information were arranged in a total of 44 columns in a universal spreadsheet template which finally came out as the adaptation inventory. The thematic sections (e.g. location and sector of adaptation; adaptor and beneficiary; forms of adaptation; drivers of adaptation, etc.) covered several queries focusing on different parameters. The inventory

also provided information about the barriers of adaptations, sustainability perspective, gender focus, capacity of adaptation measures to reduce disaster risk and vulnerability and increase large scale system resilience.

We note here that this national inventory, which collates 589 adaptation measures in different districts and areas in Bangladesh, is a living document where new entries as well as updating of the previous entries will be taking place whenever a new literature is available.

### Key findings

The adaptations inventoried represent both government and NGO participation in structural interventions as well as non-structural ones including awareness raising and capacity building activities from the late nineties to recent years. These measures cover different thematic sectors and are observed to be taken in response to regular hazard events or in anticipation of increased severity of natural disasters for protection of the vulnerable community.

### Spatial Distribution of Adaptations

Almost all the districts of Bangladesh have experienced some adaptation measures over the last few decades where some have witnessed more in number than the others. At least 30 adaptation measures were taken in each of the 64 districts while in some districts more than 100 adaptations were practiced (Figure 1).

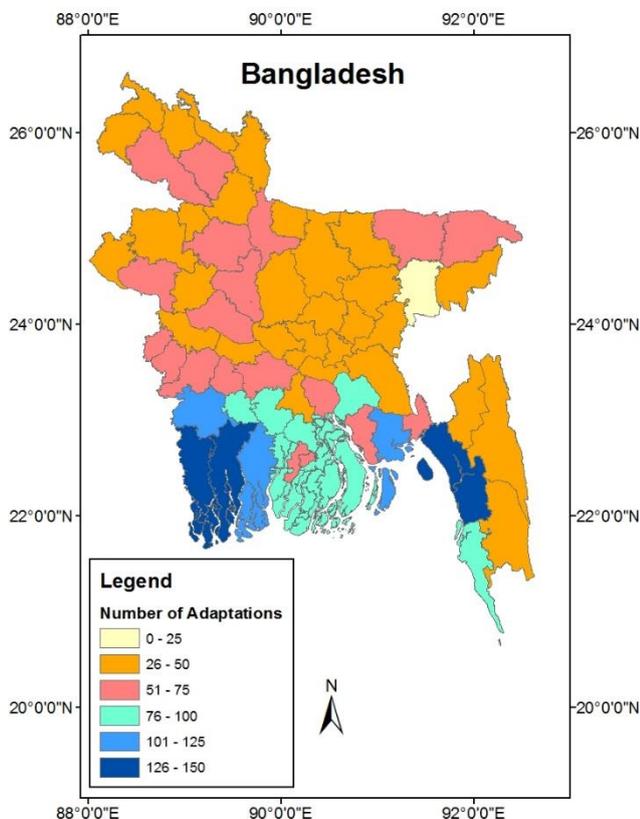


Figure 1: Spatial distribution of adaptations in Bangladesh

The coastal districts, also known as the delta region, are more exposed to the Bay of Bengal and consequently to

the devastating effects of the natural calamities like cyclonic storm surge, tidal flood, salinity intrusion and other hazards much more than the districts further inland. This has resulted more adaptation measures being implemented in the delta region (61% of the total) than the non-delta region.

Among the exposed coastal districts, Satkhira, Khulna and Bagerhat cover more than 10% of the total number of adaptation measures which can be attributed to the attention these districts received in context of climate change adaptation since super cyclone Sidr in 2007 and Aila in 2009. Also, a significant number of adaptations in Chittagong district includes infrastructural interventions like construction of embankment, drainage structures, bank protection works, irrigation facilities, etc (Figure 2). Due to increasing frequency and intensity of hazards, many adaptation measures are being restarted in the delta region for further improved protection and reduced vulnerability.

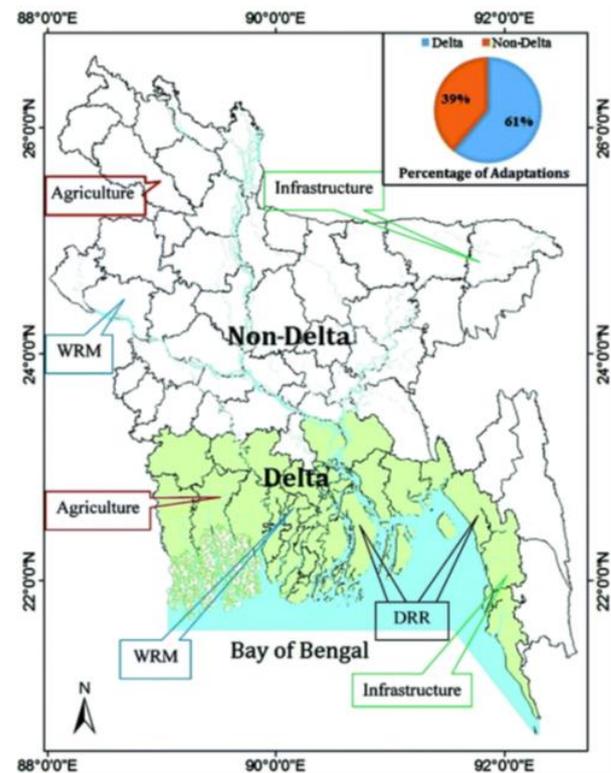


Figure 2: Spatial focus of adaptations in Bangladesh

Though the hazards in the non-delta region are not so diversified as in the delta, the need for protection and resilient socio-economic condition is still the same for the community people. This calls for higher focus of the government and donor agencies to the non-delta region so that a sustainable and well adapting societal condition can be achieved even under the alarming threat of climate change.

### Adaptation Providers

Adaptation measures in Bangladesh are being supported and implemented by GOs, NGOs and sometimes by the communities since the beginning of adaptation strategies. In most of the cases government projects and

activities (e.g. embankment/polder construction and/or rehabilitation; bank protection and drainage structures; large scale afforestation; water supply and treatment system; early warning and information dissemination; stress tolerant crop seed distribution and farmers' training, and housing and shelter facilities in disaster periods) are larger in scale, run for a longer period and serve to a bigger group of beneficiaries. Local and international NGOs also initiate and provide adaptation measures, which are mostly smaller in scale (Figure 3).

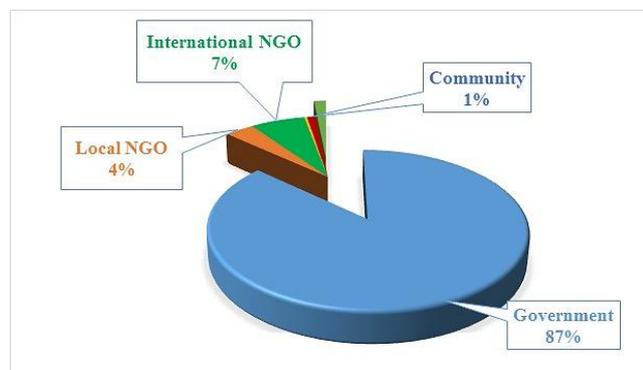


Figure 3: Distribution of adaptation providers

Major government sector adaptation providers are associated with different ministries and are implementers of ministry approved projects and activities. Ministry of Water Resources was found to be providing 39% of the adaptation practices through different implementers while Ministry of Local Government, Rural Development and Co-operatives follows the lead with 29% adaptations. These two ministries are mostly focusing on climate change adaptation in Bangladesh and other ministries are also getting more involved in this regard.

### Adaptations in Thematic Sectors

Among the sectors, Disaster Risk Reduction (DRR) was found to be the major focus in almost one-fourth of the total adaptations and seems to be the most important thematic area. The second most important thematic sector appears to be Water Resources Management (WRM) which covers 20% of the total adaptations (Figure 4). Infrastructural development and agriculture are the next two sectors which cover 17 and 13% adaptations, respectively.

Agriculture receives higher percentage of adaptations by NGOs than government which can be explained by the fact that NGOs introduced stress tolerant crop cultivation, micro credit system for marginal farmers for new crop variety experimentation, integrated crop and vegetable cultivation techniques and other similar activities. Similarly, community level drinking water supply and small-scale water treatment and purification facilities are some locally effective measures by NGOs in the WRM sector which associated them with high percentage of adaptations than the government. Also, capacity building and training activities by local and

international NGOs are known adaptation techniques which have given them a share of 14% of the adaptation practices whereas government share is only 2%.

On the other hand, environment and DRR are two major thematic sectors receiving higher government support than the NGOs. Most of the projects in these two sectors are large scale and therefore need wide institutional involvement and coordination and significant economic support as well. As a result, these practices represent exclusive government involvement.

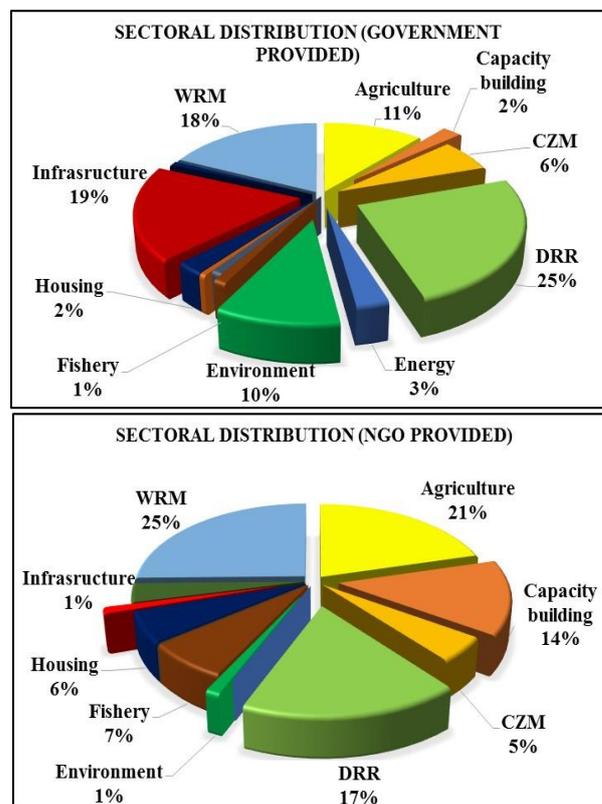


Figure 4: Sectoral distribution of adaptations by Government and NGOs.

About 73% of the adaptations for DRR are focused on the delta region (Figure 5). Also, in the WRM sector about 60% of the adaptation were implemented in the delta. Severity of natural disasters and increasing risk of disasters due to climate change have inspired many government interventions in this area most of which were funded by Bangladesh Climate Change Trust (BCCT) and Comprehensive Disaster Management Plan (CDMP) programs. Coastal Embankment Improvement Project (CEIP) is also another attempt from the government to rehabilitate the existing conditions of coastal polders. These activities represent the mode and preferences of adaptation providers in funding distribution and planning implementation. However, sectors other than DRR and WRM show a balance in receiving adaptation activities in both delta and non-delta regions.

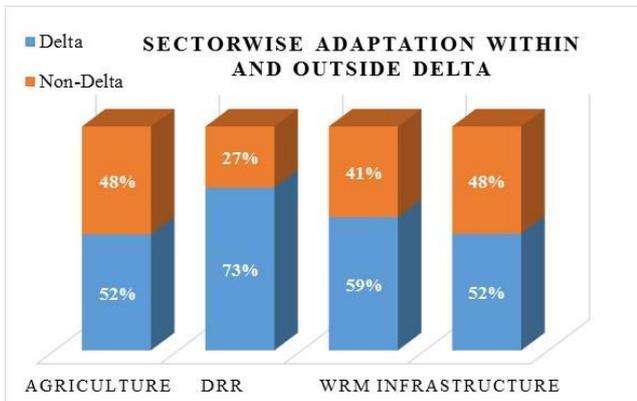


Figure 5: Distribution of adaptation in delta and nondelta regions in major thematic sectors.

### Nature of Adaptations and Stresses and Shocks Responsible

Adaptation practices have emerged due to long term chronic stresses or short lived sudden shocks. About 75% of the adaptations were triggered by long term chronic stresses in Bangladesh including salinity and waterlogging in the delta region and river bank erosion, regular flood and drought in the non-delta region. In comparison, number of adaptation measures to combat environmental shocks like cyclonic storm surge and severe flood is low. Majority of these were reactive in nature while some were anticipatory. In some cases, adaptation practices were first initiated as a reactive measure in response to a chronic stress at a location.

With time the need for improvement and the threat of higher intensity and frequency of a regular natural hazard have inspired uptake and upscaling of the former reactive adaptation measure, thus making it anticipatory in nature. However, percentage of anticipatory adaptations measures are still low. Recent activities have tried to alter the balance of this fact but still there is a lot to accomplish for creating a resilient society against climate change induced stresses and shocks.

### Significance of Adaptation Documentation and Necessity of Such Inventory

Bangladesh has been actively addressing climate change issues which can be clearly visible from the recent enactments of different plans and strategies. Though there are many activities going on around the country, but effectiveness and future contribution of the expensive, large scale interventions depend on the proper documentation and sharing of success stories as well as barriers to implementation.

Aim and sectoral focus of adaptations provided by government and NGOs changed time to time according to policy-planning and also the need of the affected community. Many of the implemented projects gained considerable success while some created maladaptive features as well. Nevertheless, the regular practices were continued without necessary modification or documentation of the associated issues.

There are many recurring problems in our country that need continuation of previous works while new threats and difficulties require upscaling or improvement of previous adaptive measures. But inadequate documentation of the methodologies, post-project success stories or barriers of any adaptation practice/project restricted the opportunity of emulating from the best or learning from the shortcomings.

### Conclusions

- Adaptations are currently disproportionately distributed in delta and non-delta regions; most of the adaptations took place in coastal districts.
- Adaptations were more abundant in DRR, WRM, infrastructure and agriculture sectors where the major provider was the Government of Bangladesh.
- Delta region being the most likely vulnerable areas under climate change scenario has been in focus for DRR and WRM adaptations.
- Chronic stresses like salinity and waterlogging in the delta region, and river bank erosion, regular flood and drought in the non-delta region were the focus of majority of adaptations, while sudden shocks like cyclone and large flood were addressed in community level through non-structural measures as well as national level through structural measures.
- Major trait has been reactive than anticipatory. Information on specific stress/shock factors addressed and the spatial/population coverage of adaptations were often lacking due to inadequate documentation.
- The inventory is a step towards proper documentation aiding proper evaluation of practiced adaptations that may inspire policy makers to devise effective adaptation measures to combat climate change in Bangladesh.

### Reference:

Tompkins, E.L., Boyd, E., Nicholson-Cole, S. Weatherhead, K., Arnell, N., Adger, W.N. (2009). An Inventory of Adaptation to climate change in the UK: challenges and findings. Tyndall Working Paper 135, Tyndall Centre for Climate Change Research, UK.

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