

## COMMUNITIES STRENGTH AND WEAKNESS FOR RESPONDING CYCLONE AND FREQUENTLY FLOOD ON SOUTHERN PART OF BANGLADESH

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### ABSTRACT:

Kaliganj is an upazila of Satkhira one of the southern coastal upazila of the country. Consist of large saline land mass and conserve Mangrove forest. Every year defined study area suffer from various natural disaster such as salinity intrusion, cyclone, storm surge, virus and epidemics etc. Our study area are leading for white gold i.e. Prawn culture has a great contribution on national economy. To fulfillment our study a focused group discussion (FGD), Transact work and semi-structure individual interview methodology have used. The key findings of the study are identify the strength and weakness factor of the community and focused on strengthen factors such as Bamboo bridge which are made by locally available materials, Caraway and goal tree plantation on the canal side, floating vegetable farming, micro scale rain water collection system, community based early warning dissemination system etc. which have involvement to mitigate the risk. No more study have conducted on that field so it's difficult to collect information. Any person or organization which wants to take any measure of this community this study will be helpful for those. This Community suffered prawn virus almost every year. Scientific cultivation method practices may good alternative for mitigate these risk.

**Keyword:** Vulnerable Community, Disaster, Green barrier, Resilient Techniques.

### 1. INTRODUCTION

Every year this area are suffering from natural and anthropogenic disasters such as frequent Flooding, Water logging, Salinity, Disease and epidemics, Prawn virus, Malicious activities, Water pollution and Drinking water scarcity etc. Frequent Flooding and Water logging is the predominant disaster of that area. After medium or heavy rainfall maximum fish farming land (Gher) are go under water. Due to inundation, community face a great economic impact; certain poor people also benefitted by it. Cyclones are not acute problem for this area. Bangladesh bureau of statistics database shown that only three cyclone shelter have in this upazila. In the last scenario show that SIDR, AILA, Mohasen, Nargis hitted the study area damaging structure and other daily accommodations slightly. Affected communities also have potential resources to be rehabilitated to some specific threatened environment. Most of the peoples of this area have a little knowledge about resilient techniques and scientific prawn culture system.

Bangladesh is a developing country. Southern coastal areas are greatly contribute in economic sector of the country. Prawn culture is most important economic activities of the households of Kaliganj upazila. Every year Bangladesh earn 196859 million taka from inland catch fish sector which are 3.61% of the national GDP and 14.39% of the total fish farming income of our country (Bangladesh. BBS, 2011). In Kaligonj upazila 12132.34 hectares area used for shrimp cultivation and 4800 metric ton fish produce every year. Till now maximum people of our country greatly depend on fish farming as protein source. For save these community and those economic and protein source it's very much needed to take initiatives.

This paper has also investigated the community's positive indigenous knowledge and practices which may reduce the vulnerability of the community. Sometimes we realize that modified practices may reduce the risk in specific sector. We have tried to find out the communities strength and weakness for responding to natural disaster. Identifying problems and adapting initiatives, communities will be more resilient introducing "Community Based Disaster Management (CBDM)" approach. That's why our study is very much important. People who wanted to gain primary knowledge about that community this findings will be helpful.

There is no researches in the study area concerning community resilience in the field of flooding and water logging. The present study was an attempt to identify various indigenous knowledge of the local peoples. Our overall objectives are

- ✓ To identify the communities indigenous knowledge to cope with flood and water logging.
- ✓ To determine communities strength and weakness from the viewpoint of disaster management.
- ✓ Analysis and evaluating cost effective practices of resilient techniques.

## 2. MATERIALS AND METHOD

### 2.1 Study area

Satkhira is one of the coastal district of Bangladesh, it lies between 21°36' and 22°54' north latitudes and between 88°54' and 89°20' east longitudes. Satkhira consist of Satkhira Sadar, Kalaroa, Debhata, Tala, Assasuni, Shyamnagar and Kaliganj Upazila. The study was conducted at different locations named Sannasirchak, kajla, Nalta and Tarali in Kaligong under Satkhira district. The upazila occupies an area of 333.78 sq. km. It is located between 22°19' and 22°33' north latitudes and between 88°58' and 89°10' east longitudes. (Ibrahim, 2012) The upazila is bounded on the north by Debhata and Assasuni upazila, on the east by Assasuni upazila, on the south by Shyamnagar upazila and on the west by India.

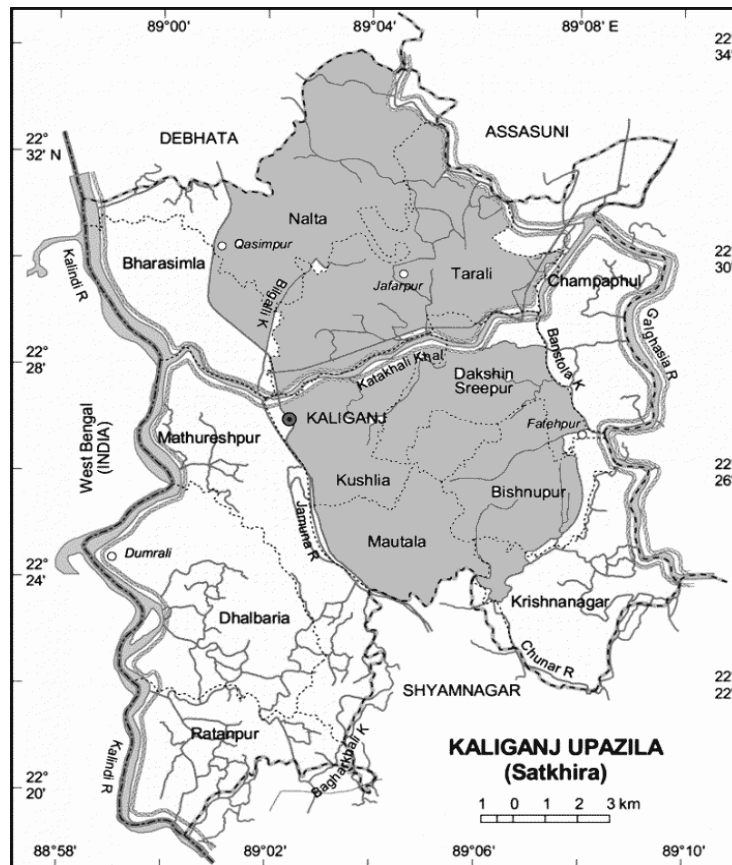


Figure 1: Study area (gray color) Map

### 2.2 Data Collection

To meet the purpose of this paper, collection of appropriate, precise, standardized and accurate information was required. In bringing this paper to existence, data was collected from both primary and secondary sources. For primary data collection we visited different locations in our study area and meet with the community people. Conduct Transact work, semi-structure individual interview, homemade interview, focused group discussion (FGD) and Key informant interview (KII) methodology have used. For secondary data collection web site browsing, eBooks, thesis paper, Government and non-government database also used.

Our tentative research outline is given below:

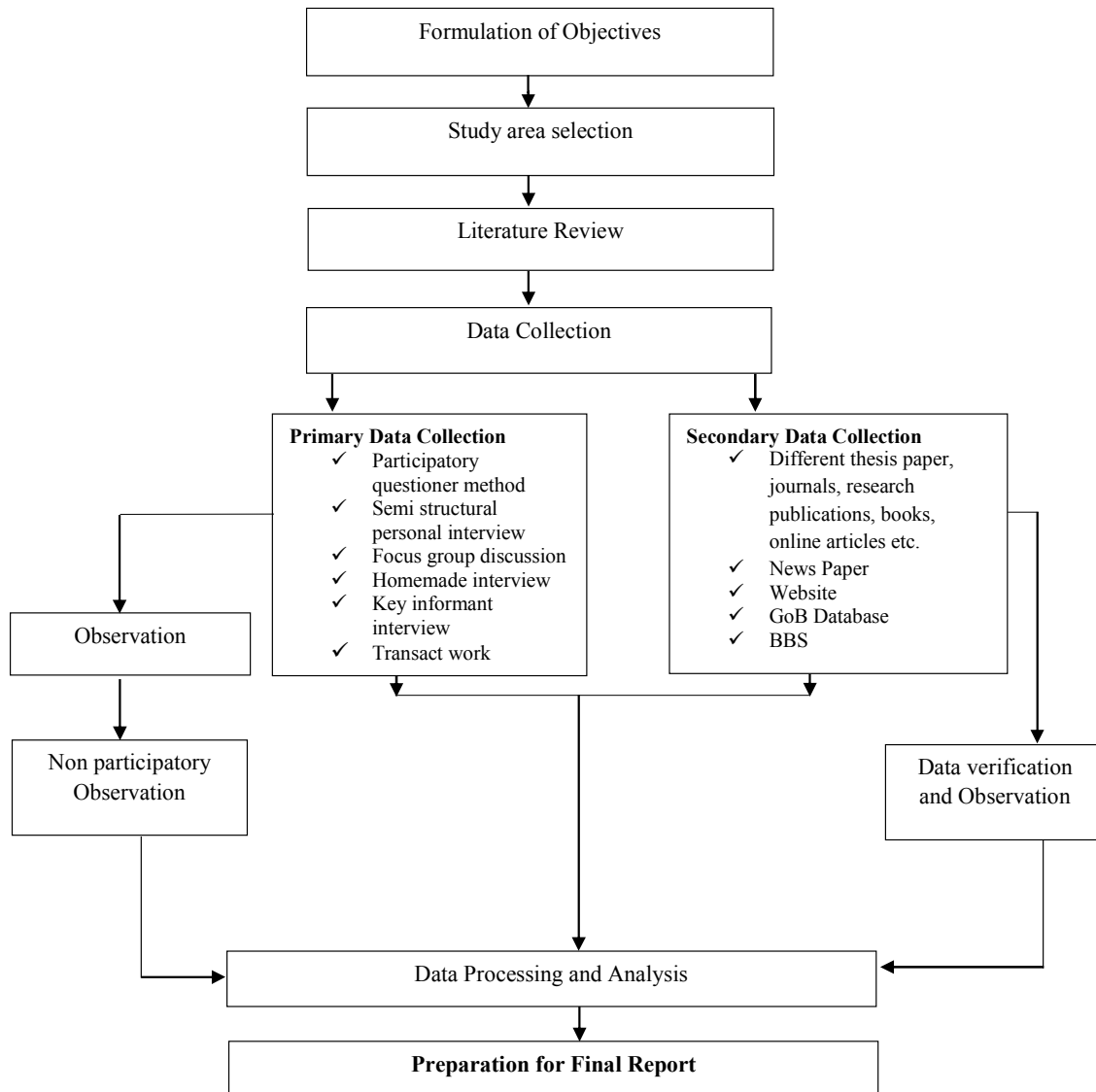


Figure 2: Research outline

### 3. RESULT AND DISCUSSION

#### 3.1 Economic condition

Local community is living in the floodplain of river, canal or plain land. Agriculture, fish farming, capturing fish are the main occupation of that area. Our field work participant's occupation and social strategy has been recorded. We identified that maximum people have at least a piece of land for living. Some landless farmers are cultivating crops on other fields in fifty-fifty shear system. People who have some capital they easily invest in others prawn farm. After selling the shrimp they got the shear according to the percentage of capital. Now a days community peoples almost adopt the 'living with disaster' mechanism. About 25 peoples occupational strategy are presented below figure:

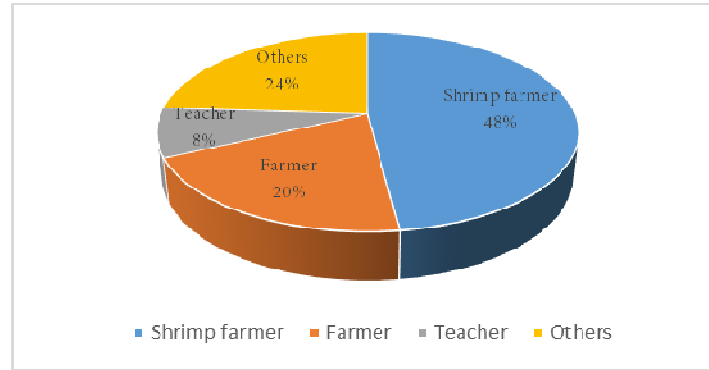


Figure 3: Occupational status of participants

### 3.2 Impact of disaster

The region is situated very close to the world largest mangrove forest Sundarban. Maximum cyclone of our country is created in Bay of Bengal and firstly hit the mangrove forest. After weaken that cyclone hit over that area that's why intensity of cyclone is not most acute. Kaligonj upazila have only three Cyclone shelter (Bangladesh. BBS, 2011).

Frequently flood and water logging are the predominant cause for devastating losses. At the time of our survey we found that some playgrounds are under water although now this is not rainy season. The study area is continuously suffering from the adverse impacts of global climate change. Due to climate change sea level height are increasing day by day. That area also the worse victim of global climate change impact (Uddin et al., 2015). Prawn cultivation needed the saline water that's why peoples are greatly depending on the canal saline water. Lack of proper authority switch gate is occasionally uncontrolled and massive water entered that area of culture.

During high tide a portion of rainwater also mixed with water flow of canal and the bank are flooded. Peoples conclude that, after medium intensity of rain for 2-3 hours maximum land become flooded. Sometimes water stay for several days, month even though year. Soils are very hard and brittle. During flood, local kacca or semi pacca structure are collapse and severally damaged aside the river or canal.

### 3.3 Strengthens

#### 3.3.1 Caraway and goal tree plantation on the cannel side

In the southern part of the country some mangrove plants (sundori, gaowa, caraway, goal etc.) are available aside the water body. Caraway and Goal plants are common in Kaligonj upazilla and is a green barrier of the community. Goal is a plant with fibrous root system and highly protect the depletion of soil from the river bank. Not only Goal but also other mangrove such as sundori, gaowa, caraway plants naturally grows at the cannel side. This bio shields can survive in the salt water even in flooded condition. Those plants are naturally used as a wind breaker and protect the bank of the river during natural disaster. By protecting the river bank, those plantation helps the local community to avoid the deluge condition. Now a day's people on this locality are practicing Goal cultivation (goal pata) which is used for shading purpose of the household (Fig.4). Goal (goal pata) is a flexible shading element than others (straw, tin and concrete). In high velocity wind or cyclonic condition this structure are swing but not easily collapse. Recently it will be a sustainable income source and shading materials.



Figure 4: Canal side Goal tree plantation

### 3.3.2 Micro scale rain water collection system

Water quality in Kaligonj is well known to be poor, with scarce use of deep tube wells, the source considered as safe. The contamination of water by minerals with long-term effects also means that there is less a drive to search for better quality water. This was highlighted by the older members of the community who noted that in previous decades there was a high prevalence of water-borne diseases, resulting in the construction of shallow tube wells, which are felt to be safer than open sources. However, the long-term public health impact of arsenic should not be overlooked or ignored with long-term complications including cancer, neurological effects, cardiac disease, pulmonary disease and possibly diabetes mellitus (A. H. Smith, 2000).

After any natural disaster such as flood peoples greatly suffer for drinking water. Furthermore few poor family have no male member or have only one disable member whose are not able to collect fresh drinking water. We observed that some poor people are use own made micro scale rain water collection system (Fig. 5) Due to fresh water source in faraway poor peoples are owe to drink that water.



Figure 5: Micro scale rain water collection

We also added that, collect rain water this way then filtered by low cost ceramic water filter or activated carbon filter. Activated carbon filter may locally made by waste of coconut. Which have a better result for human health.

### 3.3.3 Building structure and pattern

Villagers are practices one storey small house for their residence purpose. Due to saline weather here brick or concrete structure isn't have expected durability. Peoples construct house by mud mixing with husk and straw and entered bamboo into it. They prefer straw or asbestos shed rather than tin shed houses. Slight structure are made by bamboo or any porous saline tolerant wood. At the eve of cyclone this type of houses are more stable rather than tin shed houses. Not also concrete but also mud have fallen due to saline weather sublicense they prefer it. Because mud is found everywhere and relatively mud structure is easy to repair. The present situation of a building due to saline weather is presented in (Fig. 6). About one half people of there are economically susceptible. Now a days peoples construct longer lasting tiles fitting house rather than cement plaster.

Peoples are already adopting dry flood proofing techniques constructing plinth level above the previous maximum flood water heights. Temporary houses are constructed in fish farming land (Gher) which pillar are made by bamboo (locally named Basa) construct above water. This Basa have flood water passing space under it. This houses can sustain in a medium intensity cyclone. Some light structure also made by bamboo and wood. On the eve of cyclone those structure are swing but it can tolerate the cyclone and flood at a certain level.



Figure 6: Current status of brick structure due to saline weather

#### 3.3.4 Bridge construction by locally available materials

Transportation is one of the great problem of whole area of this upazila. Now several roads of Sannasirchak, Nalta, Tarali are made by Bituminous and Herringboned but maximum are made by mud. Shrimp production and transportation are interrelated. Exported shrimps of Satkhira zila are mostly collected from here. At this circumstances, prawn cultivators needed to short time good transportation system. Peoples construct the pools and bridge by bamboo (Fig. 7). Those Pools bamboo poles are probe a certain level under water. Peoples easily made this bride by using local materials and techniques. Few bridge are horizontally use only one bamboo for walk and one horizontal bamboo for catch when cross the river. Concrete and Baily bride construction cost is higher and the durability of those bridge is less than Bamboo bridge. After cost benefit analysis it is clear, locally made bamboo bride is more effective than any other types of bridge. This bridge also tolerate the intensity of cyclone. Medium size boats can easily pass under of bamboo pools.



Figure 7: locally made Bamboo pools

#### 3.3.5 Unity of people

It's a matter of great joy that peoples have a strength relationship each other. Government funded development project aren't sufficient here extreme time. Peoples construct canal bank, road, bamboo bride and other construction by voluntary work.

#### 3.3.6 Have a great religious practices

Maximum peoples of our study area is Muslim. They obey the command of the mosque Imams (religious leader) or older man of the village. So, after any disaster any practitioner or relief and assistance provided



organization if wanted to help the community then just contact those man. Those man's decisions frequently obey the villagers. At this circumstances consultants easily complete any task by engage the local people. After any disaster this unity may greatly help in rehabilitation phase.

### 3.3.7 Uses of Solar panel

The 21<sup>st</sup> century generation are headache for sustainable power consumption to save the environment. Wanted to reduce the carbon emission at the same time this community are totally depend on solar energy for light and other purpose. This area haven't get the electricity facility yet. We wanted to know community peoples how they survive without electricity? They explained that they can operate TV in solar energy and mobile phones are easily charge by it. They dry meat and fish for future use. Now a day's solar panel and accessories aren't very costly so they can easily adopt this technology.

### 3.3.8 Other indigenous technology in different sectors

Peoples frequently uses different pot for reserve capture fish. Sometimes pores in wastes pot and reuse it (Fig.8.a). Any critical situation they can easily uses this for save fish. This capture fish are alive and they can uses this fish in critical time. Middle income generation almost have boat for their personal uses. Dry season they sink boat in canal water (Fig. 8.b). In rainy season or after flood they uses for family daily needs or other business purpose. Cause of saline water this area contain warm weather almost every time. Especially summer season some young boys are sleep on boat at night. Easily they collect four stick and set four side of the boat (Fig. 8.c). Then easily hangover curtain for safety from mosquito. During flood peoples may use this boat as a live saving boat. A small family may survive 1/2 days on it.



Figure 8: Different technology a) Conserve captured fish; b) Sinking Boat; c) Boats uses for sleep in night

## 3.4 Weakness

### 3.4.1 Canal bank erosion

Maximum flood occurred due to canal bank erosion. Bank of the canal are composed by clay soil. This soil are very hard in summer but very brittle in presence of water. In low tide undercurrent frequently damaged the slope (Fig. 9). Damage slope cannot sustain a large period. Crabs and other fishery frequently create hole on the bank and increase the vulnerability to canal bank erosion. Peoples of the area also include that, children's play in canal bank after tide and increase the fragile condition of bank. Some peoples illegally uses bank clay for construct house which easily damage the stability of canal bank.



Figure 9: Canal bank erosion (Photo credit: Afjal Hossain)

#### 3.4.2 Dumping waste into canal and excessive siltation:

Peoples haven't sincere about dumping their waste. Maximum time they throw their food waste, household, straw and other garbage into the canal water. Peoples even dispose manure into canal and river water. Excessive siltation is one of the major cause for frequently flood. During high tide river water carry a vast amount of silt. Several canal are end at the dead canal. Almost every canal haven't sufficient velocity of water flow. Every year canals are going to be filled up by silt. At this circumstances canal cannot carry sufficient amount of water of high tide. In Rainy season excessive rainfall also added with high tide water and devastating flood have arisen. Participants of our field survey also added that, after a medium or high rainfall maximum fishery land go under water. In recent year about one feet water stuck on fishery land divider. This sudden flood also create water logging which stay almost one month.

#### 3.4.3 Uncontrolled Switch gate:

Canal of these area are internally connected by each other and adjacent river. Every joint area of river and canal have switch gate. Unavailability of appropriate personnel sometimes it hampered the livelihood of people. Sometimes switch off this gate and high tide flooded the adjacent area. After open this path and high velocity current damage the bank of the canal.

#### 3.4.4 Sanitation quality:

Water quality, rather than access, is the major hindrance in Bangladesh, especially in Satkhira district where mineral contamination, especially of arsenic, in shallow and some deep tube wells has been a big cause of concern. Furthermore, while sanitation access is high in the area, the access to hygienic, water-sealed sanitation facilities are worrying. Access to appropriate water and sanitation quality possibly has a synergistic effect, with studies noting a better weight in those with both than in those with one or the other (ACF, 2014). We observed that still now some poor and illiterate people uses canal side unhealthy toilet (Fig. 10).



Figure 10: Cannel side unhealthy Toilet



#### 3.4.5 Unavailability of universal primary education:

It is a matter of great sorrow that community peoples are not highly interested in educational field. It is totally opposite of MDG-2015 (3) Goal. Peoples thinking is education have not much need in their personal and professional life. A number of students also go school, college, University and acquire higher level of studies but this statistics isn't expected level. Female children's are worse victim of this thinking. During disaster developed countries strategy is to conduct Emergency Education to prevent drop out of students. These particular community have not adopt in emergency education program. Areas which are most vulnerable to cyclones include the worst performing Upazilas of Satkhira such as Kaliganj in terms of primary school attendance is very low(Relief web,2013).

#### 3.4.6 Haven't sufficient vegetable garden:

People's main occupation are fishery and agriculture. Most of the fishery are depend on saline water. Due to saline climate all vegetable rearing is not perfect. Have a fallen land but sometimes peoples not wanted to cultivate any crops. They can cultivate some crops. Floating gardening, Fish-poultry combines farming may be effective in this area.

Several people also uses their fallen land for vegetable gardening. Due to lack of proper knowledge people cannot get expected outcome. Even in flood condition, standing water causes decayed of vegetable roots. Another major cause of losses is pest attack in vegetable garden (Fig.11). Ultimately people doesn't get any outcome. This area are almost rural so, sub assistant agriculture officer cannot contact with farmers effectively. Result of that, sustainable agriculture practice have not adopt this community. Disease and pest attack is one of the great problem of the agriculture practices.



Figure 11: Pest attack in a brinjal garden (Photo credit: Faysal Talukder)

#### 3.4.7 Unavailability of drinking water collection system:

“Have a large body of water haven't any drops of drinking water” this scenario is very common some particular area. Peoples collect water from distance deep tube well. Some shallow tube well also there but it's polluted by arsenic or high level of saline content.

Rain water harvesting is better for this area but harvesting plant haven't sufficient. Community peoples does not aware about sanitation. They seldom clean the rain water collection pot. Poor peoples also drink canal water which contains different virus, bacteria, berry etc. Due to drink this unhealthy water every year a significant number of peoples affected by different diseases.

#### 3.4.8 Conflict among people for Cultivation:

There have a great conflict among people about shrimp and agriculture cultivation. One part wanted to cultivate only shrimp others are interested in agriculture crop cultivation. Peoples describe once entered saline water into any land in future farmers cannot use these land for agriculture purpose. Saline water also effect on adjacent areas land and ground water. After certain year saline land property changes the climate of the whole area.

#### 3.4.9 Slope instability of main road:

Almost every main road of the community are construct by mud. Maximum time its side fall down and sliding mud to canal or river. Every year relatively rainy season its intensity is acute. Almost every year peoples construct road and fishery land divider. Seldom people maintain slope stability measure. Peoples concern about slope stability may reduce the road side failure.

#### 3.4.10 Unavailability of Electricity:

Those community have potentiality to establish shrimp processing industry. Lack of electricity peoples cannot do so. In homemade interview people include that prawn of this area gain export quality and maximum prawn of their area have exported to different countries of the world. If they are able to process prawn immediately after catch it will be very much effective of their socio economic condition. If government have taken initiative to provide electricity facility immediately, these community could gain more economic resiliency.

#### 4. CONCLUSION AND RECOMMENDATIONS:

A vast people of our study area haven't sufficient level of educational qualification. They born with disaster, growing with disaster and surviving with disaster. Their indigenous knowledge such as for fish reserve-reuse poring wastes plastic pot, using boat in several purpose. Predominant strengthening factor of our study area are caraway and goal tree plantation on the canal side, micro scale rain water collection system, bridge construction by locally available materials, practices now a days becoming a part of the culture with the time being. Some weakness factor such as canal bank erosion, dumping waste into canal and excessive siltation, uncontrolled switch gate, sanitation quality, unavailability of universal primary education also adopted this community yet. Elder people of that area may predict any disaster just seeing weather phenomena. Day by day they are changing their coping mechanism and strategy according their own thinking. Surprisingly they have no idea about scientific disaster prediction and sustainable adaptation mechanism. This culture is continuing above the hundreds of years. Orally they taught about those knowledge and practices from their elders but it is not properly documented. If those techniques are properly identified, documented and collaborative with modern knowledge in future this community will be more resilient in any disaster.

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#### REFERENCES:

- Ali, M. Y., Mahmud, Z., Rashed, A., & Khanom, M. (2013). *POST-HARVEST QUALITY LOSS OF SHRIMP ( Penaeus monodon ) IN THE VALUE CHAIN OF SOUTHWESTERN REGION ( SATKHIRA ) IN BANGLADESH*, 3(2), 36–44.
- ACF-International, "Pathways of Undernutrition," Paris, France, 2014. Retrieved from: <http://www.actioncontrelafaim.org/sites/default/files/publications/fichiers/nutritioncausalanalysis-linkncasatkhiradistrictbangladesh2014.compressed.pdf>
- A. H. Smith, E. O. Lingas, and M. Rahman, "Contamination of drinking-water by arsenic in Bangladesh : a public health emergency," *World Heal. Organ. Bull.*, vol. 78, no. 9, 2000.
- Ibrahim, R. (2012). Statistics and Informatics Division. Population and Housing Census 2011, (June) *Community Report Satkhira Zila June 2011-2012 Retrived from* <http://www.bbs.gov.bd/Census2011/Khulna/Satkhira/Satkhira%20at%20a%20glance.pdf>
- Bangladesh, STATISTICS AND INFORMATICS DIVISION (SID).(2013). *District Statistics 2011* Chapter 11, 385–400. *Retrived from* <http://www.bbs.gov.bd/WebTestApplication/userfiles/Image/District%20Statistics/Satkhira.pdf>
- Reliefweb. (2014). *PRE-DISASTER SECONDARY DATA*, 80 (March), 1–29. Retrived from: [http://reliefweb.int/sites/reliefweb.int/files/resources/0809\\_NW\\_Flooding\\_JNA\\_FinalFINAL.pdf](http://reliefweb.int/sites/reliefweb.int/files/resources/0809_NW_Flooding_JNA_FinalFINAL.pdf)
- Uddin, J., Rahim, A., Rahman, S., Satter, A., & Dutta, N. (2015). Community Perception on Climate Change and Adaptation Scenarios in Southern Part of Bangladesh, 1(2), 12–18. <http://doi.org/10.11648/j.jher.20150102.11>