

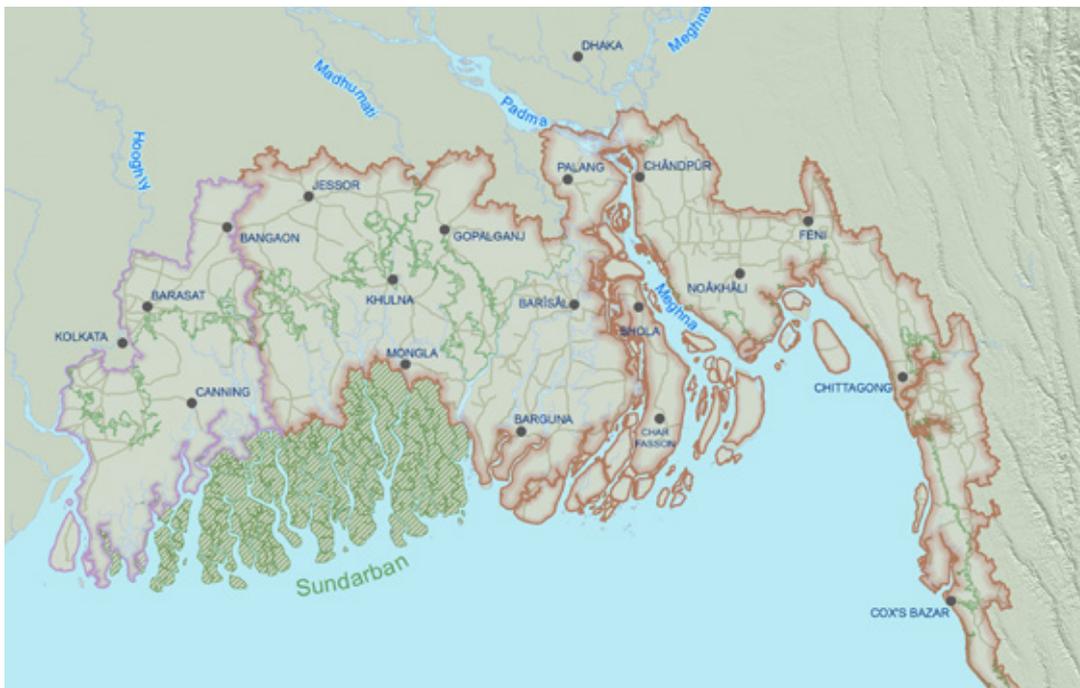


The Ganges Brahmaputra Meghna Delta: Understanding the Present State of Climate Change, Adaptation and Migration

Introduction

The Ganges-Brahmaputra-Meghna (GBM) delta is one of the most densely populated areas in the world, with more than 1200 people per km². The coastal zone (including all districts included in or below the 5m contour above sea level), which is the DECCMA study area (Figure 1), is home to approximately one third of the country's 163 million people. There is significant poverty, as well as severe development and urbanisation pressure with the rapid expansion of the major cities. The coastal population struggle to cope with current climate hazards,

including fluvio-tidal floods, tropical cyclones accompanied by storm surges, river bank erosion, salinity intrusion due to seasonal low flow levels in rivers and upstream water diversion, high levels of salinity in groundwater and arsenic contamination of shallow aquifers. Climate change impacts are expected to reinforce many of these stresses. While the country has seen many planned and autonomous adaptations, environmental stresses are believed to be driving displacement and forced migration. Future projections of migration due to environmental



and climate stresses range from 9-20 million people. While the government's priority is to minimise forced migration and displacement, there often arise situations when people have no choice. For effective planning, and to minimise adverse impacts of climate variability and change, it is important to have a thorough understanding of how effective the adaptation options have been, the circumstances under which people migrate, and if or when people see migration as an adaptation option in the context of available adaptation choices.

Figure 1: DECCMA Study Area for Bangladesh (red border)

How the governance system influences experiences of climate change in the delta.

We conducted policy analysis to understand the effectiveness of governance in important aspects of environmental challenges (e.g. natural resources management, ecosystem protection, disaster risk management, climate change adaptation and human rights in relation to migration and adaptation). To develop a better understanding of the viability of adaptation options, we tried to delineate barriers to implementation of relevant policies, via a questionnaire survey conducted both at national and local levels.

Stronger coherence is required among sectoral policies in relation to NRM.

Natural resource management (NRM) is well addressed in policies, with clear guidelines on conservation or preservation of natural resources and EIA made mandatory for development projects. However, there is a lack of coherence among sectoral policies, with eco-hydrological considerations (e.g. links between agriculture and biodiversity) lacking proper focus.

The rights of Internally Displaced Persons are not recognised.

Disaster risk reduction and response is well addressed, including social protection for women, children, elderly and other disabled groups, preparedness, relief and rehabilitation, and a supportive institutional structure that involves formation of Disaster Management Committees

(DMCs) at different levels. However, the rights of internally displaced persons (IDPs) are not recognized. There is neither any legal basis to protect their properties and possessions left behind after a disaster, nor entitlement to access social and/or psychological services. Notably, general human rights are legally well-protected, including the right to free movement, choosing residences and rights to be protected from forced resettlement or return.

Barriers to policy implementation.

In terms of effectiveness of the implementation of policies, those that are working well include early warning system, risk management, institutional capacity building, water resources management, and education and awareness raising. However, implementation has been less satisfactory in terms of resilient land use, livelihood diversification and research and development, implying that these aspects ought to be prioritised in accordance with the policies. Gender norms, cultural practices, and customary laws are viewed as deterrents in policy implementation by local stakeholders. Top-down approaches and changes in government are also major barriers, insinuating that decentralisation and a stable political situation are important to enable effective policy implementation.



Mapping climate hazards and risk in the delta

We carried out climate change hotspot (risk) mapping to understand the magnitude and location of impacts, to identify regions that are most at risk from specific and/or multiple hazards/stresses, and to analyse the variation in the underlying triggers for adaptation options. The exercise revealed several important aspects..

New parameters in hazard mapping.

In addition to conventional ways of defining coastal hazards, we have also included additional components e.g. salinity residence time and thrust force owing to combined effect of cyclonic wind and surge wave. Considering combinations of salinity residence time with peak dry season salinity, thrust force of cyclonic storm surge with surge depth and wind speed, and combined action of astronomical tide and monsoon

wind set-up are important in analysing fluvio-tidal flooding. Storm surge in the dry season (April-May-November) causes additional salinity intrusion in the region and can cause a 'multiplier effect' related to hazard induced vulnerability and risk.

Risk maps are more useful than hazard maps.

Considering hazards alone is not very useful to relate to adaptation and migration. There is no consistent link between hazards and migration (highest hazard areas show lowest migration and lowest hazard areas show highest migration). Risk maps (combination of hazard and vulnerability maps) should be used instead, and use of incremental change in climate risk will be particularly useful in future planning. Twenty-one Upazilas in GBM delta have been identified as the climatic hotspots where vulnerabilities and risks will grow most strongly and adaptations will be required (Figure 2). Such risk mapping allows investigation of the sensitivity of different adaptation measures in terms of reducing risks (by modifying any of the contributing components).

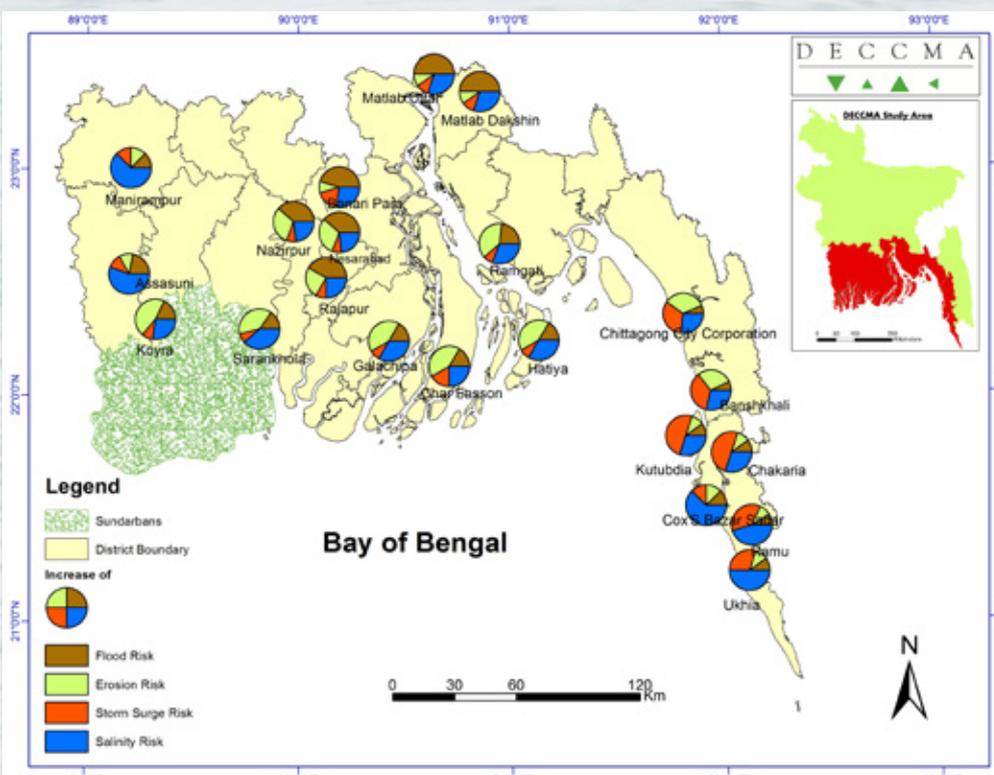


Figure 2: Hotspots where climate change risk will increase

Migration as an outcome and determinant of vulnerability in deltaic populations

We want to understand the conditions that promote migration and its outcomes, and conceptualise and evaluate migration within a wide suite of potential adaptation options for men and women at both household and delta levels. We conducted extensive literature reviews, residual migration analysis using secondary data (for delta level analysis), qualitative field work and household level surveys (among 1500 households across 50 mouzas selected randomly, which represent the full range of hazard affected areas from very low hazard to very high hazard).

Characteristics of migration at the delta level – secondary data analysis.

At the delta level, female migrants constituted around 30% of total migrants. The garment manufacturing sector appears to be the single most attracting factor. Migration from our coastal study area has been higher than the rest of the country. In the last 40 years, poverty and environmental factors are apparently the major triggers. Poorer populations (represented by high poverty level, low district GDP, low per capita income GDP) appear to have a greater tendency to undertake internal migration in large numbers, while relatively richer populations (lower poverty, higher GDP, higher per capita income/GDP) tend to undertake international migration in large numbers. Comparatively less educated people tend to migrate internally in large numbers but comparatively more educated people tend to migrate internationally.

Drivers of migration at the regional and household levels- household survey data analysis.

There have been a growing number of internal migrants (19% of total) compared to international migrants (11% of total), with the numbers for internal migration much higher than 10-12% as reported in previous studies. There is no consistent pattern between intensity of hazard and migration in sampled areas: migration is found to be very high in 'high hazard' areas, low in 'very high hazard' areas and high in 'low hazard' and 'very low hazard' areas. This reinforces two important points: firstly, the

combination of hazard and vulnerability, not hazard alone, which triggers migration; secondly, migration is an outcome of multi-causal forces, with several important drivers in play.

Economic reasons dominate people's perception as the important drivers of migration. However, environmental reasons are also viewed as important, albeit by a smaller percentage of respondents (about 1.5% people identified environmental degradation or extreme events as the first most important driver, another 5.3% as the second most important driver and another 10% as the third most important driver). The fact that environmental stresses often precipitate economic stresses also indicates that people cannot always clearly perceive the causes of economic stresses. Environmental factors might be playing a much bigger role than the numbers suggest. Intentions to migrate in the future are high (among two-thirds of all households), with seeking jobs, better education and environmental stresses as important reasons. Perceived environmental impacts (e.g. flooding, cyclone, erosion), including loss of seasonal income, are substantially reflected in areas more exposed to hazards, indicating higher probability of future migration from more hazard prone areas.

Resettlement has yet to achieve its desired goals.

Currently, there appears to be no consensus on the efficacy of the Resettlement Policy (2015). Resettlement has not achieved the desired goal as resettled people are not satisfied with infrastructure facilities or the lack of government support for livelihood transition. Successful resettlement requires relocation of a community where work can be secured (either through employment or developing enterprises) and where there are better opportunities for social services. This requires infrastructural initiatives (especially housing) to be in line with planned intervention, such as the "Cluster Village" model; economic, social, and cultural integration of the re-settlers given priority in long-term resettlement planning decisions; and more efficient communication and coordination between the government and development partners.

Economic Modelling of the Impacts of Climate Change

We want to develop a tool that allows policy makers to see how different climate scenarios affect the economic options in the delta and how these, in turn affect vulnerability and sustainability in the region. We want to link economic factors to the availability of jobs and livelihoods in the delta and thereby to potential migration fluxes – all in the context of climate change and its effects on different economic activities. We want to achieve this by developing delta level input-output tables and economic models.

Input-output modelling reveals the important economic sectors in the delta.

The input-output tables developed for the delta and non-delta regions revealed the strong importance of the agriculture sector, notably the fishing sector, which is relatively much bigger in the GBM delta than in the rest of the country. Construction, trade and transport activities are

also relatively more important in the delta. The embodied employment of women in the delta is most prominent in agriculture, while less present in services sector. Predominantly, unskilled work is observed in the delta embodied in the agriculture & forestry, services, manufacturing and mining, and construction sectors. In general, the delta region is a net importer of CO₂ emission and non-delta region is a net exporter of CO₂ emission. The important messages are: (i) safeguarding agricultural activities should be a top priority in the delta and appropriate adaptive and mitigating measures are needed; (ii) loss of livelihood in the delta is due to damage of natural resources and climate change may have a negative impact on employment - both generally and in the GBM delta in particular, and so, protecting delta livelihood should be a top policy priority; (iii) compensatory fiscal measures may be needed to address the disproportionate burden of environmental degradation in the delta region caused by activities or processes in the non-delta region.

Feasible and acceptable adaptations

We want to identify and evaluate the scope, types, and sustainability of adaptation options (including migration) for men and women in the GBM delta (at both national and household levels) and the dynamic relationship between national policy and adaptation. We have conducted a baseline inventory of observed adaptations and are in the process of analysing household adaptation to climate change using the household survey data. We assessed the scope and types of existing adaptation policies, to show how the government aims to deal with a changing climate. We also attempted to assess how adaptation interventions have been implemented in accordance with priority themes as outlined in the Bangladesh Climate Change Action Plan.

Adaptation policies are mostly disaster focused, lacking clear sectoral coherence and with little focus on gender specific adaptation and migration as a climate change adaptation.

Adaptation policy analysis revealed that climate change issues are mostly DRR focused, with ecosystem based adaptations (EBA) and community based adaptations (CBA) recently emerging. While women empowerment is emphasised in areas such as disaster preparedness and management, agriculture management and agriculture wages, there is a lack of guidelines for gender specific adaptation. Gender issues need mainstreaming in sectoral policies from climate change and disaster management perspective. Migration is not addressed as

a climate change adaptation option. Emphasis has been on overseas migration and migration due to economic reason, while rural-urban migration has been discouraged. Recent emphasis has been on fostering economic growth and employment opportunities in coastal areas through labor intensive industries in planned industrial zones. There is no clear coherence among sectoral adaptations, hence the need for framing a comprehensive climate change adaptation and migration policy to bind them altogether from climate change perspective. Most of the adaptation measures are infrastructure focused, and reactive in nature, with inadequate focus on gender issues. Our inventory of implemented adaptations revealed that agriculture and water resource management (WRM) sectors received more than half (55%) of the adaptation measures while disaster risk reduction (DRR) sector received one-tenth of those. However, most of the WRM, DRR and coastal zone management focused adaptations to climate variability and climate change are infrastructural in nature which suggests a priority of implementing organizations (mostly government) towards infrastructural development. Most of the adaptation measures have been implemented in recent decades when climate change manifestations have been clear, though some of the development activities taken back in the last century have served in combating climate change induced disastrous events. Nevertheless, adaptation activities with anticipation of future major hazards have been still less in numbers while the majority have been reactive in

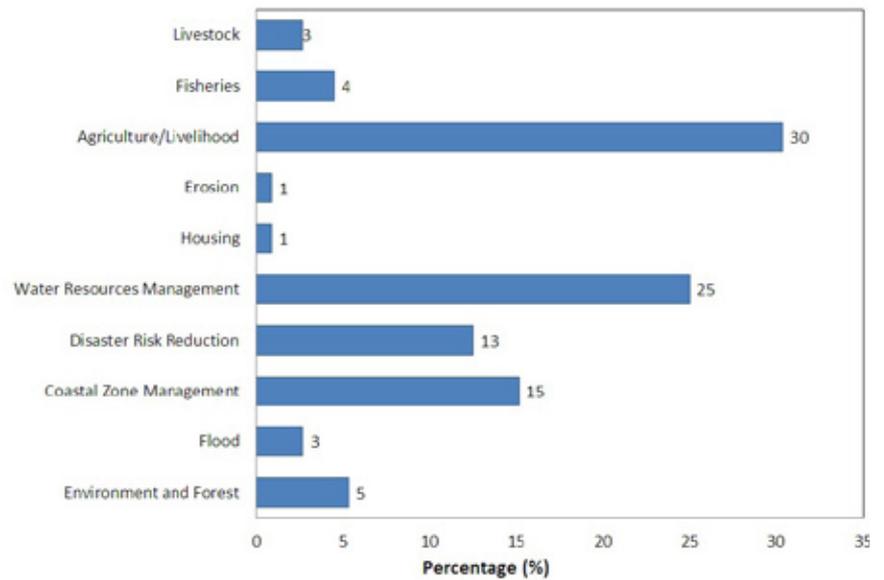


Figure 3: Sectoral distribution of adaptation

nature. This explains why the majority of the adaptations (72%) are undertaken in response to chronic stresses like floods, waterlogging, and salinity, rather than sudden shocks like major cyclones, storm surge events and large floods. Less than one-quarter of the adaptations address gender issues, implying that more focus is warranted on gender balance while planning future adaptation activities.

Policy-practice gaps in allocation of adaptation funds.

When compared to the Bangladesh Climate Change Strategic Action Plan (BCCSAP) 2009, the main policy and guiding document for planning for climate action, several digressions are found in adaptation allocation from the Bangladesh Climate Change Trust Fund (BCCTF), created by the Government with own resources, to implement BCCSAP. BCCSAP allows for streamlining use of funds from domestic and donor sources. While BCCSAP gives equal emphasis on six thematic sectors, projects and funds allocated across themes are highly skewed with food security (T1) and infrastructure (T3), accounting for about 79% of the allocated funds through 365 of the 438 projects, and only 3% of funds were allocated for climate research and capacity building in institutions (Figure 4). There has been a general preference towards tangible or visible developments, with increasing trend towards infrastructure spending. It has implications for the whole of Government approach, as strongly recognised in the 7th Five Year Plan.

To its credit, the country has seen adaptations targeting incremental risk due to climate change (Type II adaptation) overtaking the adaptations targeting hazards existing due to climate variability (Type I adaptation). However, there has been a strong regional bias in adaptations, which signifies the importance of prioritisation of adaptations according to regional deficits. A baseline for adaptation deficit is thus a priority for the country for optimal allocation of funds and mobilisation of resources.

Allocation across ministries were skewed with the top three ministries receiving funds amounted to 84% of allocation while many ministries had no projects, which highlights lack of mainstreaming at planning level. Funds allocated to local government institutions (LGIs) have been rather limited (<17% of total) and started at later stage, but they performed relatively well compared to central government agencies in targeting adaptation deficits, alignment with BCCSAP themes, and incorporation of gender considerations in adaptations.

Enhanced knowledge and capacity building is key to preparing efficient annual development plan (ADP) aligned with BCCSAP. The involvement

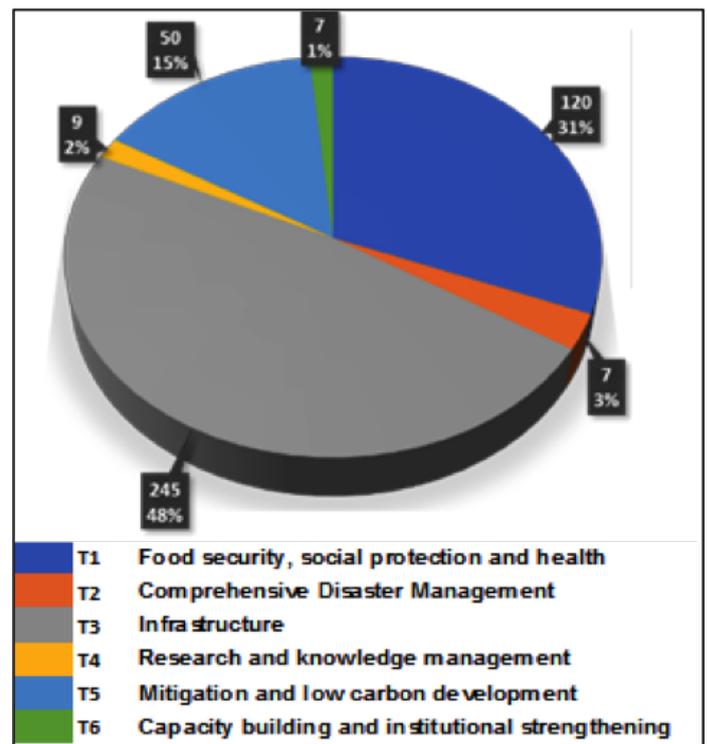


Figure 4: Adaptation finance under BCCT during 2009-2017

of LGIs in adaptation programmes under BCCTF were in more gender sensitive interventions targeting climate resilience compared to central government agencies and appears to be a viable option for making climate change adaptation participatory and gender sensitive. These issues need to be considered in devising new National Adaptation Plan 2018 (NAP2018) and new BCCSAP in 2018.