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## Migration as an Adaptation Strategy and Its Consequences on Coastal Society: Experience from Bangladesh

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## Editorial

The conference “Environmental Change and Migration: From Vulnerabilities to Capabilities” was the first of a new conference series on “Environmental Degradation, Conflict and Forced Migration”. It was organised by the European Science Foundation, the Bielefeld University and its Center for Interdisciplinary Research. The Center on Migration, Citizenship and Development (COMCAD), the Universities’ unit responsible for scientific content and quality of the conference, has launched a COMCAD Working Paper Series on “Environmental Degradation and Migration”. The new series intends to give conference participants the opportunity to share their research with an even broader audience.

The symposium focused on how environmental change impacts the nexus between vulnerabilities on the one hand and capabilities on the other hand, and how this relationship affects mobility patterns. Although the conference organizers chose to include all kinds of environmental change and types of migration, climate change figured prominently among the submissions to the conference. Therefore, the conference aimed to bring together the perspectives from climate change, vulnerability, and migration studies, and to draw conclusions about the political implications of the knowledge scientists currently have available. Toward that goal, the conference was structured along three pillars. The first concentrated on climate change and the vulnerability of certain regions and groups. It covered case studies as well as different approaches for making climate change projections and assessing the likelihood of vulnerability. The second pillar focused on empirical research on environmentally induced migration from a vulnerabilities perspective, but acknowledged the occasionally strong elements of capability within it. In this way, the aim was to learn about approaches and options to support existing capabilities. The third pillar was concerned with the opportunities and pitfalls of policy options in dealing with the future challenge of climate induced displacement, and with the analysis of dominant public discourses within the field.

The researchers invited represented a wide range of disciplines, including sociology, social anthropology, migration, conflict, gender and development studies, geography, political science, international law, and climate and environmental science. The conference was also well balanced in terms of geographic origin, gender, and academic status of the participants. The conference programme and full report can be found at [www.esf.org/conferences/10328](http://www.esf.org/conferences/10328).

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## Abstract

In this article I investigated the complex relationship between disasters, migration and poverty in a case study carried out in one of the poorest and most disaster-prone countries in the world. The focus was set on individual household and community adaptation strategies. Through a literature review in this field I have developed and tested my own analytical model. In an extensive field survey, which was carried out in the southwest coastal region of Bangladesh, I asked around 280 residents who were affected by cyclone Aila in 2009. Original in this study is the explicit testing of the effectiveness of adaptive coping strategies to reduce the damage cost and its consequences to the social structural changes. Here, I considered 'migration' as a strategic step to cope with the adverse effect of cyclone Aila. In this study, I found that affected people act as hunters towards the relief materials immediately after the cyclone. When the relief programme was closed, male members of the family started moving towards nearer cities to find an income. Most of them started to pull rickshaws or to work as labourer in industries. They live at slum-environment to accumulate more money for their dependants; their out-migration from the family creates more social problems for their spouse as well. Accordingly, their spouse should take care of other family members and children. In most of the cases, those dependants move towards cities and and they also become migrants and start working there. However, it is evident that a lot of people do not bring their family and children and get married again. It introduces changes in local social structure. Furthermore, based on the income and asset distribution at the community level, this study developed societal cluster of migration and, correlating with previous disaster and census data, it introduces a new methodological tool for analysing disaster-migration nexus.

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## 1. Introduction

Natural disasters impact communities around the world. Whether they are in the form of floods, earthquakes, cyclones, tornadoes, hurricanes, or other, they will affect community integration and potentially an individual or family's desire to migrate. It is accepted that increased disasters and chronic environmental degradation will be followed by population movements (Bates 2002; Black 2001; Afsar 1999; Myers 1997). The impacts of climate change are likely to affect population distribution and mobility. Mobility and migration are the key responses to environmental and non-environmental transformations and pressures. They should therefore be a central element of strategies of adaptation to climate change. The purposes for migration are often differed; it is difficult to know the root causes of population movements. Do people migrate in search of better employment opportunities or because of environmental damage at home? Furthermore, after one devastated natural calamity like cyclone Sidr 2007 or cyclone Nargis 2008 or cyclone Aila 2009 on the coast of Bay of Bengal, was the poorer segment of the community was to replace its location?

Accordingly, this paper explores the nature of the relationships between disaster and migration, and between migration and poverty. It reviews the findings of studies on how cyclone Aila affected people's livelihoods and on the economic and social transformations in coastal Bangladesh. The purpose of this research is to study the effects of social segregation due to migration with the event of a disaster as the intervening variable. It also looks at the ways how the social segregation destroys community cohesion and residential satisfaction and finally it address the 'social inclusion and exclusion concept' (Rawal 2007; Luhman 1995). This research is important because it calls into question of social segregation to disaster-affected community and the choice of the victims leaving their original settlements. This is a question relevant to demographers who look at migration patterns and causes which contribute to residential moves. It will also contribute to the growing theories of social changes due to climate changes. On a practical note, by examining their impact on social structure and poverty, the study will benefit those community organizations whose key emphases are to provide integrative mechanisms for the livelihood development in coastal countries.

Taking this into consideration, this article is issued from a field research conducted in the Aila affected Upazilla of Shyamnagor, from April to July 2010. Roughly one year after the cyclone hit the coastline of Bangladesh, there was an urge to properly assess what are the long-term damages, and hence the long term recovery processes engaged in the rural villages (CRF 2010). Findings show that disparity in income and asset distribution at the community level

tends to be higher at risk exposure levels, implying that individually vulnerable households are also collectively more vulnerable. Finally, they have to leave their original settlements to ensure their bread and butter. From the findings, it is expected to propose tools and recommend guidelines for the future projects that may be implemented in the area.

The remainder of this article is organized as follows. Section 2 provides an overview of the theoretical concepts underlying migration theory and climate change concepts based upon the relevant literature in this field. Section 3 introduces the case study, along with the set-up of the household survey and in-depth interview. In section 4 the relationship between socio-economic vulnerability and migration is examined, while section 5 concludes.

## 2. Literature Review

Migration involves a spectrum of movement – from commuting or temporary absence from the home for a couple of days at a time to seasonal or permanent relocation. This paper focuses on rural-urban migration, which involves both permanent and temporary moves in search of employment and livelihoods as a factor of natural calamities.

In general migration literature has focused theoretically and empirically on questions related to why individuals move (or the leaving process) (Guest and Stamm 1993); the question of why do some persons stay has had little empirical research. Perhaps this question has not been addressed because it seems quite self-explanatory; people stay because they have chosen to live in a certain community in the first place. However, with the introduction of a disaster into the picture of community living, this question becomes more salient to multiple areas of research. Much of the research related to natural disasters and migration has been done in developing countries (Brown 2008; Bates 2002; Black 2001; Afsar 1999;). These studies have focused on the socio-economic factors which influence the decision to migrate following a disaster. The research done by Belcher and Bates (1982) discusses the impact of a disaster as a “push” to leave the area and to see the event as an opportunity creating a reason to move. It maximised the social ‘exclusion’ for the original community of the victims on the one hand and the ‘inclusion’ pressure to the new community of the victims on the other hand. Here, social exclusion has been defined as ‘the process through which individuals or groups are wholly or partially excluded from full participation in the society within which they live’ (European foundation, 1195, p.4, quoted in de Haan, 1998, cited in Francis, 2002); whereas, the concept of social exclusion is seen as covering a remarkably wide range of social and economic problems (Sen, A. 2000). Accordingly, social exclusion may be directly

a part of capability poverty (Sen, A. 2000). Indeed, Adam Smith's focus on the deprivation involved in not "being able to appear in public without shame" is a good example of a capability deprivation that takes the form of social exclusion (Sen, A. 2000). However, in this paper, I defined social exclusion as 'a matter of detachment for an old member from the original settlement' and social inclusion 'as a matter of addition of a new member to an (un)known social community'.

Again, disaster impacts in developing nations are potentially severe as they affect agriculture, health and lack of water/food supplies (Swain 1996) creating a semi-voluntary move to areas that are more sustainable for human life. The risks of remaining in an impacted area and the extent of damage to one's assets also have an impact on the decision to relocate (Kirschenbaum 1996). In one case of an involuntary relocation due to disaster, Miller, Turner, and Kimball (1981) found that the possibility of a family's return to their community became a critical factor in recovery. Human-capital theory (Kontuly, Smith and Heaton 1995) also looks at migration as a balance of costs and benefits, but includes psychological costs and non-economic amenity measures that produce quality of life.

Nonetheless, migration due to climatic risk may be defined as 'push' migration. Climate change might provide both "push" and "pull" for some population displacement. This is not to downplay the seriousness of climate change: above 4 or 5° C the predicted impacts of climate change become almost universally negative. But it is to make the point that the role of climate change in population displacement is not a linear relationship of cause and effect, of environmental "push" and economic "pull". Oli Brown (2008) stated that migration, even forced migration, is not usually just a product of an environmental "push" from a climate process like sea level rise. Except in cases of climate events, where people flee for their lives, it does require some kind of "pull": be it environmental, social or economic. There has to be the hope of a better life elsewhere, however much of a gamble it might be. Past environmental migratory movements, such as in the US Dust Bowl years in the 1930s, suggest that being able to migrate away from severe climatic conditions, in this case prolonged drought, requires would-be migrants to have some "social and financial capital" such as existing support networks in the destination area and the funds to be able to move (McLeman and Smit 2005).

Migration may occur often due to a lack of year-round employment in rural areas and/or a result of natural calamities such as floods, cyclones, etc. Rita Afsar (1999) reveals that almost two-fifths of rural households in Bangladesh sent their adult members to the nearest towns due to lack of year-round employment. The data show that respondents who left their homes immediately after the great floods tended to be from the poorer sections of the popu-



lation: they viewed migration as a temporary measure (Afsar 1999). Only people who lost their homesteads and/or assets such as livestock were forced to become permanent migrants. However, climate change challenges the adaptive capacities of communities, and overwhelms some, by interacting with and exacerbating existing problems of poverty. At some point that land becomes no longer capable of sustaining livelihoods and people will be forced to migrate to areas that present better opportunities. The “tipping points” will vary from place to place and from individual to individual. This paper is an example of the diversities of adaptation at different tipping levels from on of the most disaster-prone communities of the world, namely the coastal area of Bangladesh.

### 3. Coastal Zone of Bangladesh – note to empirical survey

The coastal areas of Bangladesh is different from the rest of the country; not only because of its unique geo-physical characteristics but also for different socio-political consequences that often limits people’s access to endowed resources and perpetuate risk and vulnerabilities. A vast river network, a dynamic estuarine system and a drainage basin intersect the coastal zone, which made coastal ecosystems as a potential source of natural resources, diversified fauna and flora composition, though there is also immense risk of natural disasters. This coastal area represents an area of 47,211 km<sup>2</sup>, 32 percent of the country’s geographical area, wherein 35 million people i.e. 28 percent of the country’s total population live at 6.85 million households (BBS, Population census in 2001). In terms of administrative consideration, 19 districts out of 64 are considered as coastal district. A study of IPPC (Inter Governmental Panel of Climate Change) in 2001 reveals that 20 percent respectively 40 percent of the world population live within 30 respectively 100 kilometres of the coast, which is very true in regards to Bangladesh’s perspective. However, it is not possible to include all these 19 coastal districts for this study due to time and resources. Rather it is concentrated on a particular area that is mostly affected by cyclone Aila in 2009.

The case study is carried out in 12 villages at four unions of Shyamnagor upazila in Satkhira district. These unions were severely affected by cyclone Aila and located in the southwest of Bangladesh, adjacent to the Sundarbans as the last settlement area. The total area covers an area of approximately 134 km<sup>2</sup> with a population of 0.085 Million. Most of them are fishermen and farmers. Almost three-quarters of the land are used for aquaculture, mainly shrimp farming. Communities of fishermen are found along the rivers and most of them are used to go to the Sundarbans or even the Bay of Bengal for fishing. Furthermore, many creeks and canals are found in the area, which are also utilized for fishing. The areas topog-

raphy varies between 0.25 to 3.5 meters above sea level. Average rainfall is about 2025 mm, of which 75% falls during monsoon from June to October. The study here exposed relies on three combined approaches:

- an academic survey, developed from the available scientific articles, reports from donors and stakeholders, whose aim is to assess local conditions, especially regarding the social, economic and geographic vulnerabilities. Moreover from an in-depth understanding of the social, economical and spatial conditions of the villages, the objective is to be able to propose methodological tools to assess, understand, and address the different forms of vulnerability.

- a total of 280 people were interviewed face-to-face from the last week of April until and including the second week of May 2010 by local (male and female) interviewers. The interviewers were carefully selected and thoroughly trained in view of the low education level of respondents and the high illiteracy rate in the area. The same interviewers were also used for pre-testing the questionnaire; two pre-test rounds were used to finalize the household questionnaire over a period of two weeks, including 2 days discussion session with the expert and stakeholders of Coastal Research Foundation (CRF). Each interview lasted on average 30 minutes. A stratified sampling procedure was used, where 12 villages were chosen based on their extremity of damages and losses due to cyclone Aila. In each of these 12 villages every 18th house along one side of the main-road was selected as sample. The sample size distribution at village level is presented here in Table 1.

**Table 1: Sample size distribution**

Union (sample)	Villages	Sample
Padmapukur (49)	Garkumarpur	23
	West Pathakhali	26
Munshigonj (40)	Mothurapur	10
	Kali nagar	17
	Munsiganj	13
Gabura (139)	Chakbara	15
	Chandni mukha	26
	Kholsabunia	69
	Gabura	25
	Gain Bari	4
Atulia (52)	Nowa baki	13
	Biralaxmi	39
<b>Total</b>		<b>280</b>

The questionnaire consists of one general section and three specific sections. General section describes the demographic information of the respondents. Section two deals with specific socio-demographic situation before and after Aila, Section three asks the adaptive

measures and strategies they had taken, section four describes their opinion about disaster management operations and their future plans. The cyclone Aila related questions are aimed at examining the extent and nature of the impacts of cyclone on life and livelihood, including the aftermath inundation situation. In addition to the household's survey, 15 semi-structured in-depth interviews were carried out from the third week of May to beginning of June 2010. On an average, each interview lasted around two hours. This in-depth interview covered the impact of cyclone Aila on different occupational groups, coping mechanism during and after cyclone Aila, and information regarding household activities during normal and extreme events years. They were also asked about the effectiveness of relief and rehabilitation programmes organized by different GOs-, NGOs- stakeholders in their locality. In discussions with implementers, local, national and international institutions, efforts were taken to get a better understanding of the way programs are decided, of the way they are implemented and accepted by the local population, and the possible improvements that can be brought to the action.

## 4. Understanding Adaptation Strategies – Empirical Evidence

### 4.1 General socio-economic characteristics of sample population

Table 2 summarizes the general information regarding the 280 households included in the survey. Most of the respondents are Muslim (250) and the rest Hindu (30). Amongst them 73 are Muslim women and 7 Hindu women. The average age of the respondents was reported as 45 years (min.17 and maximum 86 years). About 40 percent of the respondents were illiterate, 31 percent possessed primary education, 26 percent possessed secondary level and the rest had university level education. Only 2 percent of the respondents were identified as landless whereas 6 percent got Khas-Land<sup>1</sup> from the government; and also 90 percent had own land where they built their own houses to live in. Almost all houses are made of

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<sup>1</sup> Khas-Land refers to unoccupied land that is legally owned by government and managed by the Ministry of Land. The main sources of Khas-Land are: land already possessed by the government, accredited land from the sea or rivers, land vested in the government as ceiling surplus, land purchased by the government in auction sales and miscellaneous sources such as surrendered, abandoned or confiscated land (Momen 1996, p 100). Government of Bangladesh has started to distribute this Khas-Land amongst the landless and poor segment of the society.

tally/goalpata (roof), mud (both wall and floors) and water-sealed pit latrines mostly provided by the NGOs is the most important sanitary facility in the dwellings. 90 percent of all households get their drinking water from collective Pond Sand Filter (PSF) Tubewell or filtered pond-water in house or in monsoon they even harvested the rain water.

The average household size found in our sample is 6.2, which is more than the national household situation (5.6) of the country. Whereas the average number of children (under 14 years) per household was reported as 2 and the average number of old persons (60 years +) was only 0.58. It indicates that the coastal people usually possessed family with many children. Most of the household are engaged in agriculture related activities to support their livelihood. Approximately 63 percent of the respondent consists of day labour. The distribution of respondents across occupational status was not representative. Relatively more fishermen and farmer were interviewed, but due to the aftermath situation, most of the respondents claimed them as day labour. However, when taken together the group of fishermen and farmer in the sample is more or less representative for the whole coastal/rural population in Bangladesh (60% of the rural population is full-time farmer or fishermen).

**Table 2 Summary statistics of respondents**

Respondent's characteristics	Value	
% Male respondent in the sample	71	
Respondent's average age (median value)	44.8 (44.5)	
Respondent's religion (%)	Muslim	89
	Hindu	11
	Illiterate	44.4
Respondent's literacy rate	Primary School	31.1
	High School	26.4
	University	2.1
	Before cyclone Aila	
Respondent's occupation (%)	Self-employed farmer	44.3
	Commercial services	12.9
	Day labours	19.1
	Self-employed fishermen	23.7
	After cyclone Aila	
	Self-employed farmer	24.2
	Commercial services	5.4
Average household income (US\$/year) (st.dev)	Day labours	63.2
	Self-employed fishermen	7.2
Average number of Family member (min-max)	6.1 (1- 16)	
Average number of adults (min-max)	0.57 (0-4)	
Average number of children (min-max)	1.99 (0-7)	
Average household income (US\$/year) (st.dev)	Before cyclone Aila	BDT 6112 (6520)
	After cyclone Aila	BDT 4013 (2810)

Respondent's characteristics		Value
Average per capita income (US\$/year) (std.dev)	Before cyclone Aila	169
	After cyclone Aila	110.8
Average household expenditure (US\$/year) (st.dev)	Before cyclone Aila	BDT 5061 (4077)
	After cyclone Aila	BDT 3100 (2359)
Income inequality (Gini Coefficient)	Before cyclone Aila	0.586
	After cyclone Aila	0.714
% owning land		88.2
% of household having sanitary latrine	Before cyclone Aila	86.1
	After cyclone Aila	71.8
% of household having access to safe drinking water	Before cyclone Aila	82.9
	After cyclone Aila	66.1

There is a wide spread in monthly income before and after Aila, as can be seen from the standard deviation in Table 2 and the Gini-Coefficient calculation for the sample population. Average monthly income was about 6112 BDT before cyclone Aila and 4013 BDT after cyclone Aila. Half of the sample population earned only 4000 BDT before cyclone Aila and 3000 BDT after cyclone Aila. Furthermore, the average monthly expenditure was 5061 BDT and 3834 BDT before and after cyclone Aila respectively. If we here consider the normal situation, likely the monthly income status before cyclone Aila, we get that the average yearly household income is 73344 BDT or US\$1050. Now, if we calculate this annual income according to respondents' household size i.e. 6.2; we get US\$169.35 per capita income per year. Again, half of the households, who earned only 4000 BDT monthly or yearly 48000 BDT (US\$ 687), has US\$110.8 per capita income per year. Using the Basic Cost Need (BCN) calculated by the Bangladesh Bureau of Statistics as the poverty threshold (US\$115 per capita per year), almost half of the population included in the sample appear to live below this poverty line.

## 4.2 Adaptation Strategy – moving to cities and its consequences

### Scenario of Movement – empirical status

Cyclone Aila damage costs can be mitigated by measures aimed at preventing, avoiding or alleviating the physical and socioeconomic impacts of a cyclone. Here, I distinguish between ex-ante and ex-post coping mechanisms at individual and collective levels. When relating cyclone Aila damage costs to the number of income sources, I found an interesting trend where an increase in income sources seems to go hand in hand with lower average damage costs. The damage costs increase significantly from one to two income sources, but de-

crease gradually from there onward, suggesting that diversification is indeed an effective coping strategy. At the village level income diversity appears to be significant and positively correlated with the distance of people's resident place to the river bank. Hence, at the household level the relationship between cyclone Aila damage and income diversity suggests that the latter is an effective coping strategy for cyclone hazards. But all of them should be at least well prepared to handle the risk.

From the key informants' interviews, it appears that the existence of social networks or an institutional set-up in the area for a more collective ex-ante or ex-post strategy to cyclone and tidal surges is very thin except the movement to the nearby cities as a rickshaw puller or industry labour. Such rural-urban migration in Bangladesh is a household based strategy for maximising income or well-being and is partially dependent on the support of other family members, and/or district-based acquaintances, friends and neighbours. The respondents perceived migration as a way of maximising their family's income and minimising its risks. Migrants and families both benefit from the migration process; the migrant gains membership of a support network and the family's resources enlarge through the economic efforts of the migrant. It is seen that 89% family members who moved to cities used to look after their wives and children.

It is seen that the male members of 35% of the sampled households had moved towards nearer cities immediately after the emergency relief works i.e. more or less 4 weeks after the incident of cyclone Aila. Most of them (78%) moved to big cities namely Satkhira, Khulna and Bagerhat; where there was a possibility to become at least a rickshaw or van driver. Amongst the rest 22%, 12% moved to the capital city Dhaka because their relatives showed some interest to offer some work. The rest 10% moved to Chittagong to work in a dockyard or in the fishing business in the sea. Respondents of the families who had moved to Dhaka, Chittagong and other far places (22%) could not specify the activities of their displaced family members. They replied as they heard about them through mobile phone or members who visited sometimes to the home.

The benefits of a strong support network among migrants should not be underestimated; it offers relocation support, opportunities for education and to learn new skills, courage to bargain for higher wages and protection from threats such as physical assault, sexual harassment, dismissal from jobs, etc. Far from the self-motivation and anonymity sometimes associated with the migrant way of life, poor migrants generally value their families over self-interest and live in a close-knit community of family and friends (Afser 2000).

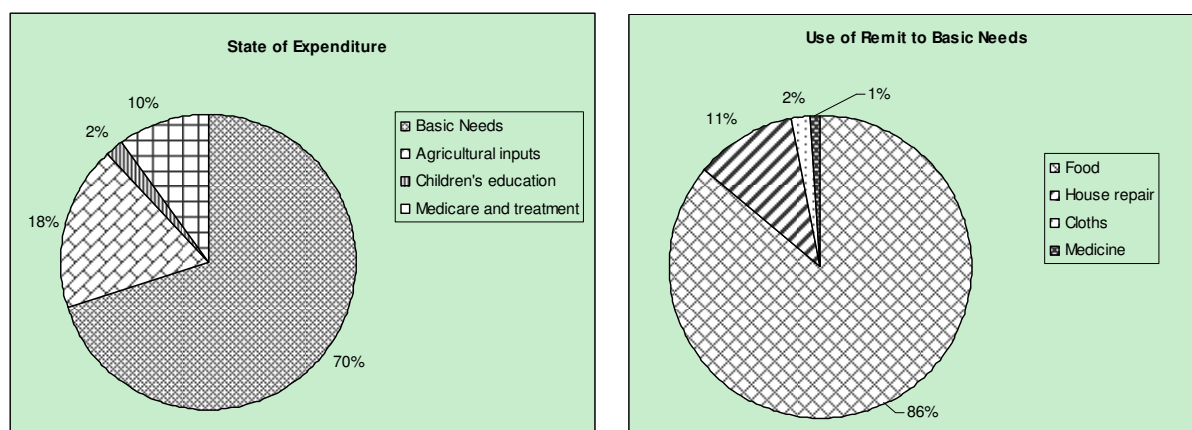


Figure 1: State of Expenditure (left) and Use of remit to basic needs (right)

This study revealed that consumption expenditure of rural households constituted almost 90 percent of the money sent by their moved family members. Figure 1 (left) shows that a significant proportion of this money (for 70 percent of all households) is spent on house repairs (11 percent), food (86 percent), cloths (2 percent) and medicine (1 percent), considered to be the basic needs of the family. Sometimes, it is also used for agricultural inputs such as irrigation and fertiliser to cultivate (20 percent of the respondents). It also helps to strengthen human capital development through children's education (2 percent of respondent) and treatment of sick members (10 percent of respondents). On average, temporary migrants of the surveyed households remit respectively 50 percent of their urban income to their families in rural areas.

### Livelihood pressure and state of the problems

Those temporary migrants face the day-to-day insecurity of work and finances. To recover this financial insecurity, respondents often resort to borrowing from friends/neighbours (25 percent of all respondents), co-workers (57 percent of all respondents) and even informal money-lenders (18 percent of all respondents) to avert crises. They used to send money to their families by the hands of their relatives or neighbours. 78 percent of the respondents reported that they received at least 3 times, 12 percent reported at least 2 times, 6 percent reported at least one time and 4 percent reported that they did not receive any money since after the departure of their family member from the locality. They were also asked how often the migrant-members communicated with their families at studied villages. It revealed that 46 percent of all respondents' families received a phone call twice a week, 34 percent reported one phone call per week, 12 percent received at least one call per month and the rest 8 percent received mostly no phone call even after a month.

Due to such irregularities in money sending and communication gap, their female family members were forced to lend money from neighbours (65 percent), moneylenders (32 percent) or even to quit from their locations (3 percent). Dependants that could not move to their husbands faced problem after problem. Their lives became more vulnerable and ways of earning of daily foods were almost out of hand. A few of them were forced to earn money by begging or even by working as maid-servants to the local land-lords or political leaders. It is reported in an in-depth interview that some-times the local land-lords forced them to be used for their sexual desire. In one hand it is a matter of social prestige and in the same time it is a question of survival of her family members. Who should take the responsibilities, if her husband did not communicate or even send money for their food? Who knew whether her husband got married again or not? How and who could help her to survive on such a disastrous situation? My paper does not address those questions in particular, but was attempted to explore few knock points of social exclusion and inclusion of those families, who had no husbands or male members in houses after cyclone Aila.

Furthermore, efforts were made to have information about the migrants who took their families to cities. Snow-ball sampling was applied. One of the migrants who took his family at Khulna and pulled rickshaw, lived at slum nearer to the railway station. After personally having talked to him, I found his neighbours and newly explored friend-networks. Discussed with them in a group, it was revealed that women and children members of those poor migrant-families were more likely to work. This put them at greater risk of remaining uneducated and in poorly paid jobs. They suffered as a result of lack of access to water and sanitation facilities, to make matters worse, slums often spring up in vulnerable areas such as along drains, around garbage dumps or adjacent to ditches or flood-prone areas. The health and hygienic condition of these areas were very low. It was also reported through discussion that three persons known to them, who did not bring their families to the city, got married again. They stopped to communicate with their family members in the villages and started a new life in the city. Exceptional cases were also reported, in which they put out of sight this new life information of their families in the villages and continue to bear the burdens of the families by sending regular money. Problem-ranking sessions were conducted with the representatives of those families and it was later on figured out as path-flow analysis (Figure 2) of the whole stories.



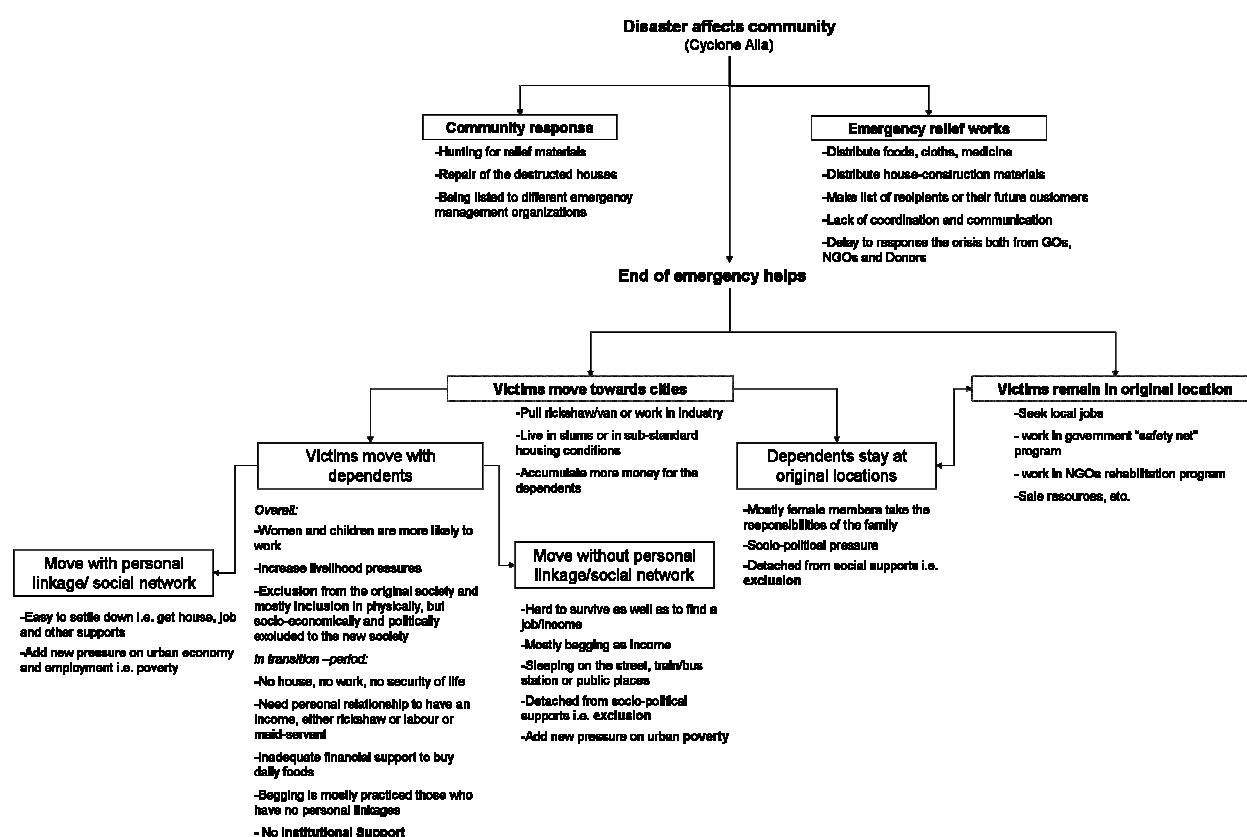


Figure 2: Path-Flow Analysis of Disaster Risk and Migration

Discussion sessions were also undertaken with the NGOs working at the sampled areas to reconstruct and to improve the livelihoods of the communities. They assisted in priority basis widow, divorcee, orphan, children and old people. In generating employment opportunities for poor rural women, they were playing a positive role in poverty alleviation through arranging earth-work for reconstruction of embankments. Semi-literate and unskilled women from rural poor families were entering the non-formal industry sector, which was previously open only to a few educated and upper- or middle-class women.

### 4.3 Cyclone Aila 2009 – spot light on risk exposure and income poverty

Aila has been called by some a “creeping emergency”, indeed, if the immediate casualties and damages were lower than those of precedent cyclones, long term adverse effects will develop all their consequences in the months following the event. This miss-appreciation of the damages also led to delays in the response actions to be taken at national and international level. For example, the IFRC emergency shelter coordination team didn’t take action until 4 weeks after the disaster. From the reports posted after Aila struck the area, the

Shyamnagor area was severely wrecked, since in some areas the totality of houses was destroyed. Traditional mud architecture is still very lively in these areas, and the houses didn't sustain the tidal surges. The wind from the cyclone itself did not trigger so much damage. As expected, there is a significant relationship between the house construction materials and household income ( $r = 0.127$ ;  $p < 0.002$ ). The people having more income have good quality housing materials, i.e. their houses are more resilient to wind and tidal surges than others.

The consequences of risk exposure, measured through economic damage costs, are negatively correlated with the distance from the river. However, comparing the damage costs across different villages' level, I found that the damage costs are higher at the level of inundated areas and duration of inundation but decreases as inundation depth and duration decreases. The damage costs of Aila across occupational groups slightly change when I examine the relative damage costs. The share of cyclone Aila damage relative to household income appears to be highest for farmers (45 percent), followed by fishermen (34 percent). This percentage was more or less the same for the other occupational groups. The poor suffer most from being exposed to environmental risk by further relationship between cyclone Aila damages and income, income distribution and income dependency on natural resources. Damage costs appear to be significantly and positively correlated with household income ( $r = 0.391$ ;  $p < 0.001$ ) at individual household and village levels, suggesting that respondents who are better off in economic terms also are most sensitive and vulnerable to suffer economic damages. That is the more one has, the more can be lost or is at stake to be lost. At the community level, greater income inequality appears to result in higher damage costs, suggesting that a policy pursuing income equality may also have important economic benefits in terms of avoided damage costs in a disaster-prone country such as Bangladesh. This finding furthermore confirms the hypothesis that vulnerability is determined – inter alia – by income equality (e.g. Adger, 2000). The following section of this paper is an attempt to identify if the migration or displacement due to climatic hazards also supports this hypothesis.

#### 4.4 Social Cluster, Migration and Poverty

It is evident here that when there is a natural disaster in an area, it arrives as a lifetime disaster for many people to drift. Many of them find it as a fatal strike to their socio economic position. Their bread and butter become uncertain and they have to start their life all over again. So it is not surprising that the migration mostly happened to the people from disaster prone areas. An attempt was undertaken to identify those social clusters that had taken 'migration'

as their only opportunities to adapt after cyclone Aila. According to the family monthly income, resource-base (land) and damages cost in a correlation matrix it is reported that damages cost was not that severe if the monthly income decreased. Again the resource-base or land was not important if there was no scope for agricultural productivity. This matrix is developed based on making clusters of the sampled household according to:

- a) *Monthly family income*: less than 2000 taka, 2000 – 5000 taka and more than 5000 taka
- b) *Land ownership*: less than 10 decimal, 10-50 decimal and more than 50 decimal
- c) *Damage cost due to cyclone Aila*: less than 10000 taka, 10000 – 30000 taka and more than 50000 taka

All these conditions are taken into considerations as the independent variables for migration as adaptation strategy after cyclone Aila and it portrayed as the figure 3.

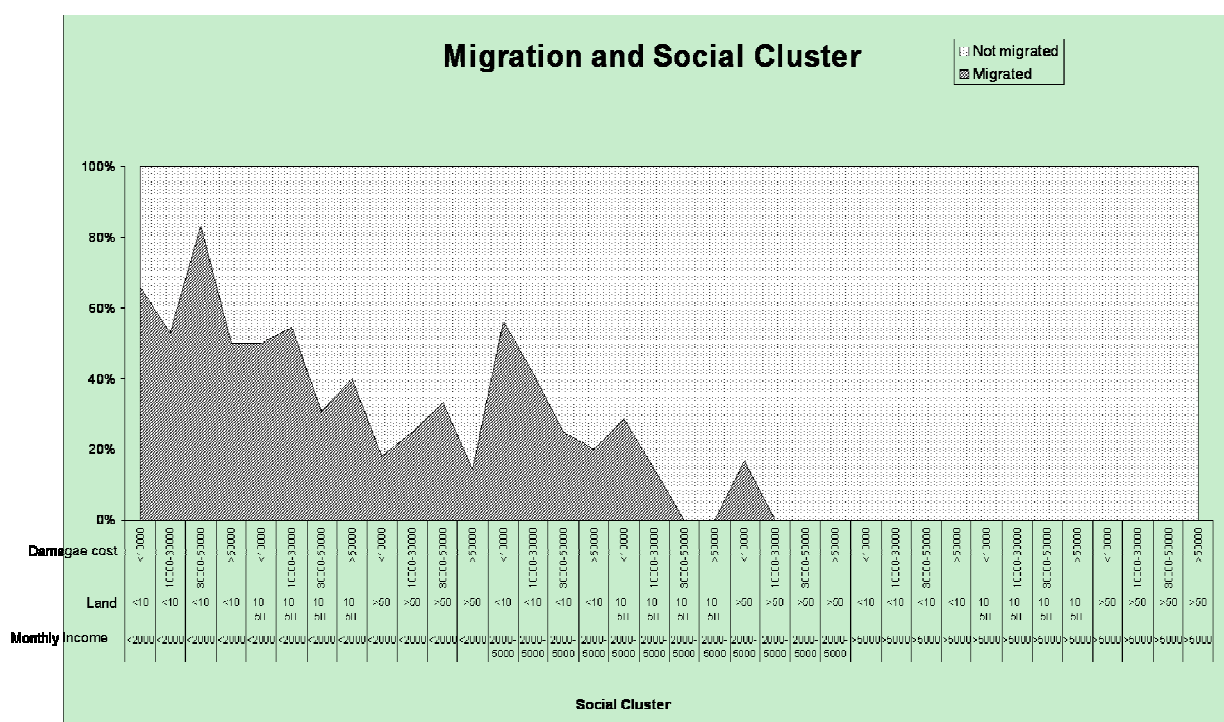


Figure 3: Social cluster that adopted migration as coping after cyclone Aila

Figure 3 depicts that mostly the poorer segment of the studied society were reported as victims of migrants. Risk is significant for them not only in the cyclone affected area, but also in the places they migrated to. Although risk minimisation and poverty alleviation programs were undertaken in affected areas, those poorly segmented group i.e. family having less than 10 decimal land and a monthly income of less than 2000 taka were not taken fully under consideration due to malpractices by the local political leaders or even they were out listed

by the screening methods of development partners. It might have happened because the front-liner of any disaster affected societies are those who possess political identity and wealth. They helped the development partners or even government officials to categorize the most devastated victims of any disaster. This is very common practice in all over Bangladesh. These front-liner or so-called 'social supreme' (Mallick and Vogt 2010) manipulate the ways of development and blocked the access to the bottom-liners of the society or underprivileged of the community. Researches are needed to find out the possible solutions to break out these walls of social supremacy to reach the bottom-liners.

Furthermore, poorer segments of the society live in low quality houses, which are not durable to cyclone. At the same time, income equality also results in higher cyclone damage, confirming hypothesis found in the literature that an unequal income distribution contributes to socioeconomic vulnerability. However, the relationship between poverty and damage costs appears to be more complex than the literature (Wisner, B. 2004; Schmuk-Widmann 1996) suggests. The poor suffer more in relative terms, but not in absolute terms. Average damage costs in absolute terms are significantly higher for wealthier households. From a practitioner point of view, a critic is developed toward the external actors and their objectives, which are disconnected from social and environmental realities. Lack of political courage to act on deep discordance between changes and traditional organization is questioned.

## 5. Discussion and outlook

This paper has examined a number of pathways through which disaster may lead to migration, which in turn may lead to changes in affected communities. It was seen here that after end of relief activities people were moving towards cities either with the family or without family. It depicts that there was lack of locally available employment or earning opportunities. It is required to ensure more locally organized income opportunities, immediate after the end of relief-works so that the push factor of climatic events can reduce the economic pull and people will stay in their original locality.

After the end of relief activities government and other development organizations started to reconstruct the road-networks, embankments, institutions and other development activities. Participation in those employments is mostly locally politicized (Mallick & Vogt 2010; Das 2010). Local elite or so-called 'social supreme' (Mallick & Vogt 2010) took control over the leadership and manipulate the selection criteria of labours or employment. They tried to maximise the participation of their like-minded people in such income opportunities. As a

result, the out-listed families or labours should have moving out to the nearest city for employment. This required commitment of the government or NGOs to ensure participation of each and every family in rehabilitation activities i.e. earth work for reconstruction of embankments, cyclone shelter constructions, other (re)construction or development activities etc.

Economic pull can be minimized only when income opportunities are made available for the migrants. Local community based/ home-based industrial activities should be taken into consideration – if there is none of such industry, disaster mitigation managers should rethink about this. Accordingly, the sampled village represented lack of home-based as well as locally available industrial working opportunities. Though there was few options to create industries based on the local resources as for example fisheries related small industries, honey producing, bio-coal industries, pair-learning approach for continuing education etc.

Furthermore, there were no institutional supports for the migrants both from the government and non-government organization in the original location and also in migrated location. It is required to develop or to assign some organization or institution for taking care of those climate migrants during their transition periods. These institutions or organizations should provide them the information regarding the available income opportunities, housing information, arrange work for them or to assist to rent a rickshaw or even enter into an industry as a worker. Recently, in Bangladesh few non-government organizations have started to accumulate the maid-servants in one plat-form. This platform provides supports both for the workers and the land-lord. One hand, it ensures the human-dignity of the maid-servants i.e. they looks after the payment, working hours, harassment etc. on the other hand, it reduce the crisis to find a maid-servant from the land-lord site. It is now slowly accepted by the community. Accordingly such type of institutional supports may decrease the transition period problems of the climatic migrants and help them to find work as well as reduce the hassles of their new settlements.

Climate change has the potential to significantly change how—and where—people live in the future. Although migration need not have negative effects, social segregation as well as inclusion is indeed possible. However, not all migrants are created alike. Those migrants who flee from disaster problems directly are generally not politicized and are unlikely to get more attention from the government. Importantly, a holistic-approach to address the disaster victims can mitigate the adverse effects of environmental change and population migration. Therefore, the relationship between the disaster, migration and poverty is not a deterministic one and will depend critically on steps taken now to prevent disasters in the future.

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