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Climate Change Adaptation and Disaster Risk Reduction Strategies in Bangladesh: The Tale of Two Coastal Cities

SUBAS P. DHAKAL and MUHAMMAD N. MAHMOOD

Abstract: International aid agencies have increasingly focused on Multipurpose Cyclone Shelters as an integral component of climate change adaptation strategies in Bangladesh. The country currently has about 2,500 shelters and it is estimated that more than 5,000 additional shelters are needed in order to adapt to the increased frequency and intensity of cyclones associated with the changing climate. Although such physical initiatives are highly commendable, little attention has been paid to the non-structural approaches for making adaptation more resilient. This paper responds to this gap and investigates the state of shelters in two of the coastal districts in the country. The findings suggest that the vulnerable people in urban areas are at risk of falling victim to climate change maladaptation. The paper ends by making a case for greater community involvement to enhance social capital and secure financial options as a way forward.

Keywords: International aid, maladaptation, resilience, social capital, vulnerability

1. Introduction

Contemporary international development and cooperation has embraced the notion of adaptation—policies and practices designed to deal with threats associated with climate change. In practical terms, adaptation can be understood as inputs or outputs that enhance the ability of a system to better cope with changing circumstances such as increased natural disasters. For example, providing funds to construct cyclone shelters in vulnerable coastal areas can be seen as inputs that can lead to outputs, such as resilient communities. Although different disciplines vary in terms of how resilience should be conceptualised and operationally defined, common to most is the idea of overcoming adversity (Buikstra *et al.* 2010, p. 976). Three threads of resilience can be identified in the adaptation literature: 1. recovery, relating to a capacity to bounce back from an adverse change into its original state; 2. stability, focused on the ability to cope with adverse changes with minimal disruption; and 3. transformability, the capability to adapt to changing circumstances (Adger 2000, Folke 2006). The third thread, transformative resilience, is of particular relevance to adaptation and has to be understood in relation to avoiding maladaptation. Barnett and O'Neill define maladaptation as: 'action taken ostensibly to avoid or reduce vulnerability to climate change that impacts adversely on, or increases the vulnerability of other systems, sectors or

social groups' and identify at least five distinct types of maladaptation: 1. increasing emissions of greenhouse gases, 2. disproportionately burdening the most vulnerable, 3. having high opportunity costs, 4. reducing incentives to adapt, and 5. setting paths that limit the choices available to future generations (2010, p. 211). The premise of maladaptation avoidance is that short-term benefits should not override long-term costs. Maladaptation in the context of international aid can therefore be viewed as assistance that ticks the appropriate boxes of timely project completion in the short-term but actually exacerbate vulnerability in the medium-to-long-term by not putting mechanisms in place that ensure completed projects can deliver sustained benefits.

Major donor agencies, such as the European Union, The World Bank, and the Department for International Development (United Kingdom), have been particularly interested in assessing the natural disaster-related risks which are exacerbated by climate change, and advocating, as well as supporting, various on-ground adaptation measures to minimise such risks. For instance, there is an enhanced presence of these agencies around adaptation and disaster reduction issues in Bangladesh, mainly because the ratio of casualties/population exposed to tropical cyclones makes it the most natural disaster-prone country in the world (Pender 2008, Karim and Mimura 2008) and the changing climate is predicted to intensify this susceptibility even further. The World Bank (2010, 2011) estimates that more than 30 million people in Bangladesh will be vulnerable to cyclones by 2050 and recommends structural measures, such as building thousands of additional Multipurpose Cyclone Shelters (MCSs), as one of the tangible ways to reduce disasters related risks and adapt. Finding adequate resources for structural adaptation measures is a formidable challenge for an aid-dependent country like Bangladesh, and attempts by aid agencies to channel scarce resources for MCSs are commendable. However, little attention has been paid to the non-structural elements for ensuring long-term benefits of MCS-based adaptive measures.

This paper responds to this gap and explores the state of existing MCSs in two of the most vulnerable coastal districts in Bangladesh, Chittagong and Cox's Bazaar, with a maladaptation lens. The paper begins by introducing international aid in the context of climate change adaptation in Bangladesh, followed by a description of the study area. The method and findings are presented next. The paper ends by make a case for greater community involvement in MCS management to enhance social capital and secure financial prospects.

2. Need for international aid

The 2011 census data indicates that Bangladesh has a total population of nearly 140 million people. Females make up a little more than half (50.1 per cent) of the population and nearly two-fifths (19.2 per cent) live in urban areas (BBS 2012a). Since gaining independence in 1971, Bangladesh has achieved notable progress in socio-economic development. The country has succeeded in gaining food sufficiency to a large extent (Quibria 2010), stabilised its birth rate to about 1.5 per cent, substantially increased its primary school enrolment rate to 81 per cent, and has a per capita Gross National Income (GNI) of \$780 (The World Bank 2013). Nonetheless, the 2013 Human Development Index ranks Bangladesh 146th out of 187 countries in the world (UNDP 2013), indicating that the country will continually need significant development assistance in the foreseeable future in order to achieve sustainable development objectives such as Millennium Development Goals (MDGs). International aid agencies have recognised Bangladesh as a particularly vulnerable country for some time. The amount of development assistance Bangladesh receives has substantially increased in recent

years. As a matter of fact, the country received nearly \$1.4 billion (equivalent of 1.4 per cent of its GNI), of international aid in 2010 (GHA 2013). In recent years the role of international aid has been particularly vital for the country in terms of adaptation, for example preparedness and recovery from natural disasters. As *Figure 1* indicates, the spike in aid that Bangladesh received in 2008 was partially because of the increase in humanitarian assistance in the aftermath of tropical cyclone Sidr. The cyclone that hit coastal districts on 15 November 2007, claimed at least 3,500 human lives and the total economic loss associated with the cyclone was estimated to be in excess of \$2 billion (Sarker and Azam 2012).

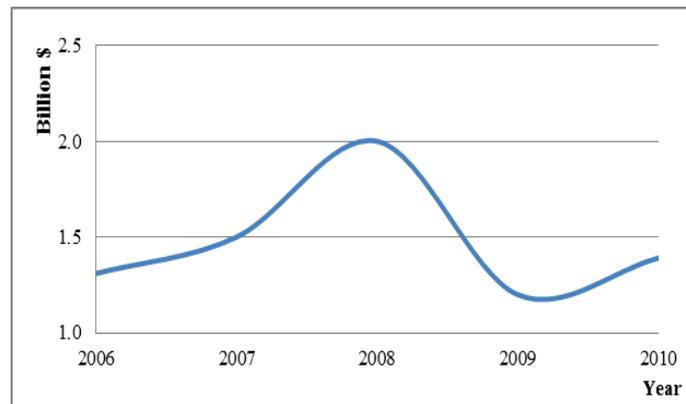


Figure 1: Official international aid to Bangladesh: 2006–10.

Source: GHA 2013.

The increase in flow of disaster-related international aid to the country is not unreasonable. For instance, a severe tropical cyclone hits Bangladesh once every three years on average and the country has been hit by 16 major cyclones since the 1960s (Karim and Mimura 2008). Unfortunately, temperature and sea-level rise associated with global warming is predicted to escalate the frequency and intensity of cyclones in the coastal districts, putting more than 9 million people in coastal areas at risk (Karim and Mimura 2008, The World Bank, 2010). Disaster preparedness and recovery has therefore become an integral focus of climate change adaptation initiatives funded by international aid agencies active in Bangladesh. For instance, the Bangladesh Climate Change Resilience Fund (BCCRF) established with the contributions of several donor countries is a mechanism that enables government to channel \$125 million (out of \$170 million) in various climate-related adaptation programs. Of which the shelters construction project—which aims to build 61 new MCSs by the middle of 2014—accounts for 17 per cent of the total budget (GPRB 2012). In addition, the majority of post-cyclone Sidr aid has been spent on reconstruction relief such as building new MCSs (GHA 2013).

Emphasis on structural adaptation can be, at least partially, attributed to the significant role MCSs played in disaster preparedness during the cyclone Sidr. Nearly 1.5 million people utilised shelters during the cyclone, substantially limiting the number of human casualties when compared to previous cyclones (Sarker and Azam 2012). There are now more than 2,500 MCSs in the country and the proposed construction of more than 5,000 additional MCSs (The World Bank 2010) in the low-lying areas of the country is expected to contribute towards adaptation. However, without non-structural measures, such as strengthening social capital, allocating maintenance funds and encouraging participatory governance, constructing new MCSs for the sake of it is unlikely to enhance adaptive capacity automatically (Mahmood *et al.* 2013). International aid agencies therefore need to be cognisant of not aiding and/or promoting solutions that weaken the resilience of vulnerable people. It is in this context

of maladaptation that this paper investigates the state of MCSs in two coastal districts: Chittagong and Cox's Bazar.

3. Method

The central question that this paper asks is: what lessons can international aid agencies learn from the current state of MCSs in terms of adaptation or maladaptation? Since this study is an attempt to crystallise the current management issues of MCSs, it utilises an exploratory research approach in order to explore the state of MCSs. The exploratory approach is particularly useful in order to clarify the problem space. Bhattacharjee (2012) states that exploratory research is often conducted in new areas of inquiry, where the objectives of the research are: to scope out the magnitude or extent of a particular phenomenon, problem or behaviour; to generate some initial ideas (or 'hunches') about that phenomenon; or to test the feasibility of undertaking a more extensive study regarding that phenomenon (p. 6). While the outcomes of exploratory studies may not always influence the short-term decision-making processes, they do have the potential to provide long-term policy insights. The paper makes use of data reported in a 2009 document, *Cyclone Shelter Information for Management of Tsunami and Cyclone Preparedness*, published by the Ministry of Food and Disaster Management (CEGIS 2009) in order to answer the research question. In addition, various aspects of 2011 census data of the Bangladesh Bureau of Statistics (BBS) are used to calculate the ratio between populations vulnerable to cyclones and cyclone shelters in Chittagong and Cox's Bazar.

4. Findings

4.1 Chittagong and Cox's Bazar: Vulnerable districts

Bangladesh is divided into seven administrative divisions and a total of 64 districts, including 16 coastal districts. The districts of Chittagong and Cox's Bazaar are located within the Chittagong division in the southeast of the country (*Figure 2*). Chittagong district includes the city of Chittagong and seven other municipalities. The city is the second largest urban area in the country and a well-known commercial port. The city of Cox's Bazar is a well-known fishing port and a growing tourism destination, renowned for the world's longest natural sandy sea beach. However, the geographic location in the waters of the Bay of Bengal and their low elevation make these two districts the most disaster-prone in the country.

Islam and Peterson (2009) demonstrated that more than one-third (35 per cent) of all cyclones in Bangladesh between the years of 1877 and 2003 have made landfall in either one or both of these two coastal districts (p. 132). With 62 per cent of Chittagong and Cox's Bazar having an elevation of less than three metres (CEGIS 2009), both of these coastal districts are extremely vulnerable to inundation associated with tropical cyclones. As *Figure 3* indicates, a total of 11 cyclones have made landfall in these two coastal districts in the past 50 years. Chittagong and Cox's Bazar have been subjected to cyclone-related casualties in an unprecedented scale, as nearly half a million people have lost their lives in these two districts as direct consequences of cyclones. Unfortunately the global warming associated with the changing climate is predicted to increase the temperature of waters over the Bay of Bengal and consequently, the occurrence and intensity of cyclones are expected to escalate (The World Bank 2010). MCSs

are therefore seen as an important component of not only adaptation strategies but also overall community resilience (Paul and Routray 2013).



Figure 2: Location map of Chittagong and Cox's Bazar.

Source: www.autarkytours.com/map.html

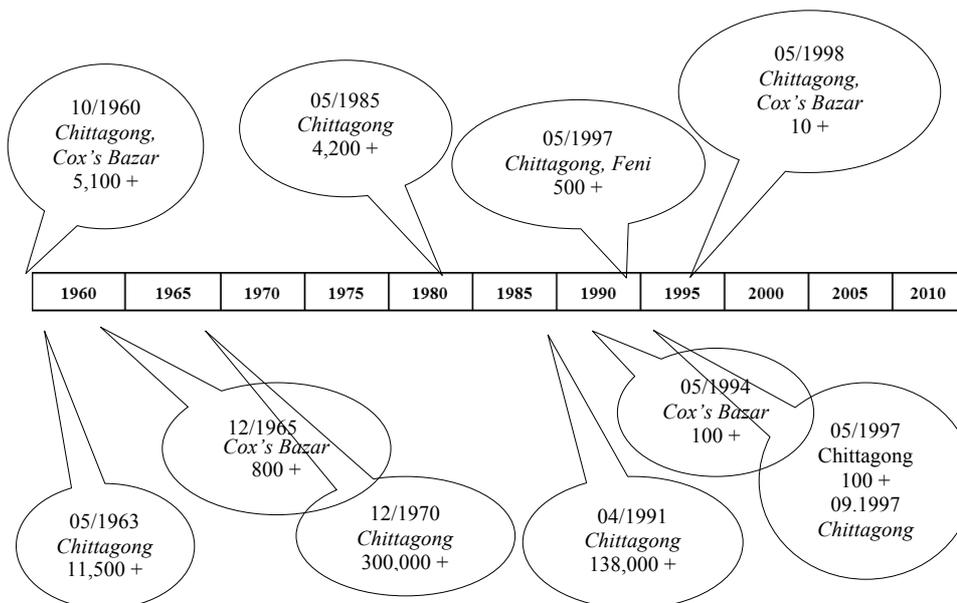


Figure 3: Date, districts and approximate deaths related to cyclones since 1960. Sources: Banglapedia 2006, Karim and Mimura 2008, Islam and Peterson 2009.

4.2 The state of MCSs in Chittagong and Cox's Bazar

MCSs often serve a dual purpose: a) schools, markets or health centres under normal conditions, and b) refuges for people during and after cyclones (Choudhury 1994, Khan 2008, CEGIS 2009). Typically MCSs are multi-storied with reinforced concrete buildings that accommodate 1,600 people on average. MCSs generally have an open ground floor structure to avoid flooding from the storm surges and top floors (either one or two) designed to accommodate people during and after the disasters (Paul 2009, 2012). As *Table 1* indicates, Chittagong district is twice as large as Cox's Bazar but nearly two-fifths of the population in both districts is highly vulnerable to inundation associated with storm surges. However, Chittagong has a vulnerable population as many as three times the size of that of Cox's Bazar. These similarities and differences provide a unique opportunity to make comparative assessments of the state of MCSs in these two districts.

Table 1: A comparison of Chittagong and Cox's Bazar.

<i>Indicators</i>	<i>Chittagong</i>	<i>Cox's Bazar</i>
2011 Population (in '000)	7616	2289
2011 Female Population (in '000)	3777 (49.5%)	1120 (48.9%)
2011 Urban Population (in '000)	3153 (41.4%)	499 (21.8%)
Total Area (in sq km)	5283	2492
Highly Vulnerable Area*	18.8%	19.4%
Highly Vulnerable Population** (in '000)	1414	442
Total no. of MCS	602	514
Total no. of Usable MCS	573 (95.2%)	504 (98.1%)
Existing Capacity of MCS (in '000)	683	607
Difference in Capacity of MCS (in '000)	731	-165

*Prone to storm surges of ≥ 1 metre; **Population residing in the area prone to storm surges of ≥ 1 metre

Sources: CEGIS 2009, BBS 2012a, BBS 2012b.

The encouraging fact is more than 95 per cent of shelters in both districts are usable. However, in terms of catering for the needs of its vulnerable population, Cox's Bazar has a capacity surplus of more than 150 MCSs whereas Chittagong has a capacity deficit of more than 700 MCSs. A closer look at the state of MCSs reveals that half of the shelters do not have drinking water facilities, and nearly two-thirds of shelters are not culturally sensitive in terms of separate toilet facilities/spaces for men and women. Hardly any shelters are accessible to people with disability. Consequently, it is not unusual for an already vulnerable section of the population, for example women, the elderly or people with disability, to avoid using shelters due to the lack of essential amenities (CEGIS 2009). In addition, as *Figure 4* indicates, an overwhelming majority of MCSs do not have adequate maintenance funds at their disposal and they lack the governance mechanism that encourages community participation. This sorry state of MCSs in general, in terms of cultural insensitivity, the lack of maintenance funds as well as community participation, is particularly alarming in the context of maladaptation.

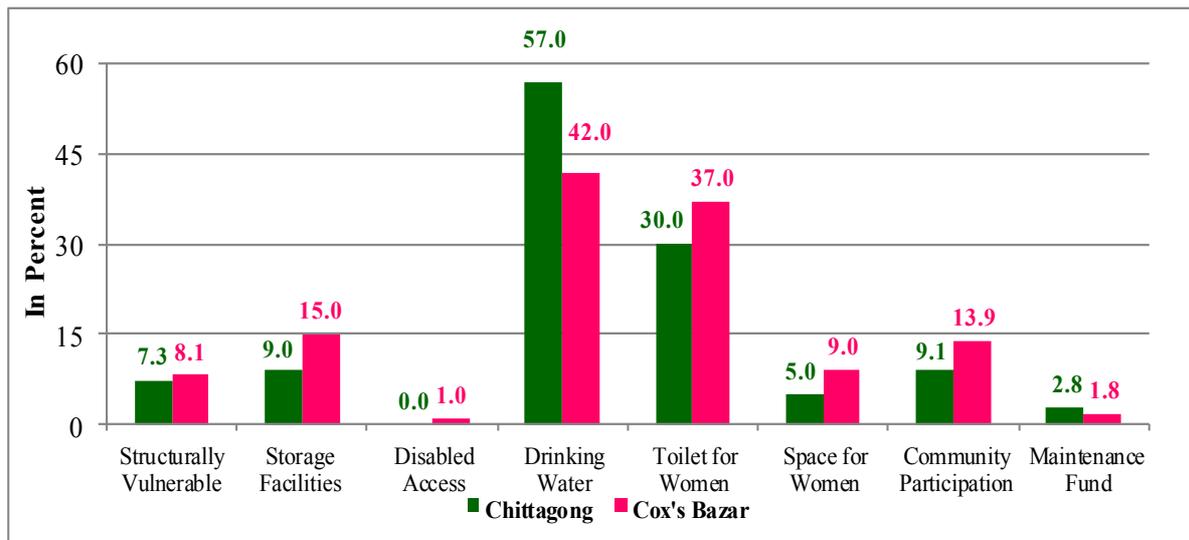


Figure 4: The state of MCSs in Chittagong and Cox's Bazar

The capacity deficit in Chittagong district is particularly alarming given the district has a large slum population. For instance, the 2006 Centre for Urban Studies (CUS) found that of the 1.5 million slum people in the district more than half (53.5 per cent) are migrants from other districts (CUS 2006, p. 47). More importantly, more than 95 per cent of slum residents in the district are considered extremely vulnerable during disasters because of: low income, poor housing, and high population and density (UPPR 2013). Although the exact proportion of urban migrants is not known in Cox's Bazar, based on the average household size of 4.4 people in Bangladesh (BBS 2012c), and an approximation by local non-government organisation, Mukti Cox's Bazar (MCB), that there are 6,665 slum households in the district (MCB 2012), we estimate that there are around 30,000 slum people in the district. These findings are consistent with a study based on the 2001 census, which indicated that more than half of the population in the coastal districts live under the poverty line and are already highly vulnerable to natural disasters such as cyclones (UNDP 2004). Given the continued growth of urbanisation and slum populations, equal and equitable access to MCSs is therefore clearly of critical importance for Chittagong more than Cox's Bazar.

5. Discussion

The state of MCSs in the two coastal districts indicates two major issues. First, the maintenance and management of MCSs has remained under the radar because of the drive to build new shelters (Mahmood *et al.* 2013). Second, vulnerability is exacerbated by the lack of urban-poor specific adaptation strategies (Ahammad 2011). In this regard, the way MCSs are governed at the local level is worth elaborating. Committees under the Disaster Management Bureau (DMB) within the Ministry of Food and Disaster Management (Mahmood *et al.* 2013) carry out MCS management at the local level. However, it is widely speculated that these committees are functional only in areas where community empowerment programs conducted by the Bangladesh Red Crescent Society are also in operation (CEGIS 2009). More importantly, financial as well as social mechanisms to instill community-based stewardship of MCSs have not been a priority of DMB. This clearly indicates that while some interventions are adaptive the way adaptive measures are being governed is maladaptive. There is, perhaps, a need for aid agencies active in the country to catalyse cultural shift in valuing the ability of

local communities to harness social capital and innovative ways to finance the governance of MCSs.

Firstly, the notion of social capital tells us that community participation is particularly important for fostering and sustaining collective action such as MCS management committees. Robert Putnam (1995) described social capital as ‘features of social organization such as networks, norms and social trust that facilitate coordination and cooperation for mutual benefit’ (p. 67). The central idea behind the notion is that trustworthy connections or relationships are valuable for commencing and sustaining community-based collective action (Dhakal 2012). Such connections are typically associated with norms that promote stronger ties and reciprocity for the mutual benefit of network members. Social capital has three distinct dimensions of connections, namely *bonding*, *bridging* and *linking*. *Bonding* represents intra-community ties between socio-demographically similar actors, *bridging* represents inter-community ties between socio-demographically different actors, and *linking* represents beyond-community ties between actors with differing levels of power or status (Gittel and Vidal 1998, Putnam 2000, Woolcock and Manderson 2009).

These three dimensions of social capital have been found to be the key to adaptation and community resilience. For instance, a closer look at the aftermath of two disasters—floods in Mumbai and hurricane Katrina in 2005 which both occurred within the span of a month—suggest that structural measures such as complexly engineered flood levies or storm water management systems are not always full-proof. Instead, Anjaria observed that ‘unlike in New Orleans, the Mumbai disaster did not lead to chaos’ (2006, p. 81). This was mainly due to the way people were already embedded in reciprocal support mechanisms, which helped them to better cope with the disaster. Similarly, Hawkins and Maurer (2010) found that vulnerable people in New Orleans relied on *bonding* connections for immediate sustenance support and *bridging/linking* connections from committed external actors, for example the Red Cross, for the long-term recovery and community revitalisation. In line with the view of Adger (2003), this paper contends that MCS management committees should be used, as a vehicle to foster social capital by involving local communities from the planning stage is as important as the construction of the MCS itself. Presently, MCS management committee members are appointed by local government representatives rather than being elected by the community (Mahmood *et al.* 2013). It might therefore be necessary to set up community-based governance of MCSs so that the management committees—that are locally elected rather than being driven from top-down bureaucracy—can build, maintain, and harness all three dimensions of social capital.

Secondly, the notion of maladaptation suggests that structural measures that overlook the needs of vulnerable people actually reduce the incentive for them to adapt. Ignoring the needs of the most vulnerable population, and not ensuring community participation channels, or maintenance funds, are the main factors driving maladaptation. The state of MCSs indicated that not only do the majority of MCSs not have facilities to fulfil the needs of the entire vulnerable population, but also only very few had access to maintenance funding. Poorly maintained MCSs are of little use in terms of disaster readiness or recovery. The locally elected MCS committee would at least make an attempt to integrate construction, operation and maintenance with an environment that strongly supports the social objectives of the community by providing equal and equitable opportunities for adaptation (Barrett and Baldry 2003, Kasim and Hudson 2006). The other potential utility of locally elected MCS committees is that they could—and should—be at the frontline of on-ground mobilisation machinery for non-structural measures such as relief and rehabilitation operations, including,

but not limited to: dissemination of early warning signals to the community (as issued by the Bureau of Meteorology), relocating people from disaster-affected areas into the shelters, rescuing distressed people, and providing first aid to the injured. In order for this potential to be realised the long-term operation and maintenance costs need to be factored in at the time of MCS planning, especially the new ones.

If the lack of maintenance funding is already a huge issue for existing MCSs, the 5,000 shelters planned for the future should consider maintenance funding as a part of the cost in order to avoid maladaptation. For instance, the construction of one MCS with the capacity to accommodate 1,600 people is expected to cost about \$214,000 (The World Bank 2010). It would therefore not be unreasonable to set aside 10–20 per cent of the total cost for future maintenance. In the meantime, existing shelters can promote and practice community-based social enterprise initiatives, particularly if the committees are elected locally. Social enterprises—community-based business ventures created with/for a social purpose—have been tried and tested to great success in Bangladesh (Hackett 2010). The brand Bangladesh is after-all almost synonymous with microfinance-driven social enterprise and there is no reason why this brand cannot be exploited to support adaptation measures (Hammill *et al.* 2008).

Conclusion

This paper began with an introductory overview of international aid in Bangladesh in relation to disaster risks reduction and climate change adaptation. Maladaptation in the international aid context was understood as an assistance that exacerbates vulnerability by not ensuring that the assisted projects can deliver sustained benefits. Using an exploratory research framework, the paper investigated the state of MCSs in two of the most vulnerable coastal districts in the country. The findings revealed that there is a lack of community-based mechanisms to harness social capital and ensure sustainable management of MCSs. The findings also indicate that the existing state of MCSs is maladaptive—marginalising the most vulnerable, and in doing so reducing incentives for the vulnerable to participate in adaptation. In line with Agrawala and Van Aalst (2008) and Ayers and Huq (2009), this paper contends that international aid agencies do not need radically new responses in order to avoid maladaptation; instead they need to place emphasis on implementing existing strategies to empower people from the bottom-up. There is no doubt that existing and future MCSs are vital for mitigating or minimising disaster-related risks; however, if these shelters are to be the backbone of adaptation strategies, MCS management cannot be viewed as an entity disconnected from the communities that they service. That would be maladaptive indeed. It is in this context that this paper recommends that international aid agencies equally focus on non-structural measures and catalyse a supportive environment to: institutionalise community-based MCS governance, and harness social enterprise opportunities. Meanwhile, the issues raised in this paper are a reminder that climate change adaptation in Bangladesh looks much more sanguine with MCSs catering to the needs of the vulnerable population than without them.

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