

## Building Community Resilience to Coastal Disasters: A Case Study of Cyclone Sidr in Bangladesh 2007

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### Abstract

The devastating consequences of ineffective implementation of community-based disaster risk reduction plans in coastal areas can be nothing short of disastrous. In order to maximize the chances of success when facing such a catastrophe, understanding the measures adopted by coastal communities is an important part of increasing resilience and preparing for disasters. This study looks into the actions taken by the coastal areas of Bangladesh in response to the 2007 Cyclone Sidr. Utilizing a scope review of the events, we can analyze the underlying causes of loss, while also determining the critical challenges government organizations or relief organizations may be confronted with. Through our research, we aim to provide policy makers and practitioners with advice on how to better address the requirements of coastal communities during times of future crises.

**Keywords:** Communities, Resilience, Disaster management, Cyclone, Sidr

### Introduction

The ever-evolving field of disaster management necessitates effective preparation and response strategies to confront emerging risks and threats. Over the years, great advances in technology and tools have improved the field, however, it is paramount to look back to previous policies that have come from prior disasters (Nghia, Pal, Chollacoop, et al., 2022; Nghia, Pal, Pramanik, et al., 2022). With an increasing frequency of extreme events and natural disasters, disaster management organizations must use hindsight to gain insights for future policy development. Reflecting upon past disaster events, understanding the important points that led to the disaster, and strategizing future protocols and policies can better equip disaster management organizations to be proactive rather than reactive in confronting future events.

In the wake of the devastating Cyclone Sidr of 2007, Bangladesh experienced a tremendous loss of lives, property, and livelihoods (Ministry of Food and Disaster Management, 2008). The storm highlighted the need for improved disaster management and social work in this low-lying and often flood-prone region. At the time, the country was ill-prepared to address the immense destruction caused by the cyclone. Poor coordination of aid and rescue efforts, lack of communication and warning systems, and inadequate supplies rendered thousands of people stranded and vulnerable (Ministry of Food and Disaster Management, 2008; Paul, 2009; Tasnim et al., 2015). This tragedy, however, not only devastated the local communities of Bangladesh, but also catalyzed a newfound era of disaster management and social work. In the wake of this calamitous event, citizens exhibited impressive resilience and solidarity as they joined forces to restore their dwellings (Ahsan & Özbek, 2022; Haque et al., 2021; Karim & Lin, 2021). To meet the demands of their situation, they developed volunteer

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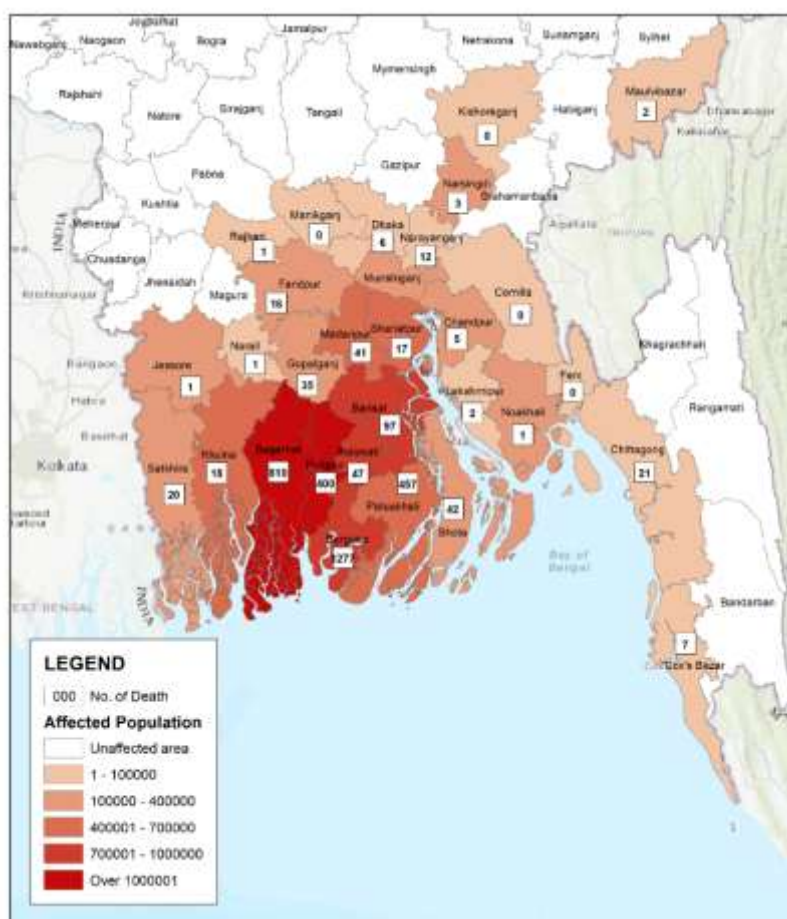
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systems to identify and prioritize needs, such as search-and-rescue operations, medical aid, and the provision of food and water supplies. This demonstration of collective effort to facilitate post-disaster development served as a teaching moment for Bangladesh and other cyclone-exposed regions, highlighting the necessity for a well-prepared, organized response by disaster-management and related organizations.

The devastating effects of Cyclone Sidr, which occurred in 2007, have had a lasting impact on Bangladesh, sparking a national conversation regarding disaster management. This scope review sets out to uncover potential contributing factors influencing emergency response systems, such as volunteer systems, during times of crisis. Through the careful analysis of these components, the study will look to gain a deeper understanding of the social, environmental, and economic factors which have resulted in either effective or ineffective management of disaster-related activities. With this understanding, policymakers and researchers can be better informed when developing preparedness and response plans in the future.

**Figure 1** Most affected areas by Sidr



Source: Developed by authors with extracting data from Disaster Management Information Centre Disaster Management Bureau (DMB) (Ministry of Food and Disaster Management, 2008).

### The Incident of Cyclone Sidr

Cyclone Sidr was a tropical cyclone that hit coastal areas of Bangladesh. It resulted in heavy rain and winds speeds that peaked at 59 m/s (Tasnim et al., 2015) during November 11-16, 2007. The cyclone significantly impacted 12 districts. The major affected areas were Borguna, Bagerhat, Patuakhali and Pirozpur. Other most affected districts were Barisal, Khulna, Satkhira, Jhalokathi, Bhola, Madaripur, Gopalganj, Shariatpur etc (Ministry of Food and Disaster Management, 2008). Details are

shown in Figure 1. On 21 January 2008, the Government of Bangladesh (GoB) official reports indicated that more than 8.9 million people were affected, including 3,406 people killed, 1,001 missing and 55,282 injured.

Taking into consideration the affected districts in terms of death toll, the Government initially classified levels of damage in order to provide proper assistance. Table 1 summarizes the major impact and the responses from respective agencies.

**Table 1** Impact and Response of the disaster

Affected factors	Major Response Action
Food security	The Government immediately distributed rice and packets of dry food to the affected area by road or via airdrops both during and after the disaster period.
Water and Sanitation	After the disaster took place, the respective agencies distributed jerrycan/cleaned drinking water and installed water purifiers in affected districts.
Shelter	The government compensated housing damages for poor and vulnerable families. In addition, many international agencies provided funding and financial aid to the government for reconstruct of damaged houses
Health and Nutrition	Relevant agencies stocked medical supplies and medical personnel were dispatched to areas in advance in order to be ready for early response.
Community Infrastructure	The relevant agencies conducted a rapid damage and need assessment and began repairing damaged infrastructure.
Inland Water Transport	The respective agencies continued searching and rescuing activities for missing and dislocated people. .
Electricity	Repair was prioritized to partially damaged sub stations. They were completely repaired within one month after the cyclone.
Telecommunication	The respective agencies repaired and restored the telecommunication systems located in the most affected districts first,
Education	Damage assessment was completed to take necessary actions for rehabilitation and reconstruction of the affected school buildings.
Livelihoods	- Government compensated poor and marginal farmers (cultivating 40 percent of the damaged crop area) with BDT 15,000 for each hectare of land. - A Medical Team formed in each cyclone affected area ran a vaccination programme for livestock.

Source: summarization from the Ministry of Food and Disaster Management (2008).

### Major Contributors to the Loss

The great Sidr cyclone created a devastating impact on the coastal region of Bangladesh, leading to widespread destruction and loss of life. The tremendous losses resulting from this cyclone were mainly due to inadequate preparedness and response. This included a poor early warning system, inadequate infrastructure and shelters, and inadequate government collaborations.

- Ineffectiveness of early warning system and risk identification

Despite warnings being issued by the relevant agencies in a timely manner, there was much doubt as to the accuracy of these predictions (Ministry of Food and Disaster Management, 2008). False alarms regarding a tsunami in the weeks prior to the cyclone incidents had caused people to distrust the warnings. Furthermore, many of those in the community did not understand the technical language of the signals, so were unsure of the level of risk and what actions needed to be taken. This made it difficult for the warnings to be communicated to the general public.

Furthermore, the forecasting and warning systems for Cyclone Sidr were ineffective in accurately predicting the intensity of the cyclone (Kumar et al., 2011). This led to many of the most vulnerable areas of Bangladesh being inadequately prepared for the destruction that the cyclone. As a result, many people living in coastal areas were unaware of the impending danger and destruction they were facing. In addition, taking into consideration affected population in 12 districts, it was highlighted that most of the affected population were distributed in different districts than the district with the highest death toll, i.e. Barguna district (Ministry of Food and Disaster Management, 2008). This difference was thought to result from the government putting more concentration of effort and resources in particular areas that were less affected by the cyclone. This could imply that the risk assessment in terms of function and location of hazards were not effective.

- Poor community infrastructure

Cyclone Sidr is a tragic example of how poor community infrastructure can lead to increased destruction in natural disasters. Many believe that the destruction caused by Sidr could have been avoided if there had been better infrastructure in place to help people cope with and survive the storm. Most of the coastal areas of Bangladesh are very poor, and the infrastructure was simply not strong enough to withstand the strong winds and rain of the cyclone (Ahsan & Özbek, 2022). Houses made of mud and bamboo were easily destroyed. According to the outcomes of the survey by Paul (2009), many people who were in the Barguna district could not receive warnings or evacuation signs or orders because of the loss of power and/or a lack of workable batteries. Many volunteers had to use sirens to warn coastal residents of the impending danger.

The local infrastructure had long been in a state of disrepair before the cyclone hit, making it harder for the locals to access the support and supplies they needed in the aftermath of the disaster (Paul, 2009). The damage was compounded by weak housing, a lack of community services and resources, and inadequate communication infrastructure, leaving the local population without access to essential aid (Haque et al., 2012; Pathirage, 2011). As a result, the destruction of cyclone Sidr was felt much more deeply by Bangladesh than other parts of the world, due to its poor community infrastructure.

This lack of infrastructure has had serious implications for the country since the cyclone. There has been an increased number of disasters and death rates in Bangladesh since the cyclone, indicating that the lack of infrastructure has not been properly addressed (Alam & Collins, 2010; Mallick et al., 2011). This has led to a rise in poverty in the country, as those affected by the cyclone were unable to rebuild and secure necessary resources. Additionally, Bangladesh's recovery from the cyclone has been likely slower than that of other parts of the world, suggesting that its infrastructure was not sufficiently equipped to respond to the cyclone's impact (Islam et al., 2021; Rokonuzzaman & Hattori, 2021).

- Inadequate and poor conditions of shelter

As reported, only 30% of the coastal area had access to shelters that were sufficient to accommodate people in the region. In some coastal zones, these shelters are located at a distance of more than 3.5 miles (5.6 km) apart and would have been too far away for coastal residents to reach during the emergency. (Paul, 2009). Furthermore, a survey conducted in 2004 by the Centre for Environmental and Geographic Information (CEGIS) on 1,705 shelters identified that many were deficient. (Ministry of Food and Disaster Management, 2008). Moreover, most of the shelters had no provision for the shelter of livestock (Islam et al., 2011). It resulted in some people being unwilling to move to the shelter as they had to leave their cattle behind (Paul, 2012).

- Ineffective information sharing and database

The respective government agencies observed that many agencies had not implemented a decentralized relief management system, tending instead to manage agency actions from Dhaka (Ministry of Food and Disaster Management, 2008). This resulted in very few deployed on-site liaison officers to the severely affected area to obtain updated information. This lack of on-site personnel meant that the agencies were unable to effectively coordinate the delivery of relief materials and services to the local people, leading to increased levels of frustration and discontent among the local population

(Rathore et al., 2012; Ullah & Hasan, 2010). Furthermore, the absence of on-site personnel meant that the agencies were unable to gather accurate, up-to-date information about the situation on the ground, leading to poor decision making and inadequate responses to the crisis. Ultimately, this lack of decentralized relief management systems hindered the effective implementation of relief efforts. This also delayed the decisions on emergency cases which resulted in a prolonged period of suffering for the people of the affected area.

### **Critical Challenges for Post Disaster Management**

Even though economic losses from tropical cyclones are unavoidable in Bangladesh, the Sidr Cyclone event made it more crucial for the Bangladesh government to develop and implement improved efforts or programmes to cope with disasters. After the cyclone took place, the government made some progress in its disaster preparation and prevention initiatives, particularly by increasing the resilience of the risk communities (Tasnim et al., 2015). One example of this progress was the development of the Cyclone Preparedness Programme (CPP) (Ministry of Food and Disaster Management, 2008). This programme encouraged the communities to be a part of the early-warning system for cyclones. Volunteers from communities were trained to provide the early warning to remote area, to provide first-aid and distribution of relief goods, and to assist people in evacuation. Moreover, due to high levels of illiteracy, the programme adopted and improved the use of sounds and symbols for effective information transfer during the disaster period. In terms of infrastructure improvement, the country improved storm surge countermeasures such as cyclone shelters and embankments across low-lying areas. The construction of multi-purpose cyclone shelters increased rapidly from 512 in 1992 to 3976 in 2007 covering 30% of the coastal region (Paul, 2009). The government also planned to build, upgrade, and repair the embankments including water control structures and drainage irrigation along the coastal which was approximately affected by 2,290 km from 5,000 km (Government of Bangladesh, 2008).

Although the government is taking big steps to improve the country's disaster management capacity, there are still many challenges to face due to several countries' socio-economic influences.

Upcoming challenges are identified as follows:

- **Risk Identifications**

Risk identification is one of the important steps of pre-disaster management. As mentioned above, there is strong indication that the country needs more improvement on hazard and risk assessments. This is demonstrated by the affected areas and death tolls being higher than expected, mainly due to ineffective monitoring and forecasting systems and their inaccuracy on the magnitude and location of the disaster.

Also, it was noticed that an assessment of vulnerability in the risk area was unsuccessful as a result of incompletely integrated collaboration among the stakeholders in the areas. Bangladesh is an extremely vulnerable country in terms of economic factors, particularly household income. Most people live in poverty and only rely on one source of income, usually resulting from livestock and agricultural products. Therefore, during the early warning stage, many people did not fully follow the instructions from the government as they were concerned about their cattle, property or farming. They were not guaranteed to be compensated for the loss of these in aftermath of the cyclone event.

These challenges must be addressed while formulating the disaster plan. The concept of socio-economic integration should be inclusively investigated and analyzed by the government to gain deeper understanding on economic costs and the basic needs of vulnerable people who live in those risk areas. This could ensure that the people will fully participate when there is another disaster.

- **Household Poverty**

One challenge is the lack of knowledge and access to information on the risk awareness measures. Many people in poverty-stricken areas may not have access to the internet or other sources of information on risk prevention, leading to a lack of understanding on how to best protect themselves.

This resulted in misunderstanding the message of early warning sent by the respective agencies. Another challenge resulting from household poverty is the lack of resources to enable people to participate in preventive measures. Many people in poverty-stricken areas lack the financial resources to purchase protective gear or even the basic supplies needed to properly practice preventative measures. Finally, the lack of access to healthcare services in poverty-stricken areas can make preventive measures even more difficult, as people may not have access to medical care if they contract a disease or illness.

In order to address these challenges, the government should take steps to make sure that people in poverty-stricken areas have access to accurate and comprehensive information about risk prevention. This could include providing resources, such as pamphlets or workshops, to help people understand how to protect themselves from the dangers of their environment. In addition, the government should provide incentives for people in poverty-stricken areas to access preventative care and use protective gear, such as masks, gloves, and protective clothing. To further increase access to preventive measures, the government should also encourage local organizations to partner with modern healthcare providers. This could include helping to fund healthcare clinics in poverty-stricken areas, or providing resources to help local organizations develop partnerships with healthcare providers. By taking these steps, the government can ensure that people in poverty-stricken areas have access to the preventive measures they need to stay safe and healthy.

- Contingency and Preparedness Plan

When examining the facilities available to accommodate and support vulnerable communities, it was apparent that the country's contingency and preparedness plans did not reflect the actual needs of the communities. This was evidenced by the fact that the shelters provided by the government were not suitable for the local community, failing to take into account gender issues, livestock concerns, and other unique characteristics of the community. For example, a shelter in a rural, agricultural village did not take into account the need to house livestock or provide separate facilities for men and women, both of which are essential components of the community. Therefore, it is important for the country's contingency plan and preparedness plan to be more reflective of the local community's needs. To do this, the government should look into providing more gender-sensitive shelters, as well as shelters that are equipped to support livestock. Additionally, the government should provide resources to help communities better prepare for natural disasters, such as providing evacuation kits and training for emergency responders. With this step, the government can ensure that the at-risk communities are better supported and prepared for natural disasters.

- Emergency Response

In view of the emergency response, most of the government actions were performed well in terms of management during the disaster. This included quick responses or actions on disaster management such as rapid classification of affected areas, good infrastructure support with limited resources, and dissemination of volunteers.

Major problems included communication in both affected people to the government and the government to the government. This resulted from limited country infrastructure and resulting poor communication and inaccurate report figures. To ensure effective coordination and management of future disaster, the monitoring and evaluation system should systematically track the key interventions and process in order to support the relief or recovery process. Moreover, the early warning system still requires development. People still have less understanding about technical words in the system. Also, the warning event are not reliable on some occasions. To ensure the effectiveness for further disaster management, the government must understand physical needs and characteristics of the communities.

- Rehabilitation

Because the country has experienced many disasters, it has strong cooperation and collaboration with international agencies and NGOs. This would help the country to quickly recover or rehabilitate in affected or damaged areas. However, improving and repairing community infrastructure is an upcoming challenge as the government had limitations on budget. Effective and strategic recovery

and reconstruction plans for the at-risk communities over the medium- to long-term needs to be enhanced in order to ensure that the assistance is brought to everyone in need, in particular those in remote and inaccessible areas. This would reduce loss of life and livelihood and promote rapid recovery following future disasters.

### Conclusion

Although Bangladesh is a low-lying country, which makes it particularly vulnerable to such events, it could not cope with the magnitude of destruction caused by Sidr. Poor preparedness, inadequate relief measures, ineffective communication of disaster risk, and failure to establish evacuation procedures resulted in heavy losses in the affected communities. In the aftermath of the cyclone, NGOs and government agencies both struggled to coordinate their responses, resulting in the rescue efforts being delayed. This cost lives and heightened the risk of further death from disease and dehydration caused by lack of potable water, food and shelter.

Moreover, in a region of the world where human capital is the key productive resource, loss of education, lack of resources and displacement severely undermined recovery efforts. And while the country's emergency preparedness programs were improved, large numbers of rural populations were excluded from emergency response services.

Cyclone Sidr highlighted the inadequacies in disaster risk management and relief responses in Bangladesh, which resulted in enormous destruction to affected communities. It also underscored the need for better coordination among governments, civil society organizations, NGOs and local communities, particularly with respect to preventing disasters from recurring. Moving forward to increase community resilience, there is a need to increase investments in infrastructure to make it more resilient, identify risk factors, improve disaster risk governance and improve community access to essential resources and services. Only then will the devastating effects of a cyclone such as Sidr be minimized.

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