Adaptation to Climate Change: An Anthropological Study on Changing Livelihoods Strategies of *Malo* Fishing Community in South-west Coastal Bangladesh

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Abstract: Bangladesh is a disaster-prone and one of the most vulnerable countries to climate change. The country has a long coastal area which is frequently being affected by several types of natural disasters due to climate change. The disasters have impacted the life and livelihoods of different natural resources depending communities living in the coastal areas. The *Malo* is a Hindu religious traditional fishing community living at Taiabpur Village in Sarafpur Union[1] of Dumuria Upazila[2] of Khulna district of south-west coastal Bangladesh. Fishing is the only means of their livelihoods and the community is engaged in fishing practices inherently in rivers, estuaries and sea since more than 300 years. The study aims to examine the impacts of climate change on the livelihoods of *Malo* fishing community and identify the adaptation practices by them from anthropological point of views. The study has identified three types of adaptation practices by *Malo* fishing community to cope with the climate change and disasters. The study has suggested some recommendations for overcoming the challenges of climate change and sustain the traditional fishing livelihoods of fishing communities of south-west coastal Bangladesh.

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[1] Union is the smallest rural administrative and local government unit in Bangladesh

[2] Upazila is the second lowest tier of regional administration in Bangladesh.

1. Introduction

In the current world, climate change has become one of the biggest threats to environment, community people and traditional livelihoods for its severe impacts. According to Inter-governmental Panel for Climate Change (IPCC), "climate change refers as a change in climate that is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and that is in addition to natural climate variability observed over comparable time periods". Between 1996 to 2015, more than 90% of natural hazards were related to climate change like storms, floods, droughts, heat waves by which extreme weather killed more than 500,000 people and damaged total than USD 3.08 trillion (United Nations Report, 2016).

The fifth assessment report of IPCC for South Asia predicted that monsoon rainfall will increase and result in higher flows during monsoon season in the river system. IPPC has also predicted that sea level rise will be between 0.8 to 0.9 meters which will lead to salinity intrusion and coastal flooding in Bangladesh.

Bangladesh is already vulnerable to many climate change related extreme events and natural disasters. It has been predicted that the climate change will bring changes in characteristics of natural hazards and gradual changes phenomenon in the physical system. Among these calamities; the salinity intrusion has caused unfavourable environment in the coastal areas of Bangladesh which is very threatening to the coastal livelihoods and biodiversity, fisheries, fresh water sources, primary production system and food security, and human health also.

Bangladesh has 710 km long coastline. According to the Coastal Zone Policy (CZP), 2005 of the Government of Bangladesh, there are 19 districts out of 64 are in the coastal zone of the country. The zone is divided into exposed and interior coast according to the position of land. The exposed coast embraces the sea directly and is subject to be affected highly by the anticipated sea level rise. The coastal zone covers 47,201 square kilometers land area, which is 32 percent of total landmass of the country. Population density in interior coast is much higher than that of the exterior coast and the country's

average. (Bangladesh Bureau of Statistics Report, 2011).

The geo-graphical location and socio-demographic features of Bangladesh made it one of the most vulnerable countries to climate change. It's south-west coastal area's fisheries practices which include the major part of the livelihoods of many natural resource communities have been impacted heavily due to climate change. Over the past few decades, studies related to climate change adaptation have been conducted from anthropological approach at the individual communities across the world considering the cultural and social values of respective community. The changes of any community due to climate change can be observed from in-depth fieldwork of anthropological study. These types of studies help to recognize the real scenario of community and recommend for ways out.

The study assessed the climate change impacts and influence on the livelihoods among the *Malo* fishing community Taibabpur Village of Sarafpur Union of Dumuria Upazila of Khulna District. This traditional coastal fishing community has been catching fish in rivers, estuaries and sea since more than 300 years. The *Malo* is a Hindu religious fishing community and its people usually become engaged with the fisheries practices inherently. Fishing is the only means of their livelihoods and in recent years, climate change has negatively impacted on their only livelihoods option. Earlier; they used to catch abundant fish, but recent natural and human induced climate change impacts reduced the opportunities of their fishing livelihoods and made them vulnerable.

The objectives of the study were:

- To examine climate change impacts on livelihoods of *Malo* fishing community.
- To identify the adaptation strategies undertaken and practiced by *Malo* fishing community to cope with climate change.
- To explore the changing livelihoods of *Malo* fishing community.

2. Material and Methods

From ethnographic insights, the study was conducted at participatory observation approach using both qualitative and quantitative perspectives. To understand the strength of coastal livelihoods and climate vulnerability of *Malo* fishing community, Sustainable Livelihoods Approach (SLA)[3] theory was applied. Data were collected from both primary and secondary sources. The primary source of data included village census, face-to-face and in-depth interviews and case studies. The secondary data comprised different national and international documents, policy papers, books and articles and peer-viewed documents on climate change, vulnerability, adaptation, coastal livelihoods strategies and fisheries.

2.1 Study area and profile of *Malo* fishing community

The Taibabpur Village is situated at Dumuria Upazila of Khulna District. The level of river salinity of Dumuria Upazila was 12.3 as measured in 2012 which would be worst future 12.6 by 2050. (Dasgupta. S, Kamal. F.A, Khan. Z.A, Choudhury. S, Nishat. A, 2014). Around Upazila, there are two major rivers name, *Shibsha* and *Shangrail*. In north Shahosh Union, in south Paigacha Upazila, in west Buri Vadra river and in east branch of Shibsha river is located of Sarafpur union. (Data source: Sarafpur Union Parishad, 2017). The lands of the area are plain.

The *Malo* fishing community have been catching fish in the area before the British period to present. The word *Malo* is derived from the Arabic word *Malia* (boatman) and their original profession was playing boats (Risley 1981). During the *Zamindary*[4] system under the British rule, the *Malo* could fish freely in all open waters in exchange for a nominal tax to the *Zaminders*. After the abolition of the *Zamindary* system, especially in 1960s when the leasing system became fully operational, their life and the livelihoods become harder. In 1986, the Government of Bangladesh declared a new fisheries policy and allowed the fishing groups including *Malo* to catch fish who have the own net. So, they have history in the south-west coastal area of Bangladesh centuries after centuries and been sustaining in the area with facing different disasters. There were found about 132 total number of households of *Malo* fishing community at the study area. The total population of this community were 532 including 273 males and 259 females.

3. Results

3.1 Cultures and fishing practices

Most of the households were poor and hardcore poor. About all the capable male including boys above 10 years were engaged in fish catching occupation in rivers and sometimes in sea and estuaries**.** The female members were engaged in different domestic tasks with preparing nets and decorating varied materials

[3] SLA was introduced by Robert Chambers and Gordon Conway in 1991. In 1997, this sustainable livelihood framework was picked up by the DFID (UK).

[4] Zaminders were the landholders of demarcated areas, responsible for collecting revenue for the monarchy and rose into prominence during the British colonial era.

while the male went for fish catching. The *Malo* fishing people can be classified in low social position considering their social dignity, property and power. Rice, bread, fish, meat, vegetable and dal were their common foods. No *Malo* people was found who had the direct connection with agriculture. Fishing was the only means of their life and livelihoods. The education rate among them was very low (about only 4%) and poverty was the main cause for this. The children must help their fathers or brothers in boat for catching fish when they become aged between 10 to 12 years. So, most of the children were not getting the opportunity to receive formal education. Early marriage was seen among the girls, so they also become deprived from education. Natural disasters and fishing livelihoods option were also the hinder of taking education for them. It was tough for them to be engaged in other professions because of their lack of education. *Malo* is a Hindu fishing community. They were seen to observe several types of cultural practices such scheduled *Puja*, *Kirtan* and song shows at the village temple. The community people usually took treatment from local doctors, community clinic and Dumuria Upazila health complex. In few cases, they tried to go Khulna Government Medical Hospital for taking better treatment. They also used to take treatment from other places while going to fish catching far from respective area of staying of their houses.

Malo fishing people usually needed some necessary equipment while going to catch fish. These necessary requirements were food, medicine, life jacket, supportive manpower, enough nets, vaccine, information about disasters, enough oils, fishing gears, big boat run by engine and water purifying tablets. These requirements were very essential to catch fish smoothly. But in many cases, most of the fishing people could not afford all this necessary equipment. It was identified that life jacket, vaccine and medicine were not affordable by most of fishing people. They faced some multiple problems like lack of education, crisis of safe drinking water and improved sanitation facilities, insufficient embankment and cyclone centers, lack of financial capital for fish catching purpose, excessive presence of middlemen, very few livelihoods options without fish catching and lack of enough trainings for achieving alternative livelihoods. The socio-economic and financial causes and climate change were responsible for these problems.

It was found that they used to catch fish from two sources for livelihoods purpose. Firstly; they used to catch fish in rivers and close and open water bodies; and secondly; they used to go to estuaries and sea for fish catching. When they caught fish in rivers and close and open water bodies; they could come back home within the scheduled day. But when they used to go to estuaries and sea, they needed a good preparation and must carry other necessary equipment to stay and spend 15 to 75 days in sea and 15 to 45 days in estuaries. But, all the fishing people did not have the ability to catch fish in sea and estuaries because strong boats, more manpower, enough oil and other equipment were mandatory while going to these fishing grounds. Those who had the capacity to arrange and manage these necessary needs usually went to estuaries and sea. The others usually caught fish in *Vadra*, *Shingrale* and *Shibsha* rivers and adjacent fishing grounds of *Sundarban*.

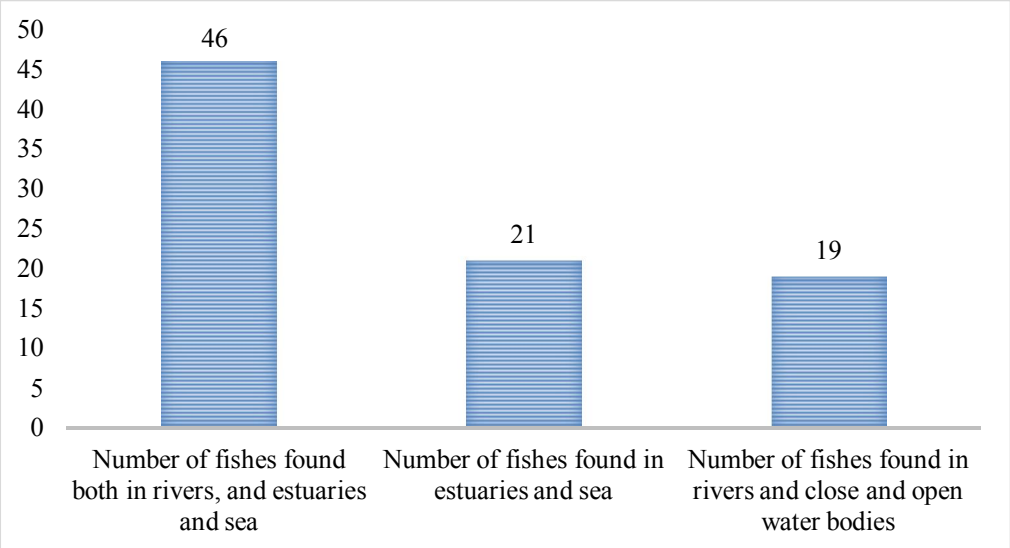

Figure 1: Fish catching by *Malo*

The figure 1 shows that about 46 type of fishes were haunted by *Malo* fishing people in rivers, and estuaries and sea. About 19 type of fishes were haunted by them in rivers and close and open water bodies.

3.3 Climate and social vulnerability

The vulnerability of *Malo* fishing community was assessed, and six hazards were identified. These hazards had already impacted and been frequently affecting their livelihoods. Sometimes, these hazards turned into disasters and make lot losses of their livelihoods.

Table 1: Ranking of the frequent hazards that affect the *Malo* fishing community

Sl.	Name of the hazard	Ranking	Affecting period
1.	River erosion	1st	June to September
2.	Tidal surge and cyclone	2nd	April to June and September to November
3.	Salinity	3rd	December to May
4.	Excessive rainfall within a very fleeting period	4th	August to September
5.	Flood	5th	July to September
6.	Excessive hot weather	6th	April to September

Impacts of hazards:

- Destroy properties and livelihoods options.
- Make economic loss and create problems for getting safe water and having access to hygienic sanitation.
- Destroy housing infrastructure and roads .
- Increase displacement and force the *Malo* people to shift their properties .
- Spread several types of diseases.

3.4 Impacts of climate change on livelihoods

Though the community area is treated as the green area due to its coastal nature but in past years the impacts of natural and human induced climate change had been visible. As a result, *Sidar*[5], *Aila*[6], cyclone, river erosion was acute in this area which had negatively impacted on livelihoods. Though in previous time, the climate of the community was mainly moderate. But in last 15 years, the climatic variation has been acute as massive changes have occurred in the seasons round the year. Heavy rainfall in the short span of time has been visible in last few years and the river erosion has increased. It was found that the climate change had many impacts on the livelihoods of *Malo* fishing community:

- Climate Change had impacts on natural, financial, physical, social and human capital of *Malo* fishing community.
- Fishing had been a vulnerable profession for them.
- Climate Change has impacts on habitat quality and migration routes of fishes and destroy the breeding sites. It was found that 15 types of fishes were less available. This occurred because destruction of fishing grounds and rise of temperature derived from climate change.
- The expenditures of living and fishing mechanisms has been found at an increasing ratio where their savings identified at a low figure.
- Boys between age 10 to 12 years must assist their fathers/brothers for fish catching. So, they were losing their childhood and opportunity of education.

3.5 Adaptation to climate change

It was found that three types of adaptation measurements were helping *Malo* fishing community to cope with the impacts of climate change.

- Indigenous/conventional adaptation practices .
- Institutional adaptation approaches undertaken by Government.
- Adaptation initiatives undertaken non-government and community-based organizations.

3.5.1 Indigenous/conventional adaptation practices:

The *Malo* fishing community of Sarafpur Union has developed their own adaptation strategy in last few decades by using their indigenous knowledge. Though they don't know the meaning of adaptation, but they can distinguish the way to fight with the natural disasters and calamities. Adaption meaning for this fishing community means way of surviving. These adaptation practices include:

- Designing disaster-resilient houses to reduce disaster impacts.
- Planting trees to tackle severe impacts of cyclones.
- Excavating dumps to preserve the valuable assets.
- Growing vegetables and rear domestic livestock to earn surplus money.
- Borrowing money from neighbors.

3.5.2 Adaptation initiatives undertaken by Government: .

[5] A tropical cyclone that made landfall in Bangladesh on November 15, 2007

[6] A big cyclone that occurred on 23-26 May 2009 in Bangladesh

- Two shelter centers at the union were established by the government at Sarafpur union.
- Union Parishad played important role on risks reduction activities like helping in shifting the vulnerable people to shelter centers, providing dry food, medicine and safe water during disaster period.
- "Dumuria Upazila Fisheries and Livestock Office" provides advices *Malo* regarding different issues.

3.5.3. Adaptation initiatives undertaken non-government and community-based organizations: .

- Some non-government organizations worked to reduce disaster risks and promoted fisheries aquaculture and salt tolerant species.
- Some community-based organizations helped to equip *Malo*'s boats with lifesaving kits, a radio (for listening cyclone warning) and re-excavated ponds which remained also as reservoir of sweet water and *Malo* fishing community's people used the water for drinking.

3.6 Changing livelihoods

Now, *Malo* have to think about alternative livelihoods as the fish catching has become vulnerable in recent years. It was found that they had apathy to alter their traditional fish catching practices, but they were bound to migrate to near city or town for better livelihoods options. They are growing vegetables and rearing domestic livestock to earn surplus money. The women are working as day labor in nearest community. Some has changed their profession as mason, laborer in rice mills and brick fields also. Some young are going to Khulna city for getting better occupation such working at shops, riding rickshaws and vans. Some of them have the plan to go capital (Dhaka) for new livelihoods searching.

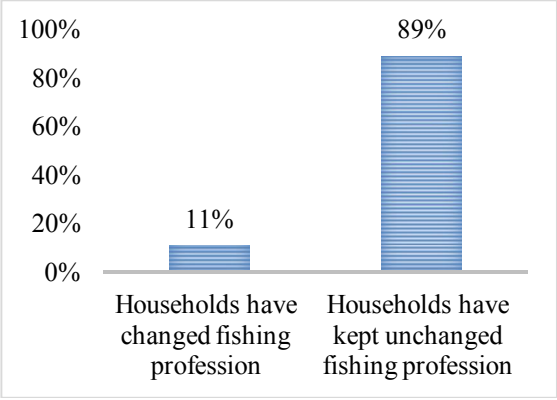

Figure 2: Changing profession in last 5 years

The figure shows that in last 5 years about 11% of the households of the study have changed their fishing profession.

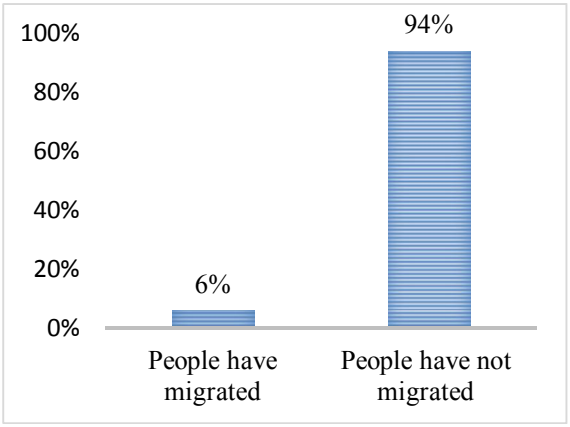

Figure 3: Migration to towns or cities for seeking alternative livelihoods in last 5 years

The figure shows that about 6% of the people have migrated to towns or cities for seeking alternative livelihoods in last 5 years.

3.6 Recommendations:

For overcoming the challenges and facing the impacts of climate change and to sustain their traditional fishing livelihoods two types of recommendations; firstly, academic and research recommendations and secondly, policy recommendations were accumulated from the study. These are:

- Research should be conducted to formulate plans and innovate new adaptation strategies for *Malo* fishing community.
- Enough cyclone centers and embankment should be established by Government for *Malo* fishing community.
- The Upazila Administration should undertake special awareness programs to reduce the adverse impact of disasters.
- There should be coordination among the Union Parishad, non-government organizations and other stakeholders while initiating any program and planning for livelihoods improvement for *Malo*.
- Different financial organizations should work to provide loans to *Malo* with low interest.

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