

## **Reducing Cyclone Impacts in the Coastal Areas of Bangladesh: A Case Study of Kalapara Upazila**

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### **Abstract**

Cyclone has both direct and indirect effects on human life and socio-economic development of a country. Bangladesh is one of the most cyclone prone countries in the world. The geographical location and climatic condition of the country are responsible for cyclone and other natural disasters. During the last 100 years, Bangladesh has experienced 53 major cyclones. Though cyclone affects almost every part of the coastal Bangladesh, but intensity and frequency of cyclone is dangerous in Kalapara Upazila of Patuakhali district. This Upazila is more vulnerable to cyclone than other places of the district. Due to poor disaster management system and ignorance of the physical plan, every year the country has experienced not only huge economic lose but also lives. The paper is an investigation into the cyclone damage scenario and scope of reducing the impacts of lives and properties. The paper makes some recommendations on the existing and proposed physical planning activities and plans of the Upazila to ensure effective cyclone management and sustainable physical development.

### **Introduction**

Bangladesh currently ranks as one of the world's foremost disaster prone country. The situation is aggravated, all the more by its being the most densely populated country in the world (Choudhury, 2007). Every year, natural calamities upset people's lives in some parts of the country. The extreme natural events are termed disasters when they adversely affect the whole environment, including human beings, their shelters, or the resources essential for their livelihood. The geographical setting of Bangladesh makes the country vulnerable to natural disasters (MoEF, 2005). The mountains and hills bordering almost three-fourths of the country, along with the funnel shaped Bay of Bengal in the south, have made the country a meeting place of life-giving monsoon rains, but also make it subjected to the catastrophic ravages of natural disasters. Its physiographic setting and river morphology also contribute to recurring disasters. The major disasters that are concerned here are the occurrences of flood, cyclone and storm surge, flash flood, drought, tornado, riverbank erosion, and landslide (Hossain, 2008). Among these disasters, cyclone is considered as the major and most devastating disaster to the human habitation of this country.

The unique natural setting of Bangladesh and the characteristics of tropical monsoon climate in South Asian subcontinent are greatly responsible for the cyclone hazards in the country. The Bangladesh coast is the most hazardous coast in the world in terms of the number of people who suffer from various types of cyclone and cyclonic surges every year. When the annual cyclones roar in, hundreds and sometimes thousands of people are swept away (Faisal, 2012). Of the 508 cyclones that have originated in the Bay of Bengal in the last 100 years, 17 percent have hit Bangladesh, amounting to a severe cyclone almost once every three years. Of these, nearly 53 percent have claimed more than five thousand lives (Khalequzzaman, 1976). Patuakhali district is

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one of the most vulnerable to cyclone in the country. The past record shows that every cyclone that passed through Bangladesh must hit Patuakhali district. Among the Upazilas of Patuakhali district, Kalapara Upazila is the most vulnerable to cyclone hazard.

Every year, the country experiences huge amount of losses (both monetary and lives of people and cattle) caused by several disasters, because of lack of proper preparedness and disaster management measures (Rashid, *et al.*, 2004). To date, the structural measures so far undertaken at both national and local level to mitigate cyclone has been inadequate and often inefficient. Recently, some non-structural measures like forecasting, warning, local action plans etc. are taken up in a short scale, as it is rather strongly believed that non-structural mitigation measures need to be complemented by structural mitigation measures in order to modify or reduce some disaster effects (Rahman, *et al.*, 2002). In spite of these structural and non-structural measures of disaster management, every year the country has to suffer a huge damage. It is evident from many studies that like many other places of the country, at Kalapara Upazila of Patuakhali district, both the approaches (structural and non-structural) of cyclone mitigation are not quite successful due to several reasons. The ultimate result is the huge damage of resources and enormous sufferings of the people by this natural calamity.

### Study Area

Kalapara Upazila is one of the most cyclone prone Upazila in South-western Bangladesh. It lies between 21°48' and 22°05' North latitude and between 90°05' and 90°20' East latitude (BBS, 2006). Kalapara Upazila is bounded by Amtali Upazila of Barguna district on the north, the Bay of Bengal on the south, Rabnabad channel and Galachipa Upazila on the east, Amtali Upazila on the west (Banglapedia, 2011). The Upazila is blessed with the sea resort, the Kuakata sea-beach. The total area of Kalapara Upazila is 483.08 square kilometers and population is 202078 where 104399 is male and 97679 is female. Kalapara Upazila consists of 9 union parishads, 58 mauzas, 217 villages, 1 paurashava, 9 paura wards and 24 mahallas (BBS, 2006).

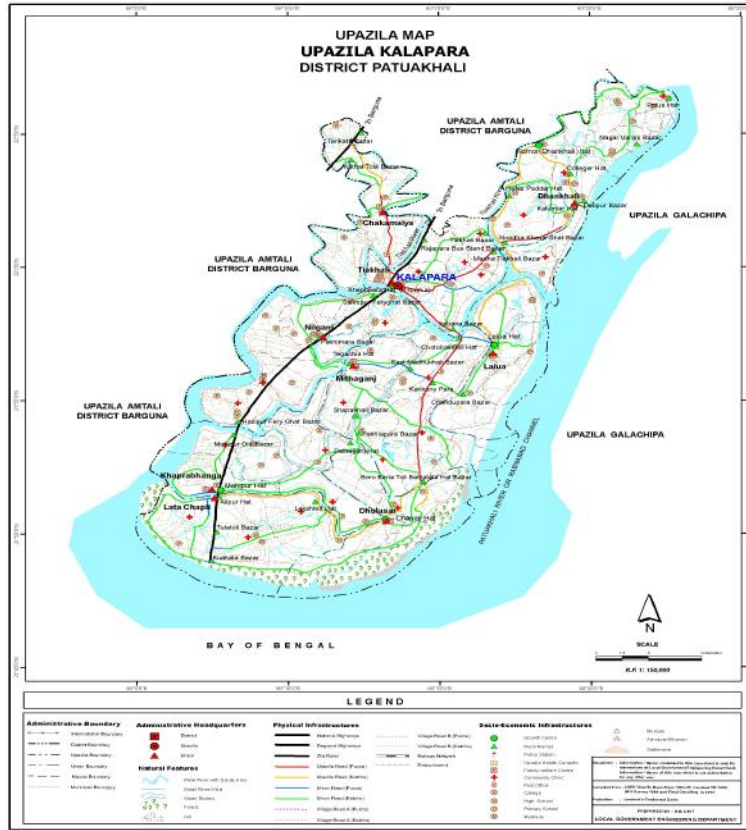
### Objectives and Methodology of the Study

The aim of this study is to focus on the existing cyclone management measures of Kalapara Upazila and identify the weaknesses of these measures. Finally it tries to propose some strategies from planning perspective to reduce the impacts of cyclone in the study area along with all the coastal districts of the country.

This research is mainly based on both primary and secondary data and information. The primary information for this research was collected through empirical field observation and interview. A questionnaire survey was conducted among 100 sample households. Purposive sampling method was adopted. Data and information was also collected from different relevant organizations, such as Disaster Management Bureau, Patuakhali Zila Parishad, Kalapara Upazila Parishad, Upazila Disaster Management Committee, local NGOs etc.

### Conceptual Issues

**Cyclone:** Cyclone is a tropical storm or atmospheric turbulence involving circular motion of winds. Cyclone is always formed over the sea, where the water is warm and when a cyclone moves across the coastline over to land, it loses its sources of energy and begins to disappear. Technically a cyclone is an area of low pressure where strong winds blow around a centre in anticlockwise direction in the Northern Hemisphere and a clockwise direction in the Southern Hemisphere. Cyclones occurring in the tropical regions are called tropical cyclones and those occurring elsewhere are called extra tropical cyclones. On an average, 80 tropical cyclones are formed every year all over the globe. Destructive power increases with the square of its speed. Wind damage is usually higher on the right of the tract in the Northern Hemisphere. Cyclones, tropical cyclones, hurricanes, typhoons are the synonyms of cyclone (<http://en.wikipedia.org/wiki/Cyclone>).



Source: <http://www.lged.gov.bd>  
 Fig. 1: Map of Kalapara Upazila

**Cyclone Eye:** The most striking feature of a cyclone is its eye. The eye can be seen clearly in satellite picture in the case of a well-developed cyclone. The eye is small and almost circular. Every cyclone has an eye. It is the centre of the cyclone. Usually the diameter of a cyclone eye is 8 – 50 km or more (<http://en.wikipedia.org/wiki/Cyclone>).

**Classification of Cyclone:** Cyclone can be of different strengths depending mainly on the wind speed. Table 1 presents the classification of cyclone.

Table 1: Classification of cyclone

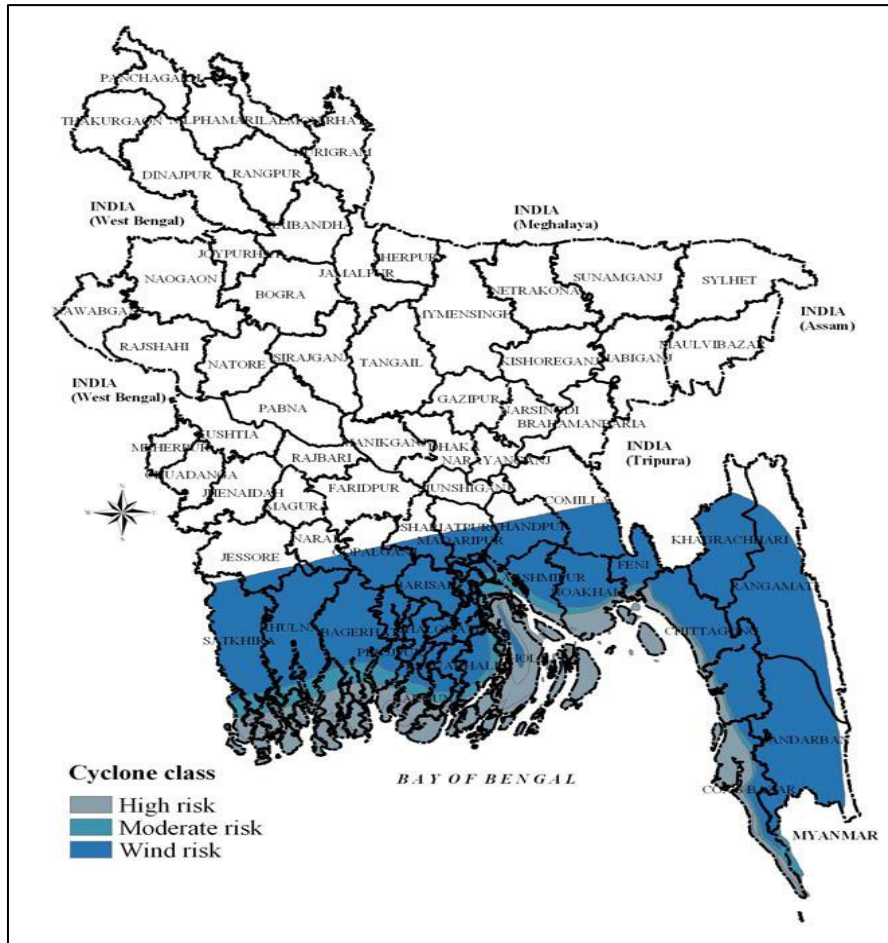
Cyclone Intensity	Range of Pressure Drop (nib)	Range of maximum sustained wind speed (Km/hr)
Depression	3.0 to <3.5	44 to <52
Deep Depression	3.5 to <6.0	52 to <63
Cyclonic Storm	6.0 to <9.0	63 to <89
Severe Cyclonic Storm	9 to <16.0	89 to <119
Severe Cyclonic storm of Hurricane intensity	16.0 or More	119 and above

Source: Rahman, 2008

**Causes of Cyclone:** According to Rahman (2008), the main causes of cyclone formation in Bangladesh are - warm oceanic temperature (if the temperature of the sea is more than 26° C, it may contribute to the formation of cyclone), presence of high vertical wind, presence of low pressure area, presence of easterly wind in the Bay of Bengal, cyclone gets momentum from the diurnal motion of the earth etc.

**Trend of Cyclone Occurrence at Coastal Areas of Bangladesh and Kalapara Upazila**

Figure 2 shows different cyclone vulnerable areas of the country. Due to its unique geographic location, Bangladesh suffers from devastating tropical cyclones frequently. The coastal regions of Bangladesh are subject to damaging cyclones almost every year. They generally occur in early summer during April-May or late rainy season during October-November (Hossain, 2011). Bangladeshi coastal areas face more than one cyclone of various velocities every year. The major cyclones leave its devastating print on its path. The whole coastal areas are affected seriously. Table 2 shows the major cyclones that hit Bangladesh with velocities and number of deaths.



Source: Climate Change Cell, 2007  
 Fig. 2: The areas vulnerable to cyclone

Table 2: Major cyclones in Bangladesh

Serial No.	Year of Occurrence	Velocity (Km/h)	Number of Death
1.	1822*	-	40000
2.	1872	-	270
3.	1876*	-	400000
4.	1897	-	175000
5.	1911	-	120000
6.	1917	-	70000
7.	1919*	-	40000
8.	1926	-	606
9.	1941	-	7000
10.	1958	-	12000
11.	1960	-	11446
12.	1960	210	8149
13.	1961	145	11468
14.	1961	145	10466
15.	1962	200	50000
16.	1963	201	11520
17.	1965*	161	19970
18.	1965	-	12000
19.	1965	200	870
20.	1966	-	850
21.	1967	130	128
22.	1969	-	175
23.	1970	222	500000
24.	1971	110	11000
25.	1973*	122	183
26.	1983	122	1043
27.	1983	136	300
28.	1985	154	11069
29.	1988	160	5708
30.	1990	-	150
31.	1991*	235	145000
32.	1997	225	126
33.	2007*	200	3406

Note: Means the cyclone hit in the Kalapara Upazila

Source: Compiled by authors, 2012

Bangladeshi coastal areas faced fifty two major cyclones in the 19<sup>th</sup> century and among them seven cyclones were in Kalapara. During last 10 years of the present century, coastal areas have faced at least four devastating cyclones of which two hit Kalapara Upazila. The number of death and loss of socio-economic condition are also increasing with the increasing number of cyclones. The following figure shows the trend of cyclone occurrences in Kalapara Upazila along with coastal areas of Bangladesh.

From Table 2 it is found that the number of cyclone occurrence is increasing in Kalapara Upazila with the increasing number of cyclones occurrence in the coastal areas of Bangladesh. The study area faced 5 cyclones within the time period of 1821-1960. But 7 major cyclones have occurred here during the last 40 years, where 2 were within last 10 years.

### Impacts of Cyclones in Kalapara Upazial of Patuakhali District

Every year, 3-4 cyclones hit Kalapara at different time period with different intensities. As a major portion of the people of these areas are poor and live below poverty line, so there is a great impact of cyclone on socio-economic condition of Kalapara Upazila of Patuakhali district. The impacts of cyclones, Sidr and Aila on socio-economic condition of Kalapara Upazila can be observed from Table 3.

Table 3: Impacts of cyclone Sidr and Aila on socio-economic condition of Kalapara Upazila

Impacts of cyclones	Name of cyclone	
	Sidr	Aila
Affected unions	9	9
Affected paurashava	1	1
Affected people	210000	93675
Totally and semi destroyed houses	27895	18128
Number of dead	94	-
Number of injured	1678	152
Affected crops	45%	Tk. 1304000
Affected educational institutions	195	68
Affected religious institutions	886	285

Source: UNO office, Kalapara, 2011

**Social Impacts of Cyclone in the Study Area:** Every cyclone leaves its devastating scenario on every aspects of social life at Kalapara Upazila. The devastating impacts of cyclone are discussed here under some social indicators:

**Education:** Total 81 cyclone shelters are used as educational institutions in Kalapara Upazila (Field survey, 2012). During cyclone risk period, it is not possible to continue educational program. On the other hand, other educational institutions are wiped out or seriously affected by cyclone. For example cyclone Sidr and cyclone Aila affected 195 and 68 educational institutions respectively (UNO office, Kalapara, 2011).

**Health (including accidents and deaths):** Cyclone puts such impact on health that it is seen after several years of cyclone occurrence. According to Kalapara UNO office, 94 people were dead and another 1678 people were seriously injured by cyclone Sidr of 2007. Because of cyclone Aila, 152 people were seriously injured in 2009. According to local people, more than 1000 people were

dead by Sidr and more than 5000 people were seriously injured. Among the injured people many are living with permanent disability.

**Transportation:** One of the most cyclone affected sectors is transportation. Both pucca and kutchra roads are wiped away by cyclone and dams are broken down. As a result, victims cannot move and it becomes difficult to reach relief to the affected people. About 5 km pucca and 284 km kutchra road was totally damaged due to the impact of Aila in this area, and 29.05 km dam was severely damaged during that time (UNO office, Kalapara, 2011).

**Economic Impacts of Cyclone in the Study Area:** Every natural hazard has a great impact on economic condition of an area. As cyclone is the main natural hazard of Kalapara Upazila so it has a devastating impact on economic condition of this area. According to Kalapara UNO office, the amount of losses in the cottage industry by cyclone Aila was Tk. 30,000. In nine Union Parishads and one Pourashava total of 620 number of fishing nets which are worth of Tk. 3,850,500 were destroyed by the Cyclone Aila. Cyclone Aila destroyed 500 acres of salt culture which had a market value equivalent to about Tk. 1,500,000. The industrial losses by cyclone Aila were in 44 industries and it is approximately Tk. 1,002,000 in the monetary value. About 385 fishing boats were also scratched by the Aila and this loss is approximately Tk. 2,995,000.

#### Existing Cyclone Mitigation Practices in Kalapara Upazila

**Forecasting the Warning System:** For cyclone, there is a standing order that to be disseminated to all concerned ministries, divisions, departments and nongovernmental agencies and also to press the public to be ready to discharge their duties in a speedy and systematic manner to handle the situation efficiently. More frequent contact is maintained between BMD and Betar (radio), and television transmission hours are extended as and when Danger Signals or Great Danger Signals are hoisted. In this process, the mass people get the cyclone warning. Related authorities and volunteers use different modes to disseminate warning. Dissemination modes depend on the signal number. Table 4 shows the cyclone warning dissemination system in Kalapara Upazila.

Table 4: Cyclone warning dissemination modes

Signal No.	Dissemination Modes
1-3	Conversation
4-7	Mega Phone/ Super mega phone
8-10	Hand Siren

Source: Developed by authors, 2012 with help of Office of the Assistant Director, CPP, Kalapara.

**Cyclone Shelter:** In Kalapara Upazila, there are 113 cyclone shelters, where capacity is to accommodate 101,035 people. Among the shelters, Bangladesh government has built 27 and the rest 86 shelters have been built by different non-government organizations, donor agencies and friend countries. Table 5 presents all relative information about the cyclone shelters of Kalapara Upazila.

Table 5: Cyclone Shelters at Kalapara Upazila

Name of Union	Number of CS	Capacity	Fund		Types of Use				Facilities		
			GoB	NGO & others	Educational	Office	others	No use	Water Supply	Toilets	Valuable Facilities
Chakamaiya	04	3775	01	03	03	-	-	01	02	03	01
Dhankhali	13	12825	05	08	10	-	01	02	08	12	05
Dhulasar	18	11285	03	15	08	2	06	02	07	09	01
Khaprabhanga	15	14225	05	10	14	-	-	01	10	12	05
Lalua	15	13150	01	14	11	-	01	03	08	13	-
Lata Chapli	13	13350	03	10	07	02	03	01	10	11	02
Mithaganj	10	9200	02	08	09	-	-	01	08	10	02
Nilganj	15	13200	04	11	13	-	-	02	11	12	04
Tiakhali	08	8375	01	07	04	02	-	02	05	06	02
Kalapara Pourashava	02	1650	02	-	02	-	-	-	02	-	02
Total	113	101035	27	86	81	06	11	15	71	88	24

Source: Faisal, 2012

### Problems Associated with Existing Cyclone Management in the Study Area

The problems associated with the existing cyclone management in the study area are discussed below:

**Problems Related to Cyclone Warning System:** Local people get cyclone warning from Cyclone Preparedness Program (CPP), Red Crescent Society, and Union Parishad chairmen-members of the concerned area, Volunteers, Radio and Television. But in the rural remote areas, radio and television are not available in everywhere and often they are deprived from the news of cyclone warning due to remoteness. As a result, these rural people suffer most in the cyclonic period.

**Poor Condition of Cyclone Shelters:** There are total 113 cyclone shelters in Kalapara Upazila. Among the shelters, only 71 have water supply facilities and 88 have toilets. Maximum shelters are vulnerable to earthquake, tsunami or cyclone. About 70% people go to cyclone shelter and the rest 30% people do not go. Among the 30% people, maximum people do not go to shelters because of security in the cyclonic period (Field Survey, 2012).

**Lack of Coastal Embankments:** Coastal embankments can protect people, livestock and agricultural fields from saline water inundation/storm surge. But there is no coastal embankment in most of the areas of Kalapara Upazila.

**No Guidelines for Cyclone Proof House Construction:** As the damage of dwelling houses by the cyclone causes maximum loss of the inhabitants, so houses should be cyclone proof. But till now, the local authorities of Kalapara Upazila have not taken up any mentionable initiatives to arrange training program for local people to follow guidelines of constructing cyclone proof houses.



**No Land Use Plan:** There should be a detailed land use plan for the district, which will indicate the most vulnerable areas of the district. This type of plan helps to make decision and undertake actions to control cyclone problems on priority basis. But in Patuakhali district there is no such type of land use plan.

**Lack of Coordination among Government and Non-government organizations:** There is lack of coordination among the government and non-government organizations in the study area for effective management of cyclone.

**Training and Public Awareness Related Problems:** There is no provision for any disaster preparedness training program for the local people. The training programs are arranged for the officials of different organizations and for the member of disaster management committees and volunteer committees. As a result, the local people can not develop their skill to cope with cyclone. On the other hand, the presence of local people in different awareness programs such as seminar, meeting etc is not satisfactory. A large number of people do not participate in these programs due to their unawareness and lack of information. As a result, they cannot get any benefit from the awareness program and be remaining unaware regarding disaster preparedness and thus mitigation of loss.

**Local Disaster Action Plan Related Problems:** Most of the unions of Kalapara Upazila have no union (local) disaster action plans for cyclone mitigation as there are no disaster management committees. As a result, those unions have no guideline and plan to reduce disaster risk. During cyclone, the people of those areas face severe problem. On the other hand, the unions which have local disaster action plans are not properly implemented. The disaster management committees prepare plans, but they have not enough resource and manpower to implement the plan. Thus it remains an unused tool for cyclone management.

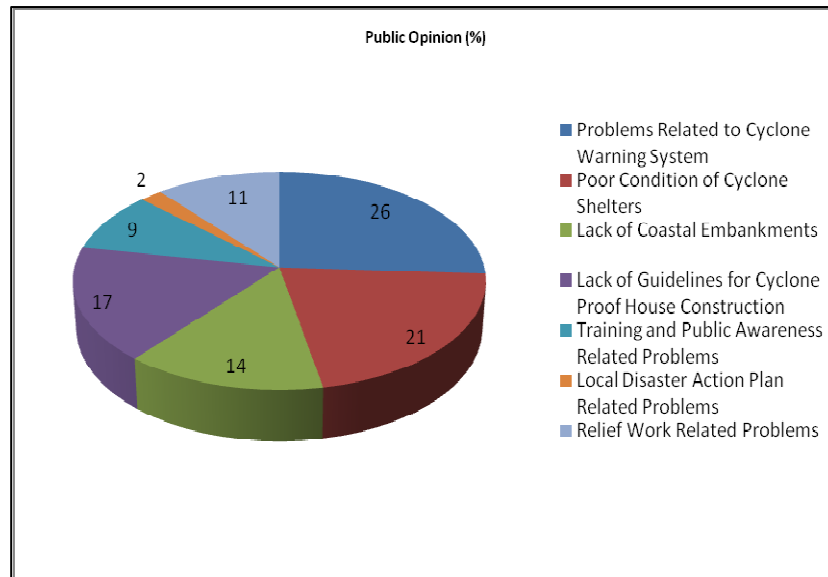
**Relief Work Related Problems:** After the attack of any cyclone, the cyclone affected victims require relief materials for their survival. But from the past experiences it is seen that due to lack of proper coordination between different Government Organizations and NGOs in distributing relief materials, often cyclone affected victims of some parts of Kalapara Upazila were deprived from getting relief materials.

Figure 3 shows questionnaire survey result of public opinion about major weakness in existing cyclone management measures of Kalapara Upazila. From the figure, it is observed that most of the respondents (26%) have identified major weakness of the existing cyclone warning system. It is important to note that 21%, 17%, 14% and 11% respondents respectively have found out poor condition of cyclone shelter, lack of guidelines for cyclone proof house construction, lack of coastal embankments and relief work related problems as main weaknesses in the existing cyclone management measures. Also 9% and 2% respondents respectively have mentioned lack of training and awareness program and lack of local disaster action plan as the main weaknesses for cyclone mitigation in the study area.

### **Recommendations for Cyclone Management**

By analyzing existing facilities and weaknesses in cyclone management, it is clear that there is need to improve the existing cyclone management measures of the study area. Both the structural and non-structural measures need to be improved. For this purpose, following planning guidelines for the improvement of cyclone management facilities in Kalapara Upazila of Patuakhali district should be adopted:

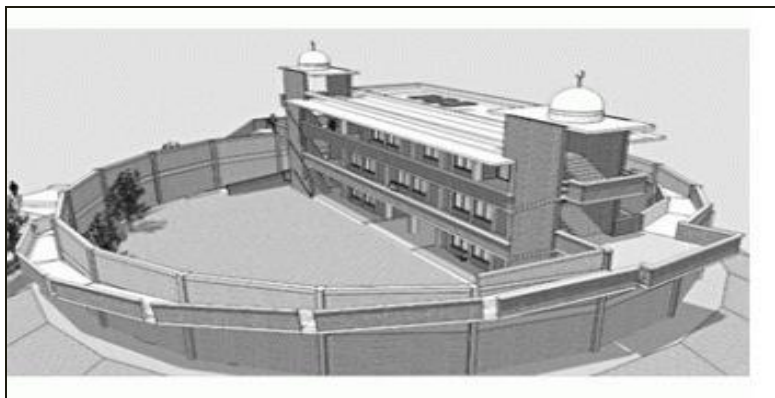
**Guidelines for Renovation and Construction of Cyclone Shelters:** The traditional cyclone shelters do not have facilities for the shelter of domestic animals. As a result, often the poor people of this coastal area do not feel encouraged to go to cyclone shelters keeping their valuable



Source: Field Survey, 2012

Fig. 3: Major weaknesses in existing cyclone management at Kalapara Upazila according to public opinion

domestic animals at home. For this purpose, the introduction of the model cyclone shelter as in Figure 4 may be effective. In this model, the main building is enclosed by a 20 ft wall to protect the inside open space from water. This open space can be used as the shelter of domestic animals. There are also sufficient facilities for sanitation and pure drinking water. The columns and the whole establishment are round shape to prevent the space from cyclone. It is two times expensive than the traditional cyclone shelters, but safety and facilities are greater than the traditional ones. This building can also be used as educational and other social meeting purposes in other time (Faisal, 2012). Construction of new cyclone shelters in Kalapara Upazila may follow this model and the old cyclone shelters should be renovated one by one according to this model.

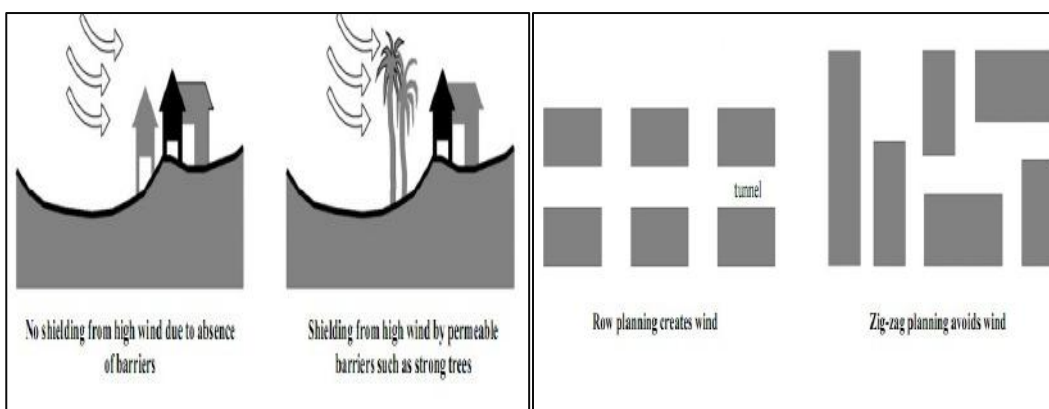


Source: <http://www.prothom-alo.com/detail/date/2011-11-13/news/200584>

Fig. 4: Proposed design of cyclone shelter

**Construction of Cyclone Proof Houses:** To make houses cyclone proof, following steps can be taken:

- To protect the house from cyclone, the row of trees should be preferred to provide natural shielding. If there is any tree in front of the house, the cyclonic storm hit first on it. As a result, the storm speed and damage will be decreased.
- The group housing should be arranged in a zig-zag pattern. In the row type housing, the cyclonic storm hit directly. But in zig-zag arrangement, cyclonic storm cannot hit all buildings directly.
- To make the low cost houses gable roof, flat roof, overhanging roof and pitches roof should be avoided. The hip roof should be preferred.



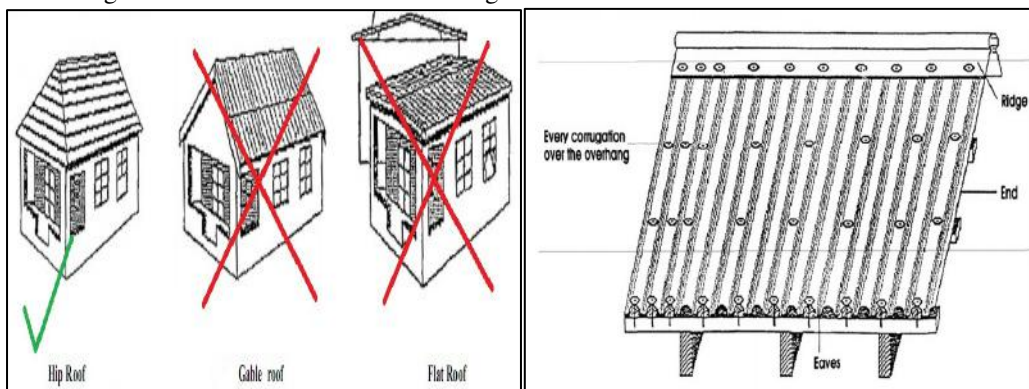
Source: Agarwal, 2007

Fig. 5: Trees decrease the losses of cyclone

Source: Agarwal, 2007

Fig. 6: Zig-zag arrangement of housing

- In case of low cost tin shaded houses, the following two strategies should be followed:
  - Fixings every two (2) corrugation at ridges, eaves and overhangs.
  - Fixings every three (3) corrugation, maximum spacing at all other locations or use galvanized iron flats under the fixings.



Source: Agarwal, 2007

Fig. 7: Preferable roof types of low cost houses

Source: Agarwal, 2007

Fig. 8: Roof construction technique of a cyclone proof low cost house

**Construct Coastal Embankments:** There is a need to protect vulnerable areas by renovating the existing embankments and creating new ones. Along the coast lines of Kalapara Upazila, coastal embankment should be constructed in such a way so that this can be cyclone resistant, all weather serviceable and durable.

**Construction of Roads, Bridges and Culverts Following Proper Design:** Roads, culverts and bridges should be constructed in such way that people can go to the villages in all types of weather including cyclonic period. These should also be designed and constructed in such a way that it will be cyclone resistant and all weather serviceable and durable. This will help to carry out emergency response activities and distribute relief materials to remote places after the impact of cyclone.

**Enhancement of Plantation Program:** Shelter belts are barriers of trees or shrubs that are planted to reduce wind velocities and as a result, reduce transpiration and prevent wind erosion. In coastal areas, shelterbelt plantation of Casuarinas as a main specie is the most suitable and effective alternative to minimize the impacts of wind velocity and saline ingress. They also provide direct benefits to agricultural crops, resulting in higher yields, and provide shelter to livestock, grazing lands and farms. On the other hand, plantation, regeneration and protection of Mangroves act as a bulwark against the natural hazard like cyclone and provide natural shelter as well as protective shield for the lives and property against this hazard and other hazards. They also help in prevention of soil erosion and provide ecological and economic benefits to the coastal community including livelihood and employment opportunities. Extra care should be taken immediately to Sundarban which can be called as “Safeguard of Bangladesh” from cyclonic hazard.

**Preparation of Land Use Plan at Upazila Level:** Preparation and proper implementation of a land use plan can reduce the socio-economic impacts of any disaster including cyclone. So an effective land use plan should be formulated and at the same time proper implementation of it should also be ensured in Kalapara Upazila.

**Making Cyclone Management a Part of Physical Planning Process of Kalapara Upazila:** From the international experiences, it is evident that disaster management measures must be considered into the physical planning process for efficient disaster management. But in Bangladesh, disaster management issue is not incorporated into the physical planning activities both at national and local level. Without making disaster management a mainstream physical planning issue, it is not possible to effectively manage the problems of natural disasters (Hossain, 2011). As cyclone is the main natural disaster in Kalapara Upazila, so the cyclone management should be brought into the main stream of physical planning process of this area.

**Arrangement of Training and Public Awareness Building Programs:** Sufficient number of training and public awareness building programs should be arranged regularly both for local people and members of disaster management committees and volunteer committees. As a result, the local people can become more aware and develop their skill to cope with cyclone.

**Preparation of Local Disaster Action Plan for All the Unions of Kalapara Upazila:** Local disaster action plan for cyclone mitigation should be prepared immediately for all the unions of Kalapara Upazila. At the same time, proper implementation of these plans should also be ensured.

**Developing Coordination among Government and Non-government organizations:** A good coordination among the government and non-government organizations in the study area should be developed for effective cyclone management.

### Conclusion

Every year, many people in the coastal belt of the country lose their valuable properties and lives due to cyclone. This affects the social and economical condition of the whole country. Like other coastal areas of Bangladesh, the people of Kalapara Upazila depend on agriculture and fishing. When cyclone occurs the people lose their crops and fishing instruments. They become jobless and have to depend on relief. On the other hand, the country faces more complicity because it has to manage relief, provide medicine, develop social condition, etc. To deal with these problems the country has to face economic suffering. It is impossible to prevent the natural disasters, like cyclone but coping with cyclone is easily possible. If the recommendations of the study are followed properly, the negative impacts of cyclone may be reduced in Kalapara Upazila of Patuakhali district and as well as in the coastal areas of Bangladesh.

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