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EVERYDAY STRUGGLES AND ADAPTIVE STRATEGIES: A SNAPSHOT ON THE IMPACT OF CLIMATE CHANGE OVER THE LIVELIHOODS IN HAIL HAOR, MOULOVIBAZAR, BANGLADESH

Mohammad Monjur-Ul-Haider and A. F. M. Zakaria

1. Assistant Professor, Department of Anthropology, Shahjalal University of Science & Technology (SUST)
monjur-anp@sust.edu
2. Assistant Professor, Department of Anthropology, SUST (on study leave); Graduate Fellow, Environmental Policy, Memorial University of Newfoundland, Canada.
afmanp@gmail.com

Abstract

Bio- cultural diversity and survival strategies are getting high concentration in present academic scholarships due to rapid climatic chaos. Bangladesh is one of those countries, which is tagged as one of the most vulnerable to climate change. Climate driven hazards are exhibited frequently in the Haor-regions of the country. The resources around Haor like- water, fishes, birds, firewood, seasonal crops and vegetables, sand, coal, stones etc. are reacting with the changing climate and the Haor-people are struggling to adapt in their everyday life. The Haor-people have to sustain with their pertaining resources and those are deeply influenced by climate change. It becomes necessary to understand the impacts of climate change over the peoples and adaptation strategies that people adopt and discover in their everyday life in Hail Haor of Moulavibazar district, Bangladesh. One should also identify the problems that Haor-people face due to climate change and suggests recommendations from the local perspective to overcome from the situation.

Keywords: adaptation; adaptive strategies; climate change; natural resources; *Haor* lives; livelihood.

1. Introduction

Human history is a history of adaptation and mal-adaptation. Adaptation to climate change, a promising scientific field of study, its expression remains confused and is predestined to be so due to the lack of clarity if its definition, which is still in shaping (Burton, 2002). Anthropology studies the nature

of adaptation an adaptive strategies from its very beginning especially by forming a different school of thought namely cultural ecology. It looks at the manner in which individuals and groups adapt to their environment by measuring the costs/benefits and successes/failures of these changes.

The Tropic Cancer passes through the middle of Bangladesh dividing it into two halves, and it enjoys a tropical climate. The climate of this country is characterized by high temperature, heavy rainfall, often-excessive humidity and a fairly marked seasonal variation throughout the year. Bangladesh, one of the poorest countries, almost every year faces climate driven hazards (World Bank, 2000). Hazardous extreme events occur frequently, which are originated from water driven and climate induced phenomena (Rahman, et al., 1990). The climate-induced natural disasters are floods, cyclones and storm surges, droughts that cost much to the country's physical infrastructures, crops, lives and other properties of the people.

The importance of wetlands for Bangladesh can hardly be overstated. About half area of the country can be considered as wetlands (Khan, M.S. et al., 1994). Bangladesh possesses vast areas of wetlands including rivers and streams, freshwater lakes and marshes, *Haors, Baors, Beels*, water storage reservoirs, fish ponds, flooded cultivated fields and estuarine systems with extensive mangrove swamps. The life and livelihood on Bangladesh is dependent on the wetlands. The lakes are the source of fisheries, aquatic vegetations and other biodiversity, irrigation, navigation and flood control etc (Chakrabarty, T. R. 2005). Because of extensive dependency, lack of proper management and climate change, these resources and local people livelihood are in enormous danger. Resource driven conflicts and marginalization process have been escalated.

This paper allows understanding how local practices and mitigation measures (i.e., decision making and techniques applied) with the greater cultural sphere of the *Haor*-peoples. This also helps in knowing how *Haor*-peoples identify their problems related to disaster risk reduction and climatic vulnerability. On the other hand, this study helps in examining the findings of the former studies undertaken at the study area. It enables the inclusion of *Haor*-peoples' view regarding different mitigation measures, livelihood initiatives and social actions in *Moulavibazar* district.

2. Objectives

The study explores the impact of climate change and the adaptation strategies taken by the peoples of *Hail Haor* in *Moulavibazar* district. More specifically, this paper reveals the impact of climate change among the lives and livelihoods of the *Hail Haor by* assessing the vulnerabilities of the *Haor*-peoples, knowing how they respond and documenting the recommendations from the local perspective to overcome from adverse effect of climate changes.

3. Theoretical Understanding

Adaptation is at the end both a process and its outcome of everyday struggle to cope with the surrounding environment (Simonet, 2010). It refers to kinds of working relationships of everyday life. Confronted with the acceleration and intensification of global environmental and socio-economic changes, which are the source of this problem, research into the adaptation of systems continues to grow (Moran, 2000). In anthropology, adaptation is defined as the process through which organisms or populations of organisms make biological or behavioral adjustments that will facilitate or assure their reproductive success, and therefore survival, in their environment. The success or failure of adaptive responses can only be measured on a long term basis and the consequences of the observed behaviors on evolution are not predictable (Bates, 2005). However, despite an influence on an old regional scale, the appearance of climatic changes induced by man on the planetary scale is unprecedented. From hunting-gathering to post capitalism is the result of continuous struggle to cope with the changing circumstances and for searching better coping mechanism. Therefore, since individuals have always adapted to climate, which can be called as somatic adaptation which is experienced by an individual by his life course but ultimately it is shared and the whole community that follow but sometimes improper interference from outside in the name of technical advice or management that also may leads towards mal-adaptation too. Since life resembles and reflects a successful adaptation, the sole objective of the adaptation of a system resides in its survival.

According to Terrell (2006), Human adaptation is a classic example of what has been more generally termed ecological niche construction. Niche construction occurs when an organism modifies its relationships with its surroundings by actively changing one or more of the factors in its environment,

either by physically perturbing factors at its current location in space and time, or by relocating to a different space-time address, thereby exposing itself to different factors. By analyzing Guinea wetlands management, Terrell (2006) also focuses on adaptive strategies of local people which derived from inherited friendship and transgenerational management of resources. These epistemological understandings give the framework in articulating this study in exploring the *Haor people's* perceptions and reactions in coping mechanism in the era of climate change in Bangladesh

4. Methods

The study has been conducted by a research team that brings together a range of methodological approaches including Participatory Rural Appraisal (PRA), Life Histories, Case Studies, In-depth Interviews, Focus Group Discussions (FGD) in order to obtain greater insight into the study areas. The purpose of the FGD was to collect local perception on a specified topic (regarding climate change) from a group the members of which 'spark' off each other. The research team tries to identify the households having 2-3 generations (grandfather/grandmother/father/ mother/son/daughter/grandson/granddaughter) in a family as key respondents to collect generation views and experiences regarding climate change. Field site inter-generational dialogues has been arranged with the participation of local social activists, teachers, youths, farmers, fishers, and local elected bodies (different ages) to raise the issues to address the climatic changes that are occurring and coping strategies.

This study also focuses on an interdisciplinary review of secondary sources related to climatic changes, adaptation and livelihood strategies in the disaster-prone areas. The institutional data have been collected from universities, research institutions, apex agencies, and relevant departments of the government.

5. People and Struggles

The *Hail Haor* is located in the North-Eastern Bangladesh and is a part of the Sylhet *Haor* basin. Sylhet basin covers a large number of *Haors* and wetlands and among those *Hakaluki haor*, *Tanguar haor, Hail haor* etc. cover an extensive area (WRI. 1990). This basin is an extensive alluvial plain supporting a variety of wetland habitats. It contains about 47 major *haors* and more than 6,000 *beels*, or freshwater lakes, nearly half of which are seasonal (Haque M.I. 2008). The *Hail Haor* is located in

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Mirjapur, *Kalapur*, *Srimongal Sadar*, *Ashidrone*, *Bhunobir* unions of *Srimongal Upazila*; and *Nazirabad*, *Giasnagar* unions of *Moulavibazar Sadar Upazila*. The aforesaid two *upazilas* are under Moulavibazar district. This *Haor* is a wetland basin in the midst of three hillocks (namely- *Satgaon*, *Balishira and Barshijura*) that become a large single body of water which overall catchment area 60,000 hectors; wet season *Haor* area 12,490 hr. dry season 4009 hr. (in the year of 1999, source: Bangladesh Water Development Board). It is surrounded by a chain of tea-gardens, pineapple fields, groves of rubber and natural forests. *Manu* River passes over the North-east side of the area and meets with *Kushyara* River. Thus, the *Hail Haor* consist of a variety of types ranging from ditches, peat lands, lakes, and rivers to deepwater paddy fields. All these variety form a unique mosaic of habitats with rich diversity of flora and fauna. This *Haor* bears the livelihood of thousands of people from diverse activities as fishing to collecting water plants, materials of thatching and firewood. The grazing system in this region support cattle that recycle nutrients, enrich soil and provide draft source. The plant diversity provides snakes, frogs, and certain fish species that help agriculture in general.

Synopsis of Case Study-1: Climate changed considerably

Arjot Uddin*, 65 an elderly peasant of *Hajipur* had experienced very worst situation with his paddy cultivation. He lost all crops for unwanted draught. He told us, "The age-old trends in climate parameter have been changed considerably. We have experienced climate anomalies and this is very true. We have observed almost 30 consecutive rainless days during peak monsoon, which is unthinkable. Temperature increases, century old patterns of cultivation have changed as well." Mr. Arjot Uddin also added, "New generations in both rural and urban do not believe that there had been six seasons in Bangladesh."

The hydrology of *Hail Haor*, as elsewhere in other wetlands of the country, was dominated heavy rainfall by the end of April that fills up the entire *Haor*. Peasants had to leave the almost ripe paddy just about 10-15 days before harvest. But the realities have been changed in recent decades by the creation of dwarf embankments. The most important *Boro* (early maturing variety) paddy enabled to harvest a bit earlier than before, while the submersible embankments can now hold the water for a few extra days that are critical to harvest the crop before the entire *Haor* becomes flooded. Once flooded, water can easily overtop the dwarf embankments allowing aquatic plants and fish to flourish. Though there is no

option left for a second crop, abundance of fish helps to continue local economy. Availability of other aquatic flora and fauna helps the peoples of *Hail Haor* to maintain their livelihood. According to the local people, there are 138 *Beels* in *Hail Haor* among those 14 were noticed as sanctuary for fish conservation and availability of fishes by safe breeding. Among 14, the mentionable are- *Agura, Balla, Barokandi, Borogangina, Digholi, Dum, Jaduria, Jathua, Kajura, Patrodoba,* and *Sananda Koch*. There is a permanent sanctuary named *Baikka Beel* where different fish species are available including the endangered fishes, like- *Kajoli, Gulsha, Meni, Rani* etc. In recent times number of fishes reduces remarkably due to different reasons, such as: scarcity of fish food, brood fish catching, use of insecticide in the crop field, degradation of water quality, dewatering in dry season, lack of rain, disappearing; pollution, over harvesting of the natural resources, land use conflict, lack of upstream water flow in winter, over flow of water in monsoon, increase risk of flood, entrance of saline water due to lack of water flow in winter, land erosion, siltation, road construction and other development activities.

Besides, climate change is also a factor for reducing the number of fishes. Climate change has influenced the rainfall patterns. Temperature and rainfall patterns of the last decades show that the average temperature in both monsoon and winter has increased and that's why people of *Hail Haor* are having more rain in the monsoon and less in the winter. If excess rainfall occurs between the end-April and early-May. It would not be possible for the peasants to collect their almost ripe paddy. This will have adverse impacts on food availability from local sources. Moreover, frequent use of chemical fertilizer and insecticides lessened the paddy variety and production. Therefore, it would add reliance on imported rice from uncertain international markets, which may add an extra measure of poverty to the poor peoples of the *Hail Haor.*

Hail Haor has been famous for its livestock farming and milk supplying. The available land for grazing has decreased remarkably. Shortage of transportation facility is another barrier in this sector. Delay in raw-milk marketing might have resulted in loss of income. The peoples of *Hail Haor* do not feel comfort in livestock husbandry now.

It is found from the study that there are some key factors for which climatic hazards occurs in *Haor* region, viz. slope and flat landscape, increasing population density, agro-based economy, climate based

cropping and fishing, seasonal variety dependant on monsoon. It is likely that the ecosystem of *Hail Haor* will be affected badly due to climate change; heavy falling, flash-flood, soil erosion, decreasing fertility, draught and some other environmental hazards take places. The *Haor* ecosystem is abundantly dependent on availability of water. If water comes in earlier than the harvest of *Boro* paddy, the production decreases. On the other hand, fish grow well if there is adequate monsoon flow. However, there is huge uncertainty regarding the timing of occurrence of monsoon rainfall. If pre-monsoon local convective rainfall comes early, farmers may not find adequate time to harvest *Boro*.

In the dry season, the area of the *Hail Haor* shrinks. The study shows that huge changes have occurred due to sedimentation and as a result depth and duration of inundation has changed. This change shows a positive impact on agricultural aspects enhancing emergence of new soil boundaries and serious negative impact on eco-environmental aspects i.e. reduction of wetland ecosystem (Uddin, M. J., Mohiuddin, A. S.M. & Hossain, S. T., 2013). Similar results were also described by Nishat, A (1993) and Sultana et al. (2009) in accretion of land for edifice use in some flood prone areas of Bangladesh (Erickson et al., 1993). Sedimentation has taken place in low lying areas where grazing land emerges in course of time in some flood prone areas (Ullah et al., 2006). The study revealed that the farmers grew pineapple and citrus fruits (like: citron, lemon, lime, orange etc.) in rows running up-down slope of hillocks pick up the pace of soil erosion.

6. **Adaptive Strategies**

The NAPA (National Adaptation Plan for Action) Bangladesh document is one of the few adaptation strategies which address the Climate Change issue for Bangladesh. An in-depth review of flat lands, coastal areas and wetlands reveals that Bangladesh requires a topographical and ecology specific strategies in adapting to Climate Change. The impacts of Climate Change are not restricted to environmental damage alone, the loss of life and property along with social catastrophes are all serious problems which require immediate interventions.

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For thousands of years peoples of *Hail Haor* have faced common climatic hazards of the area including flashfloods, floods, droughts, heavy rainfall and cyclones. The people have developed many adaptation techniques, knowledge and innovations to address climatic vulnerabilities. Their beliefs, practices and knowledge must be considered as an integral part of development. *Haor* peoples develop their location specific knowledge and practices of agriculture, natural resource management, human and animal health care and many areas over *Mulavibazar* district. The farmers of *Hail Haor* have found various ways for improving their farming techniques and adapting to their vulnerable situation. Like other wetlands *Hail Haor* remains submersed in water for most of the time of the year. This restricts farming activities severely, but the farmers have adopted the practice of making floating gardens using water hyacinth and banana tree. They also plant Banana, *Hijal* and *Koroch* trees to protect the homestead land from soil erosion. During the *Aman* season, farmers are cultivating *Dhoincha*. *Dhoincha* cultivation is a successful means to protect *Aman* paddy from the attack of flashflood at the bank of *Hail Haor*. They also adopt mixed cultivation combining paddy, beans and vegetables for maximizing the utilization of cultivable land. Farmers have developed their own means to save their life and assets from cyclone and tidal wave. They announce with a *chunga*-mike to alert the neighbors and they also use the mike of the mosque for the same purpose. The agricultural production system of this *Haor* relies mostly upon local practices, which has deep root within the *Haor*-land, environment and local people.

Synopsis of Case Study-2: Needs comprehensive initiative

Mr. Shahidullah*, a retired primary school-teacher of the Boruna village opined that, “Climate change is obvious; we have no way to make it unchangeable. We can adapt with it as our forefathers did. Side by side, weather forecasting, precautionary initiatives, awareness program through leaflet, billboard, drama, and folksongs would help the *Haor*-dwellers to concern about climate change.” “Necessary training should be given to the local people so that they can utilize *Haor* resources doing no harm to the nature”- he added.

* *Name used in this paper is pseudonym in order to*

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7. Concluding Remarks

Subsistence agriculture, commercial farming, fisheries, cattle grazing, livestock activities in *Hail Haor* have appeared as the dominant sources of livelihood which are seriously impacted by climate change. Against the impacts of climatic irregularities, respondents have adopted various strategies to cope with the new circumstance. The importance of the use of local perception for sustainable development has been gaining recognition and momentum worldwide. There are many examples in Bangladesh of development schemes that have failed because they have not listened to local people, nor tried to understand the society within which they are working. However, some recommendations hereunder from the local perspective to overcome from adverse effect of climate change.

Firstly, Paddy production can never reach the expected amount due to early rainfall and flash-flood. To mitigate the frequent loss in paddy sector, district agricultural officer should promote high value crops, with the help of DAE (Department of Agricultural Extension) which can initiate a joint venture that would enable local peasants to ensure maximum utilization of available resources under climate change and also should facilitate communities to practice low external input based sustainable agriculture & integrate biodiversity concerns.

Secondly, it is a fact that population of *Haor* is increasing. Adaptation strategy will not be sustainable if it only refers to agricultural sector. Non-agro activities also should be emphasized in the planning of adaptation strategy. The richness of *Haor* ecosystem in terms of fish should be considered to be an advantage where government loan or incentives should be given to establish export-oriented fisheries processing industries. The processed fish could be exported to the countries like UK & USA where there is a cluster of Bangladeshi Diaspora who have migrated from greater *Haor* region.

Thirdly, livestock farmers should get advantage of the flourishing urbanization and developing transportation. Local entrepreneur can invest to the milk pasteurization trade. It will create diversified employment opportunity which also facilitates communities to enhance capacity and practice alternative livelihood strategies.

Fourthly, the adolescent and the youth who dropped out from education should be brought under vocational training or technical skill enhancement program so that they may get job or could be a successful entrepreneur.

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Fifthly, early warning on heavy rainfall and flash-flood in *Haor* basin should be a priority. We can reduce the losses by improving national forecasting system. For better performance early warning with a high time of about 24 to 48 hours would be a good initiative. Local radio station and FM (frequency modulation radios) can play a good role by broadcasting such weather updates in right time in right language to *Haor* based communities. Farmers have their own knowledge to save their assets and almost-ripe paddy; that knowledge should be shared and disseminated.

The environmental problems that can result from imported technology such as the destruction of soil structure through foreign cultivation techniques, irrigation tools, establishment of embankment and culvert, or could be avoided if locally derived techniques were given the value they deserve. Local knowledge alternatives have a far higher up-take because they are in keeping with local socio-cultural norms and because in general they are more affordable and sustainable.

This study tries to understand how different socio-economic features would affect vulnerability and socio-economic thresholds for change, such as economic non-viability and unacceptable task. Systematically documenting and disseminating information related to the impact of natural resources activities on the global climate and vice versa is an important task. Identifying appropriate technological and policy interventions and area specific cultural knowledge to mitigate global climate change is crucial at the local and national level. On the final note, this study suggests to initiate a new integrative *Haor* management policy by incorporating indigenous environmental knowledge and appreciating the local adaptive strategies for facing the challenges lead by climate change.

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