

Community Shelter Development: A Concept of Climate Change Adaptation in the Coastal Region of Bangladesh

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Abstract:

The concept of Community Shelter Development (CSD) is related to a variety of terms including participatory, local community, community-based, collaborative-joint and disaster risk reduction. The CSD in the coastal area is an adaptation approach by integrating food security and ensuring safe shelter. The study area is located Kashipur village, Tala Thana, Satkhira District under Khulna Division in the south-west coastal region of Bangladesh. The Pair-Wise Ranking is a socio-technical tool to analyze the relative importance of different factors. The SWOT Analysis has been conducted to evaluate the Strengths, Weaknesses, Opportunities, and Threats. Geographic

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Information Systems (GIS) has been used to determine the land usage pattern of the study area. At the present, food is the main concern, then shelter, followed by education, and then medical treatment. Near about 80 % of the settlement area will be used only for food production. The food availability about 42.86 % will be ensured by following the proposed concept of developing community shelter. After 2 year, people have to spend 79975.23 BDT for taking loan from Micro-credit Institution and 1219118.37 BDT from Money Lender against BDT.53000 that is the average cost of house preparation at community. Because, the interest of Money Lender at community is so high. The strengths of the study are high social bonding among the local people, hard laborious and High frequency of flood. This new dimension research will ensure the food availability, avoiding the rebuild cost of home in the context of climate change adaptation.

Key words: CSD, SWOT, GIS, Food Availability, Climate change adaptation

1. BACKGROUND OF THE STUDY

Climate change is a reality in recent age and the development challenges are largely dependent on how fairly the nations are capable to address climate change. The frequency and the intensity of disaster due to climate change (CC) are increasing day by day. In a report, 1 out of 25 people worldwide were affected by natural disasters (Guha-Sapir et al., 2004). The Inter-governmental Panel on Climate Change predicted that the global temperature will rise between 1.8°C and 4°C by the last decade of 21 century (IPCC, 2007). Bangladesh is among the countries which ranks in the global list of most vulnerable nations due to climate change associated natural disasters (BCAS, 2012, IPCC, 2007; WB, 2011). Bangladesh has a 711 km long coastline which is the worse vulnerable in the context of CC. According to Integrated Regional Information Networks (IRIN) rising sea levels in the Bay of Bengal are encroaching on vast areas of flat agricultural land in the southern districts of

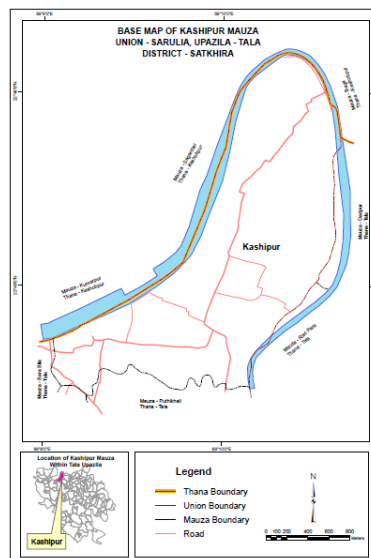
Khulna, Satkhira, Bagerhat, Jessore and Magura thus leading to increased level of soil salinity and other environmental hazards. Out of 37 million people living in 12 coastal districts, 20 million had been affected by the rising sea (IRIN, 2007). Most of the likely undesirable consequences of climate change come in the form of extreme weather events, while water-related hazards such as flood, drought, salinity intrusion, river bank erosion, continuous water-logging leading to large scale reparation to agro-crops, employment, livelihoods, and local as well as national economy (Huq et al., 1996; Asaduzzaman et al., 1997; Choudhury et al., 2005, BCAS, 2010).

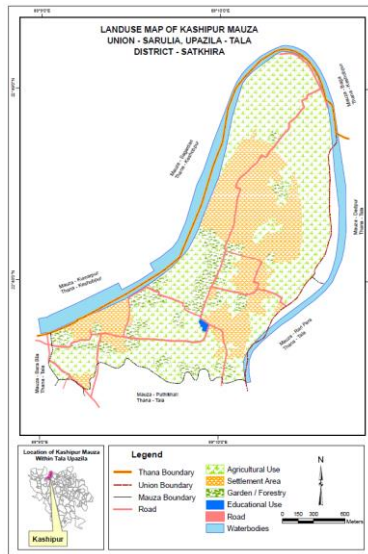
Food security (or, food availability) is inseparably associated with climate change induced natural disasters. The unprecedented impacts of climate change along with other environmental and geomorphologic changes make more distress over food security especially, for the poor and marginal population (Gregory and Ingram, 2000; Parry *et. al.*, 2001; Rosegran and Cline, 2003). Bangladesh since its independence in 1971 when most of the people were living under the poverty line were facing challenges in affording food security however it had always been to address climatic impacts in food production (IFAD, 2012). The term 'food security' is a multi-dimensional development issue which refers to explain a status of any given society or a country where all people at all times have both physical and economic access to adequate food to afford their nutritional needs for a productive and healthy life (WFS, 1996). Thus the likely impacts of climatic natural disasters will be largely on marginal group of farmers who produces food on his farm covering the components of food availability, food access and food utilization (Unnayan Onneshan, 2012). Therefore it is commonly accepted that climate change is unambiguous and impacts the food systems that fortify food security (IPPC, 2007).

In terms of our study area (Satkhira District), it's located in south-west coastal region Bangladesh has been experienced extensive river flooding as a result of high coastal sea levels, which has similarly led to a rise in local salinization (BIISS, 2009). As a result, agricultural food production has been reducing at high rate. So, the unemployment rate in want of livelihood options increased. The freshwater as well as the potable water is getting unavailable to mass people. The study area is particularly prone to numerous anthropogenic as well as climate change induced abnormalities: water-logging, rapid sedimentation, river flooding, river bank erosion, salinity ingress, cyclone attack, reduced freshwater flow and so on. The flood protection embankments are subject to occasional 'tidal overtopping', leading to saline water-logging within embanked areas (CEGIS, 2006). Decreased dry season freshwater flow is leading to increased water shortages resulting increased salinization in the areas (Huq et al., 1996; Ahmed, 2005; CEGIS, 2006). Also such reduced freshwater flow might aggravate the draw-down of shallow aquifer systems, reducing its potential for drinking and irrigation water (Halcrow et al., 2001). In a longer term consequence the above-mentioned impacts of climate change particularly at the Bangladesh's south-west coastal zone, the community is already facing socio-economic disasters; the evidence of such impacts is already in field including loss of lives and livelihoods and hardship for the poor, in particular women and children; devastation of human settlements and national infrastructure; and bottlenecks for national development due to frequent diversion of development budget to facilitate post-disaster rehabilitations (CCC, 2009). Ultimately such devastating impacts collapse the economy by imposing risks to both livelihoods and national food security (World Bank, 2000; Asaduzzaman *et al.*, 2005).

The concept of Community Shelter Development (CSD) is related to a variety of terms including participatory, local

community, community-based, collaborative-joint and reduce disaster risk. On the other hand, the CSD in the coastal area is an adaptation concept by integrating food security and ensuring safe shelter. In same way, the World Development Report (World Bank, 2001) also highlighted on informal strategies in the subject to agricultural production like "arrangements that involve individuals or households or such groups as communities or villages. The concept of CSD will be increased the prevention as well as the adaptive capacity of the disaster. Bangladesh is one of the most populated countries in the world. According to the Population census in 2011, 180 million people live in 144000 sq. areas at a density of 1064 persons / km. Poor farmers in Bangladesh have been disadvantaged by policies that favor of land lord farmers by increasing agricultural production. Food security is the first pillar among the six pillars in the Bangladesh Climate Change Strategy Action Plan (BCCSAP, 2009).





2. METHODOLOGY

Pair-Wise Ranking is a socio-technical tool to analyze the relative importance of different factors. It is used to overcome the difficulties of people often have with ranking more than two items at a time. When asked to think about how five or six different items relate to each other, people can sometimes find it difficult to access so many objectives at once. Pair-wise ranking helps to bear the process down so that people are only comparing two items at any time (IFRCRCS, 2004). It has been done for the purpose of prioritization of the fundamental needs (Food, Education, Shelter, Medical treatment and Cloth). Participatory Applied Policy Analysis (PAPA) is a methodology which measures the applied side of the policies by participation all sorts of representatives of the stakeholders as well as the experts. The main criteria of the PAPA is when the applicability of the research or project comply between the stakeholders and the expert are fit more than 90%, then it would be feasible in the field. It has been followed in the study

area for the implementation of the Community Shelter Development in the disaster prone in the south-west coastal region of Bangladesh. The SWOT Analysis has been conducted to evaluate the Strengths, Weaknesses, Opportunities, and Threats involved in the study. It is general used for a new venture or strategy. It is conducted in the field based on the public opinion. Geographic Information Systems (GIS) has been used to determine the land use pattern of the study area. The software ArcGis 10.1 has been used for this purpose.

3. RESULT AND DISCUSSION

3.1 Pair-wise Ranking of the Basic Needs

During Focus Group Discussion meetings, the highest demand of the basic needs currently facing mentioned by asking the people. It was really difficult for the local people to define the order of the five basic needs. A table has been drawn on a piece of paper, as shown below. In this study, the groups of people mentioned food, education, shelter, medical treatment and cloth.

List the basic needs has been developed as shown in the table 1 below, and asked the group what they considered to higher demand of basic needs: food or cloth. Then, asked them which was more demandable basic needs in this pair. This is why, it is known as pair-wise ranking. They reported that food was more essential need, filled in their answer, food, in cell 1. Next, we asked which has a more demand between food and education. They responded food, filled in the answer, food, in cell 2. In this way, the ranking proceeded with all the mentioned basic needs, always letting them chose between one and another. The eventual result looked like the following table:

Table 1: The pair-wise ranking among the basic needs

Basic Needs	Food	Education	Cloth	Shelter	Medical Treatment
Food					
Education	F				
Cloth	F	E			
Shelter	F	S	S		
Medical Treatment	F	E	M	S	
Total	04	02	0	03	01
Rank	I	III	V	II	IV

Note: Food – F, Education – E, Cloth – C, Shelter – S, and Medical Treatment – M

The ranking of the basic needs has been made and mark the ones that had their biggest priorities at the listening by listening them all. The ranking are given below:

- Food, chosen four times
- Education, chosen two times
- Cloth, chosen zero times
- Shelter, chosen three times and
- Medical Treatment, chosen one time

From this list, it can be easily conclude that in this community, al the present situation, food is the main concern, then shelter, followed by education, and then medical treatment. The fact that cloth has a score of zero does not mean that it has no need. It means that it is less severe than the other four basic needs.

From the above table it can be easily said that the rank of Food is I that is why, it is the most important basic need of the Kashipur community. So, the CSD has given the more emphasis to satisfy the demand. Education is the second most vital fundamental demand based of the opinion of the local people. In most of the year the educational institution are in close due to inundation. The school also is used as a shelter for any kind of disasters. The Climate Change (CC) and the permanent water logging also are speeding up the vulnerability

to achieve the goals. Medical Treatment, Shelter and Cloth are following the ranking and the significant consistently.

Table 2: Landuse of Kashipur Mauza

Sl No	Landuse Type	Area (Sqm)	Area (Acre)	Area (Hectors)
1	Agricultural Use	2239960.65	553.51	224.00
2	Educational Use	7125.61	1.76	0.71
3	Garden / Forestry	429573.35	106.15	42.96
4	Road	34474.89	8.52	3.45
5	Settlement Area	1176613.10	290.75	117.66
6	Waterbodies	176189.88	43.54	17.62
	Total	4063937.476	1004.234	406.395

3.2 Current status of land-use by settlements of the Study Village

The traditional household setting is high land consuming policy. The land is mainly used for household purpose. The settlement of the study village is using in different purposes like households, roads networks, homestead forests or gardening, Ponds, educational institutions (School, College and Madrasha), Mosques, community club, playground, family graveyard and etc.

3.3 Proposed community Shelter Settlement

The proposed community shelter settlement seeks to minimize the land-areas currently used by settlements and other associated purposes, and to make free the resulted land areas for agricultural food production to ensure a long-term sustainable food availability of the local community living at that village.

According to the Proposed Community Shelter Settlement =
 Community Shelter (for Living) + Road Networks + Homestead Forest/Gardening + Water Bodies (Ponds) + Community Educational Institutions (School + College + Madrasha) + Community Religious Institution (Mosques/Others) + Community Club + Community Play

Ground + Community Graveyard + Others (e.g., Fallen or Barren Lands)]

In the planned way, it is based on the field report that only 20% area of the settlement area is enough for the community shelter purpose.

Now, 20 % of the Settlement Area = $[(20 / 100) * 290.75]$ Acres
= 58.15 Acres [Will be used only for Community Shelter]

Then, 80 % of the Settlement Area = $[(80 / 100) * 290.75]$ Acres
= 232.60 Acres [Will be used only for Food Production]

3.4 Estimation of Potential Food Production to Ensure Food Availability

The paddy production varies different areas based on soil characteristics, climatic conditions, different sorts of disasters and so on. The paddy production in Satkhira District is 1085 kg/Acres (**BBS, 2013**)

The total paddy production can be calculated as:
 $(1085\text{kg/Acres} * 232.60 \text{ Acres}) = 252371 \text{ kg}$.

Now, the total population of Kashipur is 2387 (**BBS, 2011**).

The per capita paddy production can be calculated as
= $(252371 \text{ kg}/2387) \text{ kg}$
= 105.72 kg. paddy
= 76.65 kg. rice [In general 40 kg. paddy = 29 kg. rice]

This term indicates that at Kasipur 76.65 kg rice will be allocated per person. This amount of production is possible only in the present land area of households.

According to the assessment jointly conducted by the World Food Programme (WFP), Food and Agricultural Organization (FAO) and Shushilan, 2011 on A Follow Up Rapid

Food Security Assessment in Satkhira in the Context of August 2011 Flood and Water Logging, the per capita average rice consumption is 0.49kg./day

Per capita food consumption pattern on an average
= 0.49 kg/day
= (0.49 * 365) kg/year
= 178.85 kg./year.

This indicates that in all around the year one person can consume 178.85 kg rice. That means, 178.85 kg rice is needed for the availability of food.

The food availability per capita will be
= $(76.65/178.85)*100\%$.
= 42.86 %

The study area is annually experienced numerous natural disasters. As a result the inhabitants are under constant or growing vulnerabilities from such perilous events. The proposed idea of community shelter development will provide opportunities to the community people to take part in climate change adaptation with their indigenous and local innovative knowledge's of disaster management. This concept will be helpful to manage the people within a short time at the disastrous period. The total people will live at safety condition. Then the social bonding as well as social security will be increased. In this way, the risk of any likely hazardous event (e.g., flood, cyclone, storm surge and so on) will be minimized.

Only one crop can be considered in our study because Boro rice from November to March is comparatively free from disaster risks. So, the food availability is 42.86 % will be ensured by following the proposed concept of developing community shelter.

3.5 Rebuild Cost of Home

Every year the water logged affected people have to spend average BDT. 53000 to repair their home, if they use the Tali as roof. In another case, when they use Tin as the roof, then the cost is average BDT. 70,000. Most of the people in the study area are poor, so they have no savings that will be utilized as repairing cost. As a result most of them are dependable on Microcredit Institution or Moneylender at community.

Estimated amount for Roof Tali: (BDT.47000-BDT.58000)

- 1.Wall (mud) BDT. 25000- BDT. 27000
- 2.Bamboo BDT. 5000- BDT. 7000
- 3.Roof (Tali) BDT. 8000- BDT. 10000
- 4.Labour BDT. 5000- BDT. 8000
5. others BDT. 4000- BDT. 6000

Estimated amount for roof Tin: (BDT.64000-BDT.76000)

- 1.Wall (mud) BDT. 25000- BDT. 27000
- 2.Bamboo BDT. 5000- BDT. 7000
3. Roof (Tin) BDT. 20000- BDT. 25000
- 4.Labour BDT. 8000- BDT. 9000
5. others BDT. 6000- BDT. 8000

3.6 Comparison between Microcredit Institution and Moneylender at Community

All the amount of money, they take loan from micro-credit NGOs like Grameen Bank, ASA, BRAC, Uttaran and so on. According to, Khalily, 2011, the compound profit rate is 22.84 %. In some cases, they can take loan from the local moneylenders, and the moneylenders take high amount of interest than the NGOs. According to, Mallick, 2009, the simple profit rate is 103.33 %. In most of the time the flood frequency is so high. In last one and half decade the floods have been occurred 11 times. The comparable scenarios are given below of

the continuous two years flooding by taking the minimum cost (BDT.53000) of the repairing for home. The scenarios are:

Table 3: Comparison of interest rate between Microcredit and Money Lander

Year	For Microcredit Institution	For Money Lender at Community
1 st year	$Capital = P(1+r)^n \text{Tk.}$ $= 53000(1+22.84\%)^1 \text{BDT.}$ $= 65105.20 \text{ BDT.}$	$Interest, I = Pnr$ $= 53000 * 1 * (103.33\%) \text{ BDT.}$ $= 54764.90 \text{ BDT.}$ $Capital = 53000 + 54764.90 \text{ BDT.}$ $= 107764.90 \text{ BDT.}$
2 nd year	$Capital = P(1+r)^n \text{ BDT.}$ $= 94000(1+22.84\%)^1 \text{BDT.}$ $= 79975.23 \text{ BDT.}$	$Interest, I = Pnr$ $= 54764.90 * 1 * (103.33\%) \text{ BDT.}$ $= 54764.90 \text{ BDT.}$ $Total \ Capital = 107764.90 + 54764.90$ BDT. $= 1219118.37 \text{ BDT.}$

From the above table, it can be said that Micro-credit Institution is better than the Money Lender at the community for the purpose of taking loan. Though the Micro-credit Institution has followed the compound interest, after 2 years, they have to spend 79975.23 BDT for taking loan from Micro-credit Institution and 1219118.37 BDT from Money Lender at community because the interest of Money Lender at community is so high.

3.7 SWOT Analysis of Community Shelter

The SWOT analysis generally discuss about the feasibility of any new concept. The analysis table is given below:

Table 4: The SWOT Analysis

Helpful	Harmful
Strengths: <ol style="list-style-type: none"> 1. The social bonding among the local people is high 2. The people are hard laborious 3. Thigh frequency of flood 4. The levels of awareness are high 	Weaknesses: <ol style="list-style-type: none"> 1. Most of the people are poor 2. The investment capacity is low

Opportunities:	Threats:
<ol style="list-style-type: none">1. The people are in risky condition, so they are trying to be saved2. The food availability will be increased the resiliency of flood3. The high standard of life4. The quality of education will be high	<ol style="list-style-type: none">1. High political bilateral polarization of the people2. Traditional culture

From the above SWOT analysis, it can be concluded that the strength and the opportunity part are more feasible than then weakness and the threat. So, the community shelter development will be convenient for the people of the study area.

4. CONCLUSION

In the conclusion it can be said that the study looks for an integrated prevention from natural disaster in the study area. This prevention will be ensured by increasing the food availability, avoiding the rebuild cost of home. In addition the poor people have been facing in a circle where they are bound to take the loan from the different sectors with high rate of interest for meeting the instant demand in the disaster period. This amount of money will be safe by addressing the community shelter concept. The community shelter concept which will increase the social resilience to address the risks and associated disaster vulnerabilities specific to the study area. As better as the resilience capacity will be higher, the climate change adaptation capacity through the food security achievement will be enhanced.

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