



# The state of multi-purpose cyclone shelters in Bangladesh

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## Abstract

**Purpose** – The purpose of this paper is to explore the state of management practices of existing multi-purpose cyclone shelters (MPCS) facilities across the 16 coastal districts in the country, in the context of an identified need for 5,500 new MPCS facilities in Bangladesh.

**Design/methodology/approach** – A “multi-capitals” framework – a conceptual model for appraising the state of MPCS facilities based on seven forms of capital resources – is adopted.

**Findings** – MPCS facilities are not equitably distributed across the 16 coastal districts to cater to the needs of the highly vulnerable population. Nearly 9 per cent of the existing shelters are unusable in the event of cyclones. Once built, MPCS facilities have no maintenance funding and only around 19 per cent of shelters have a governance mechanism that enables community participation. A strong correlation ( $r = 0.65$ ) was detected between the availability of maintenance funds and provision for community participation.

**Research limitations/implications** – The potential of a multi-capitals framework to assess the management practices of existing MPCS facilities in a holistic way was limited by the secondary nature of data on the four forms of capital: built, cultural, financial and political. The significance of the other three forms of capital: human, natural and social and their implications in the context of MPCS facilities are discussed.

**Practical implications** – If the existing and new MPCS facilities are to become a vital component of disaster management strategies, MPCS governance mechanisms are likely to be enhanced by embracing the principles of community-based facilities management.

**Originality/value** – The paper introduces the utility of a multi-capitals framework to assess the existing management issues surrounding MPCS facilities and offers potential solutions in the context of developing countries. The value of the framework is in understanding the utility of an MPCS as more than just a facility.

**Keywords** Climate change, Natural disasters, Community-based facilities management, Multi-capitals framework

**Paper type** Viewpoint

## 1. Introduction

A changing climate coupled with the very location of the waters of the Bay of Bengal, often the source of tropical cyclones and storm surges, make Bangladesh

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one of the most vulnerable nations in the world in terms of natural disasters. Climate change associated with the sea-level rise is predicted to further increase the frequency and intensity of natural disasters, particularly in the coastal districts of the country (Karim and Mimura, 2008). Recent census data indicates that more than half of the population in the coastal districts live under the poverty line and are highly vulnerable to natural disasters such as cyclones (UNDP, 2011). It was estimated that around 1.5 million people took refuge in multi-purpose cyclone shelters (MPCS) when Cyclone Sidr hit the coastal districts in 2007 (Paul *et al.*, 2010). Accordingly, > 2,500 MPCS facilities have already been built across coastal districts as part of disaster risk reduction strategies (CEGIS, 2009). The World Bank (2010) further estimates that there is a need for > 5,500 new MPCS facilities as an integral component of a disaster management strategy. To date, MPCS-related studies conducted in Bangladesh have generally focused on:

- disaster mitigation planning (Asgary and Halim, 2011; Mallick and Vogt, 2011; Mallick *et al.*, 2011; Paul and Routray, 2013);
- modelling, forecasting and adaptation measures (Karim and Mimura, 2008); and
- impact and mitigation measures of cyclones and storm surges (Paul, 2009, 2012).

While these studies provide important insights into the need for more MPCS facilities, there is clearly a lack of systematic review of the existing shelter management practices. This paper responds to this gap and explores the state of the existing MPCS facilities in the country based on a “multi-capitals” framework. The multi-capitals framework – a conceptual model for appraising the status of MPCS facilities based on the various forms of capital – offers a comprehensive way to explore the current management practices surrounding MPCS facilities.

The paper first provides an overview of Bangladesh in relation to its vulnerability to cyclones and the existing management practices surrounding MPCS facilities, followed by the study approach and the findings and discussions. The paper ends with the contention that the adoption of a community-based facilities management approach has the potential to maximise benefits from MPCS facilities and minimise risks associated with natural disasters.

## 2. Cyclones and cyclone shelter management in Bangladesh

With a population of > 143 million people and a population density of > 1,200 persons per square kilometre, Bangladesh is a densely populated country in the south Asia subcontinent (BBS, 2012). The country’s geographic location in the waters of the Bay of Bengal (often the source of tropical cyclones and storm surges), its low elevation and high population density make it one of the most disaster-prone nations in the world (The World Bank, 2010). For instance, on average, a severe tropical cyclone hits Bangladesh every three years and the country has been hit by 16 major cyclones with a loss of nearly 500,000 lives since the 1960s (Karim and Mimura, 2008). The ratio of casualties/population exposed to cyclones makes Bangladesh the most vulnerable country in the world in terms of cyclones (UNDP, 2004). As Table I indicates, the need to reduce cyclone-related casualties is nowhere more urgent than in Bangladesh.

The 16 coastal districts that comprise approximately 20 per cent of the country’s total landmass are home to > 30 million people (BBS, 2012). With more than half of the

population under the poverty line being vulnerable to natural disasters (UNDP, 2011), the extent of human casualties in areas without MPCS facilities can be much higher in the coastal districts (Paul *et al.*, 2010). Consequently, MPCS facilities are considered an important component of not only disaster management strategies but also overall community well-being (Paul and Routray, 2013). These shelters differ from other public buildings in the sense that they serve a dual purpose: schools, markets or health centres under normal conditions and refuges for people during and after cyclones (Choudhury, 1994; Khan, 2008).

Typically, MPCS facilities are multistoried, with reinforced concrete buildings that can on average accommodate 1,600 people. These shelters 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; The World Bank, 2010).

The main agency responsible for constructing and operating MPCS facilities is the Disaster Management Bureau (DMB) which operates within the Ministry of Food and Disaster Management. Under the supervision of the DMB, the hierarchical structure of shelter management is the *zila* (district level) disaster management committee, *upazila* (sub-district level) disaster management committee, *union* (village-unit level) disaster management committee and the MPCS management committee (MoEF, 2008). The MPCS management committees are generally involved in relief and rehabilitation operations, such as dissemination of early warning signals to the community issued by the meteorological department, relocating people from disaster-affected areas into the shelters, rescuing distressed people and providing first aid to the injured. The committees operate with support from the governmental program called the Comprehensive Disaster Management Programme (CDMP). The CDMP specifically provides assistance in terms of capacity building and awareness initiatives of MPCS facilities through the various levels of hierarchical bureaucracy. Some of the MPCS management committees have been active under the guidance of the cyclone preparedness programme of the Red Crescent Society since 1973. While the programme has trained > 40,000 volunteers in community-level preparedness and response in coastal areas, programme coverage is more or less limited to only 30 *upazilas* of highly vulnerable coastal districts. It is therefore widely speculated that MPCS management committees are mostly functional only in districts where the Red Crescent programme exists (CEGIS, 2009).

The MPCS management committee generally comprise local elites. The prevalent perception amongst the general public seems to be that MPCS facilities are government

Vulnerable countries	Deaths/100,000 people
Bangladesh	32.1
India	20.2
Philippines	8.3
Honduras	7.3
Vietnam	5.5
China	2.8

**Table I.**  
Cyclone-vulnerable  
populations

Source: UNDP, 2004

facilities, and therefore their management should be the sole responsibility of the government. Furthermore, the DMB has been found to be indifferent to regular monitoring and assessment of the integrity of MPCS management committee structures and activities (SDC, 2010). Nevertheless, the existing accumulated capacity of MPCS facilities is such that they can accommodate only about 8 per cent of the total coastal population (MoEF, 2008; UNDP, 2009). The need for building more MPCS facilities in the coastal districts resonates well with the The World Bank's (2010) recommendation to build > 5,500 new MPCS facilities. However, this paper argues that it is necessary to examine and appraise the current management practices of the existing shelters before allocating scarce resources to build more facilities for the sake of it.

### 3. Method

The central research question that this paper addresses is: "How are MPCS facilities in Bangladesh being managed and how can this be improved?" The paper makes use of an exploratory research approach to assess the state of MPCS facilities in Bangladesh. The approach is particularly useful to clarify the problem space (Ghauri *et al.*, 1995). While the outcomes of exploratory research may not always influence the decision-making processes right away, they have the potential to provide significant insights and directions into the future. It is in this context that the paper utilises the multi-capitals framework as an exploratory appraisal tool for scrutinising the current management practices of MPCS facilities.

The multi-capitals framework identifies a variety of capital assets that individuals or organisations can build up and/or draw upon to accomplish identified goals. Flora *et al.* (2004) view capital as a resource or asset that can be used, invested or exchanged to create new resources or assets. Assessing community inputs in designing, implementing and evaluating *resources* or *assets* with a multi-capitals lens has been well accepted in the literature (Bebbington, 1999; Ellis, 2000; Dhakal, 2011a). The basic premise behind this framework is that harmonious linkages amongst different forms of capital can not only provide a tool to examine whether certain goals are being accomplished but also whether such accomplishments are meaningful to the community. The flagship work of Flora *et al.* (2004) incorporates seven different types of resources under the label "community capitals" as a way to analyse community initiatives (Table II). This paper describes various forms of capital and proposes contextual indicators in managing MPCS facilities. In particular, the benefit of using the multi-capitals framework is that once the various forms of capital have been assessed, such assessment can be used as a planning tool to identify and implement future interventions (Flora *et al.*, 2004).

The 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, is used as a source for secondary data analyses through the multi-capitals lens described above. In addition, 2011 census data of the Bangladesh Bureau of Statistics have been used in calculating the ratio between populations vulnerable to cyclones and cyclone shelters.

### 4. Findings

Data analyses indicate that the existing MPCS facilities are not equitably distributed across the 16 coastal districts, and thus do not reflect the needs of highly vulnerable

Capital	Descriptions	Indicators in the context of MPCS
Built	Physical assets including material infrastructure and man-made assets (Flora <i>et al.</i> , 2004)	Usability of facilities, e.g. operation and maintenance of MPCS facilities
Cultural	The way people understand the world and how they interact with it as well as their traditions and language (Throsby, 1999)	Gender-related issues that influence the way MPCS facilities are managed
Financial	Money or wealth that facilitates productivity (Goodwin, 2003)	Availability of funds to maintain facilities
Human	Skills and competencies that make people act in productive ways (Coleman, 1988)	Know-how of beneficiaries to manage and use facilities in a time of need
Natural	Resources that reside in a certain place (e.g. land, water, organisms) in the natural environment which provide environmental benefits through ecosystem services (e.g. forests, wetlands) services such as clean air and fresh water, or aesthetic pleasure (Costanza <i>et al.</i> , 1997)	Protection, restoration and management of terrestrial or marine ecosystems that have a direct or indirect influence on the way facilities are needed, built, maintained and used
Political	Ability to access power, connect to resources and power brokers in order to voice concerns and be heard (Aigner <i>et al.</i> , 2001)	Community participation in MPCS management committees
Social	Features of social organisations, such as trust, norms and networks, that can improve the efficiency of society by facilitating coordinated actions (Putnam, 2000)	Relationships within and between communities

**Table II.**  
A snapshot of various forms of capital

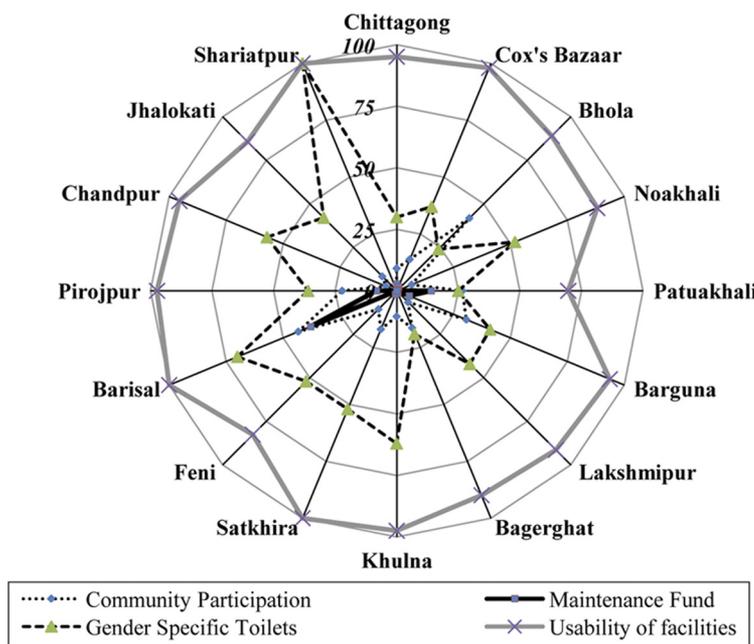
populations (Table III). For instance, the Noakhali district with a highly vulnerable population of 1,807,000 has an existing shelter capacity for accommodating only 266,000 people. That means the existing MPCS facilities cannot provide refuge to 85 per cent of the vulnerable population in a time of need. Conversely, the Khulna district with a zero highly vulnerable population has the shelter capacity to accommodate 76,000 people. These results suggest that the existing MPCS facilities may not be strategically located and hence are inequitably distributed.

Four specific forms of capital (i.e. built, cultural, financial and political capital) within the multi-capitals framework are applied to the available data to assess the state of MPCS facilities. Figure 1 reveals several interesting observations. First, while the majority of MPCS facilities are usable, nearly 9 per cent of the existing shelters (246 out of 2,829) are unusable in the event of cyclones. The shelters are considered unusable if the Center for Environmental and Geographic Information Services (2009) reported that their structural condition is beyond repair. In particular, nearly one-third (30.4 per cent) of MPCS facilities in the Patuakhali district are unusable. Second, only one district – Shariatpur – has separate toilet facilities for women in all of its MPCS facilities; only 19 per cent of MPCS facilities in the Bagerghat district have separate toilets. It is evident that most of the existing MPCS facilities in general do not accommodate the culturally sensitive needs of women. Consequently, it is not unusual for women to not use the shelters due to the lack of essential amenities. Third, once built, an overwhelming majority (97 per cent) of the MPCS facilities do not have adequate maintenance funds at their disposal.

Vulnerable coastal districts	Highly vulnerable area (per cent) <sup>a,c</sup>	Highly vulnerable population (Estimated in '000) <sup>b,d</sup>	Number of usable shelters <sup>c</sup>	Existing capacity of shelters (Estimated in '000) <sup>c</sup>	Net difference in shelter capacity (Estimated in '000)
Chittagong	18.83	1,414	573	683	731
Cox's Bazaar	19.42	442	504	607	-165
Bhola	65.79	1157	429	390	767
Noakhali	58.82	1807	245	266	1,541
Patuakhali	54.83	832	165	157	675
Barguna	22.01	194	147	147	47
Lakshmipur	47.32	810	106	118	692
Bagerghat	21.62	316	98	86	230
Khulna	0.00	0	77	76	-76
Satkhira	0.00	0	65	55	-55
Feni	48.71	692	57	61	631
Barisal	30.23	693	37	41	652
Pirojpur	0.99	11	36	32	-21
Chandpur	1.88	45	21	26	19
Jhalokati	0.00	0	12	7	-7
Shariatpur	1.10	13	11	14	-1

Notes: <sup>a</sup>Prone to storm surges of > 1 metre; <sup>b</sup>Population residing in the area prone to storm surges of > 1 metre; <sup>c</sup>CEGIS (2009); <sup>d</sup>BBS (2012)

**Table III.**  
Capacity of MPSC facilities in 16 districts of Bangladesh



Source: CEGIS, 2009

**Figure 1.**  
The state of MPSC facilities in 16 coastal districts of Bangladesh

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Although more than one-third (37.8 per cent) of MPCS facilities in the Barisal district have an allocated maintenance fund, MPCS facilities in the rest of the districts do not. Finally, about 81 per cent of MPCS facilities do not have a governance mechanism that encourages community participation – ultimately undermining the inputs of potential users of the facilities.

Although there is no single district that is doing better than the others in all four capital aspects, there is a strong correlation ( $r = 0.665$ ;  $p = 0.005$ ;  $n = 16$ ) between MPCS facilities having community participation mechanisms and maintenance funds. While it is necessary to be cautious in establishing the causal relationships between variables based on the correlation coefficients alone (Cohen and Lea, 2004), the strong correlation between these two variables indicates the potential for MPCS governance to be enhanced by increasing the number of MPCS facilities with access to maintenance funds and institutionalised community participation.

## 5. Discussion

Although it was not possible to make use all of seven forms of capital under the multi-capitals framework due to the limitations of secondary data, the state of MPCS facilities captured in terms of built, cultural, financial and political resources clearly demonstrates the lack of governance mechanisms to improve MPCS service delivery. More importantly, as Paul and Routray (2013) indicate, the interrelated aspects of human, natural and social capitals are equally vital for making the most of MPCS facilities. For instance, the Bangladesh Red Crescent Society in collaboration with government agencies has been training management committees in relation to disaster preparedness and management (IFRCRCS, 2012). However, skills and competencies of committee members required to manage MPCS facilities during normalcy as well as in the event of cyclones have not received adequate attention. In this regard, the role of social capital is particularly important for enhancing the outcomes of community-oriented intervention (Putnam, 2000). Because there is generally a positive association between social capital and outcomes of community-based initiatives (Dhakal, 2011b), the ways in which committees build and maintain relationships within and outside the communities that they serve are significant for building capacity of facility managers and or volunteers. For instance, MPCS management committee members are currently chosen by local government representatives on their own discretion instead of being elected by the community. It might therefore be necessary for the MPCS management committees to consider ways to harness community relationships as a core element of facilities management (Ngowi and Mselle, 1998). The aspects of natural capital in the context of MPCS facilities could range from climate change mitigation strategies at the global scale to mangrove restoration in coastal districts at the local level. For instance, a total of 88 MPCS facilities have been destroyed or dismantled because of the loss of natural capital; for example, river erosion in the vicinity of the shelters (CEGIS, 2009). This is clearly an indication of the lack of integration between environmental strategies and the construction of MPCS facilities.

The management of a facility such as an MPCS is about integrating operation, maintenance, improvement and adaptation of the built capital to create an environment that strongly supports the social objectives of the community (Barrett and Baldry, 2003;

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Chotipanich, 2004; Kasim and Hudson, 2006). The governance mechanism for managing facilities, particularly in developing countries such as Bangladesh, cannot be disengaged from the community that it intends to serve. MPCS facilities therefore need to be governed by the principles of community-based facilities management, which is defined by the relationship of management committees to the wider stakeholders of MPCS facilities (Alexander and Brown, 2006; Moore and Finch, 2004). The term governance captures a shift from the traditional hierarchical structure towards a horizontal decision-making process in which formal and informal relationships amongst various stakeholders – the private sector, government representatives and community stakeholders – are valued (Dhakal, 2011b). In other words, MPCS governance is likely to function better when those responsible for managing the facilities invest in strategic relationships with community stakeholders rather than acting unilaterally. For instance, Alexander (1996) suggests that facilities management will only be effective when management incorporates the needs of end users and has a social focus regarding the delivery of desired services. The contention of this paper is that the utility of a multi-capitals framework in assessing and guiding MPCS management practices lies in its potential to insightfully inform governance mechanisms for community-based facilities management and allow optimised delivery of MPCS services to the community.

## 6. Conclusion

This paper began with an introductory overview of cyclones and cyclone shelter management in Bangladesh. The data analyses indicated that there is an incongruous emphasis on building shelters for the sake of building, instead of ensuring appropriate governance mechanisms are used to engage communities in shelter management and stewardship. While the construction and operation of MPCS facilities are the responsibility of government agencies, these agencies do not have clear guidelines for the day-to-day management of MPCS facilities. More importantly, MPCS management committee members are not elected by the community that the committee intends to serve. Based on these findings, this paper contends that for MPCS facilities to effectively and inclusively serve the needs of communities they need to be engaged in MPCS governance. The fact that nearly one-tenth of the existing shelters are already unusable, combined with The World Bank's (2010) recommendation to build > 5,500 new shelters certainly calls for a new governance approach to holistic management of MPCS facilities rather than just building new shelters. This paper sees value in incorporating a multi-capitals framework with a community-based facilities management lens for enhancing MPCS governance. If the lack of maintenance funding is already an issue for current MPCS facilities, future shelters must factor in the cost of operation and maintenance during the planning phase. Drawing on already constrained budgets, economic analyses have demonstrated that developing and replacing existing, and often aging, public facilities (AAMCoG, 2011), such as MPCS facilities, is an increasingly expensive process for developing countries. There is no doubt that the existing and new shelters are vital for mitigating or minimising the casualties of vulnerable populations in the event of natural disasters. If cyclone shelters are to be the backbone of disaster management strategies in Bangladesh, then MPCS facilities cannot be viewed simply as facilities disconnected from the communities they service. This paper recommends that MPCS governance might benefit from:

- democratically electing the management committee;
- incorporating community needs and requirements in designing the facilities and finalisation of proposed shelter locations; and
- focusing on skills and competencies of the management committee to ensure holistic shelter management.

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