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Supraghat case study: community and institutional responses to the challenges facing squatter dwellers in Khulna, Bangladesh

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Abstract

Supraghat[1] is one of two low-income settlements studied in Khulna City of Bangladesh as part of the ESRC-DFID funded project on '*Community and Institutional Responses to the Challenges Facing Poor Urban People in Bangladesh in an Era of Global Warming*'. It is the biggest low-income settlement in Khulna by population size and the fifth largest by area covered. A squatter settlement by definition, it has evolved over the past 40 years on land partly owned by the government and partly by a Christian Mission. This study applies a range of data collection methods, involving some quantitative (e.g. a short survey) but mainly qualitative techniques (life history interviews, key informant interviews, case studies, participatory appraisals and a dialogue). Of the 145 case study households living in the selected section of the settlement, 121 are Muslim and 24 Christian – all but 11 (who are tenants) are resident owners (informal). As is the norm for squatter settlements, eviction threat remains the number one problem and commonly underpins all forms of vulnerabilities. However, there are also advantages to having informal claims of ownership of land and/or dwellings – no matter how insecure this may be. The processes by which the residents have established and maintained these claims have helped them become fully integrated within the informal economic, social and political life of the city. This has created space and opportunity for a range of adaptation practices. But, given persistent insecurity of tenure, the residents are unable to realise their full potential.

Keywords: adaptation, Bangladesh, Khulna, squatter settlement, urban poverty

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[1] We have anonymised the settlement and all persons cited in the text.

1. Introduction

The *Supraghat* case study is a contribution towards answering the following four questions from the viewpoints of dwellers of a very common type of low-income settlement in Khulna (and Bangladesh) – squatter settlements:

- What are the socio-economic and livelihood challenges facing Khulna's squatters, and how are and will they be compounded by climate change?
- What adaptation practices are people developing to tackle these challenges?
- What role do institutions play in supporting or hindering these practices?
- What are the policy implications, based on existing adaptation practices and institutional support?

The justification for studying a squatter settlement (this study) and a private low-income settlement (Jahan et al., 2012), the associated methodology and other background information are presented in our Khulna City-level study (Roy et al., 2012) and in the *ClimUrb* analytical framework paper (Roy et al., 2011). All of these studies are part of an ESRC-DFID-funded research project on '*Community and Institutional Responses to the Challenges Facing Poor Urban People in Bangladesh in an Era of Global Warming*'.

The research aims to examine how the urban poor are adapting to increased vulnerability and the ways in which public institutions and market forces help and/or hinder their strategies. It involves detailed study of six poor urban settlements – two (a squatter settlement and a private settlement) from each of the three main cities of Bangladesh (Dhaka, Chittagong and Khulna), alongside data collection and collation from other sources, including: (a) review of available literature and official documents; (b) city-level elite interviews; and (c) three city dialogues with representatives of the case study settlements, public officials, and members of the civil society and academic community.

In Khulna, the two case study settlements (*Supraghat* and *Magbara* – a squatter and a private settlement, respectively) were selected after a reconnaissance survey of five potential case study settlements (shortlisted in consultation with Khulna-based NGOs/CSOs) and an assessment of their suitability as case study sites using six predefined criteria.[2] In each settlement, we applied the same methodology for data collection. We: (i) introduced

[2] These are: (i) socio-economic diversity – to ensure selection of settlements where there is a variety of socio-economic groups, so we can learn about a variety of livelihoods and perspectives; (ii) presence of adaptation practices – to ensure that we can study challenges to poor urban communities, as well as the practices that they develop to adapt to those challenges; (iii) presence of institutional structures – to be able to understand institutional roles in poor people's adaption practices; (iv) diversity of tenure/security – this is to ensure that we do not pick a community that has a secure tenure or only one form of tenure structure; (v) not atypical – to ensure that we are able to capture the dynamics of multiple forms of livelihoods and complex forms of community organisations; and (v) existing environmental problems – so as to help us understand how the existing problems could be compounded by climate change.

ourselves to community leaders and explained our research; (ii) introduced the research team to each household head and conducted a questionnaire survey of all households; (iii) analysed the initial survey results and selected 15 households for life history interviews; (iv) conducted participatory exercises of settlement problems with resident groups; and (v) held discussions with key informants about our findings.

Supraghat is a particularly large settlement (see below) and we could study only a part of it, involving 145 households. We selected the area that best met the above-mentioned selection criteria. The study was conducted during the first half of 2011. Apart from conducting a short survey, we conducted 15 detailed life histories (see Annex 1 for a brief profile of the household interviewees), four participated exercises, and 12 *Supraghat*-specific and 10 city-level key informant interviews. The final event was the City Dialogue, which involved more than 50 representatives from 20 organisations, to provide for a broader testing of findings. This paper is a synthetic presentation of the *Supraghat*-related data and findings.

2. *Supraghat* – brief background

The settlement has evolved over the past 40 years on land partly owned by the government and partly by a Christian Mission. The majority of the residents have spent almost their entire lives here – the average stay being 24 years, the longest 41 and the minimum two years. With such a long-term evolution, it presents a rich account of livelihood diversity, community-based practices and built-environment consolidation.

Like the majority of squatters' settlements in Bangladesh, *Supraghat* began to emerge as a settlement during or immediately after the War of Independence in 1971. At that time, the area was a wetland on the bank of the Rupsha River, exposed to tidal influences. The initial settlers built stilt dwellings using bamboo and *golpata* (palm leaf, sourced from the mangrove *Sundarbans* located just over 60km south of Khulna). The chairperson of the Christian Mission reports that the land was donated to the organisation by a local *jamindar* (landlord) just before he migrated to India during the liberation war.

When a few families started to squat on this land, the Mission decided to rehabilitate some of its followers from Khulna and the surrounding region, in order to keep possession of its land. These families never paid rent, and after their arrival received a range of support, including help to build their initial homes and advice on political and legal issues. While they were given the hope that in future they would be given legal ownership of the land, this never materialised.

By the late 1980s, the area had become densely populated, with the Christian settlers packed into a pocket-like area surrounded by Muslim settlers. The settlement was linear in shape, extending along the river bank. People built raised bamboo bridges to penetrate as far as possible into the river. Then, in 1993-94, the construction of the Khulna City embankment began, reclaiming a large part of the river, including the low-income settlements. Significantly, passing just outside the *Supraghat* settlement, the embankment

protected the area from tidal influence (Figure 1). The embankment took almost five years to complete and become a major road (The Independent, 2012).

The Khulna Water Development Board (WDB-2), the embankment implementing authority, is the owner of the reclaimed land, just outside the Christian organisation's land. Ownership was later transferred to the municipal authority, although there is some ambiguity with regards to the maintenance of the embankment and other structures, such as the sluicegates. The municipal authority has leased its property to groups carrying out various industrial and commercial activities. This has drastically expanded the livelihood options for *Supraghat* dwellers, as it led to a massive expansion of industrial and commercial activities. These include thriving shrimp-processing activities, shipyards, a wholesale market of traditional building materials, such as bamboo and *golpata*, timber sawmills, shipping of stone chips and coals, and two river-crossing points and ports.

Figure 1: *Supraghat* settlement and the research site

Being located within such a vital economic hub, *Supraghat* was always in danger of eviction – but this never happened, despite several attempts. Perhaps the split ownership of land between the municipal authority and the Christian Mission was an important factor. However, our households and key informants report that recently a large segment of the Christian Mission's land has been sold to an influential local businessman, who has been attempting to take control of his land, by engaging *mastaans*[3] as well as by lobbying with higher level politicians. This has escalated fear of eviction in recent times.

[3] Several households report receiving threats from musclemen, known locally as *mastaans*. They highlight three particular causes. First, the local powerful people with political and/or economic interests, such as the businessman who bought part of the settlement and is trying to take possession of his land, support the *mastaans*. Second, situated on the bank of the river Rupsha, the settlement is an important transit for drug trading, and timber smuggling from the *Sundarbans* (the mangroves) – the local *mastaans* control these illegal activities. Thirdly, communal disputes between Christian and

Within this complex process of land transfer, grabbing and reclamation, most residents continued to enjoy unauthorised land ownership, either because they were the original settlers or by (informally) purchasing the land from the original settlers or their successors. A 2005 survey found 3,700 households, 15,875 residents, and a population density of 6,400 people per hectare in *Supraghat* (Islam et al., 2006). This makes it the biggest (by population size) and fifth largest (by area covered) settlement in Khulna. There has been an ever-present element of conflict between Christian and Muslim settlers. The section of the settlement where the two groups converge has interesting physical features and a high degree of segregation – which has social, political and environmental implications.

The most dominant physical element is the presence of two adjacent ponds – the remainder of the original wetlands, the depth of which has been increased by further excavation to raise the plinths of nearby dwellings. These clearly separate the majority Muslim part of the settlement (on the embankment side) from the majority Christian part (on the far side). There is even a signpost at the entrance road through the ponds warning of legal consequences for illegal trespassers to the Christian part – this is obviously more symbolic than practical.
Importantly, as is the norm for stagnant water bodies adjacent to low-income settlements in Bangladesh, these waters are highly polluted with all sorts of waste, including deliberate escape of raw sewage (Figure 2a). Hot and humid conditions make these water bodies a breeding place for disease vectors. In the rainy season, these ponds are a source of waterlogging. Located at the far end of the settlement away from the embankment, where land elevation is considerably lower (by at least 1.5metres) compared to the embankment, the area surrounding the ponds is subject to waterlogging.

There is a sluicegate to drain out excess water to the river during low tide and to prevent sea water (via the river) entering the settlement (Figure 2b). During our study, however, the connecting channel to the gate inside the settlement was almost blocked by settlement encroachment. To make matters worse, there is heavy sedimentation of the connecting channel on the riverside. There is also a lack of duty bearer to operate and look after the gate – at present this is operated by the watchman of a nearby shrimp-processing house, following requests from the dwellers.

Figure 2: The ponds and the sluicegate

a. Water pollution

b. The sluicegate during low-tide

As we could only study a part of the settlement in detail, we chose the area surrounding the ponds, including the dwellings built on both sides of the road that connect this area to the embankment-cum-main road. There are 145 households in the area that we examined, with 24 Christian and 121 Muslim households, only 11 (7.5 percent) of which are tenant households. Of the total number of households, 39 percent are very poor, 41 percent poor and 20 percent non-poor.[4] There is one absentee landlord with five rental units and three resident owners, each with two units. In general, people have access to basic services provided by various external organisations. Within our study area there are two masonry-built toilet blocks, and three water points (including one deep tubewell). Most of the access roads are paved, there are numerous masonry-built internal drains, several recipients of socio-economic support funds (e.g. two block grants and five educational support recipients), and a growing sum of savings by the community groups formed by NGOs.

The residents have benefited from the availability of diverse informal work to support an array of thriving industrial and commercial activities. However, about 35 percent of residents have reported being out of regular income (Table 1). In addition, there is a high degree of dependency, especially by women, on one particular industry – shrimp processing. Nearly 45 percent of the workforce is involved in shrimp processing: 35 percent in cutting/cleaning (all of whom are women); 16 percent in trading; and, four percent in retail selling. These statistics are generated from our short questionnaire survey. However, one of our key informants reports that as many as 75 percent of *Supraghat* dwellers are dependent on shrimp-processing activities in one form or another. As the paper will reveal, such high dependence on shrimp processing has a serious downside, especially in an era of climate change.

[4] We categorise households into these groups by using the simplified poverty scorecard technique developed by Chen and Schreiner (2009). Necessary data come from the mini-survey conducted at the start of the fieldwork.

Table 1: Occupations of case study population

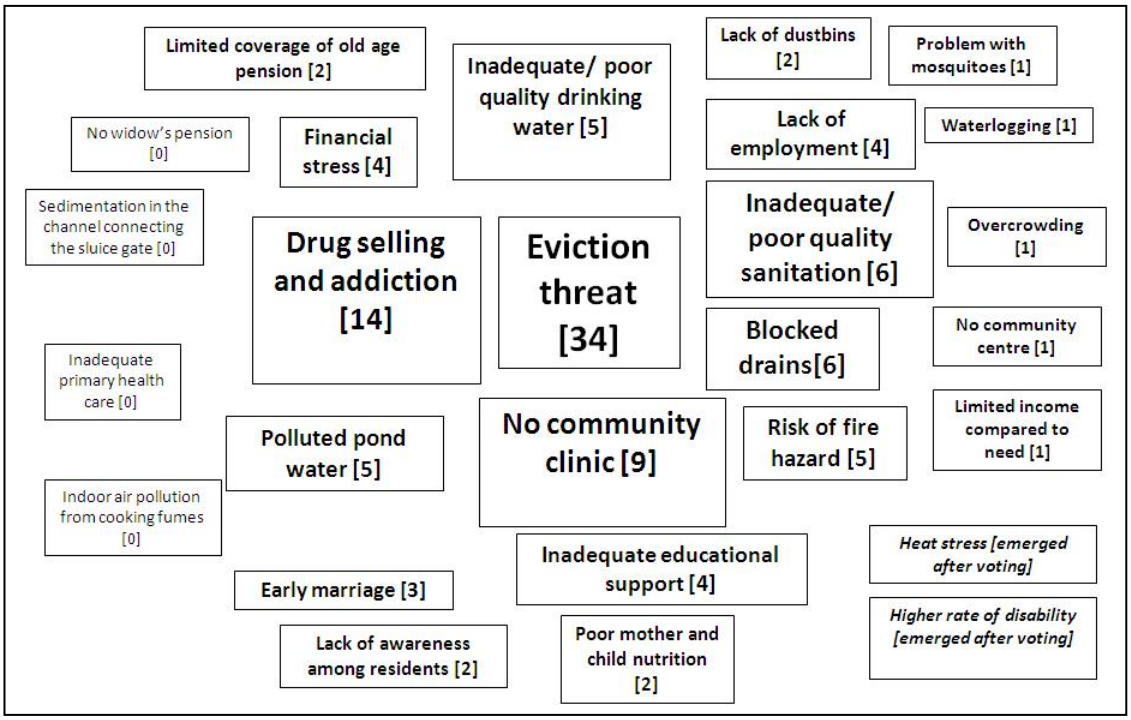
Employment by category	No.	%
Business and self-employment (total)	*70*	*26.9*
Shrimp processing	42	16.2
Fish selling	9	3.5
Vegetable selling	4	1.5
Grocery	4	1.5
Electricity supply	1	0.4
Food/tea selling	1	0.4
Furniture making	3	1.2
Other (e.g. home-made products; street vending)	6	2.3
Skill-based labourer (total)	*38*	*14.6*
Carpentry	34	13.1
Motor mechanic	2	0.8
Electrician	2	0.8
Casual labourer (total)	*127*	*48.8*
Shrimp cutting/cleaning	90	34.6
Construction	15	5.8
Rickshaw/van pulling	12	4.6
Transportation	2	0.8
Housemaid	4	1.5
Other (e.g. restaurant worker; mosque Iman)	4	1.5
Formal employment (total)	*22*	*8.5*
Government	2	0.8
Private/NGO	20	7.7
Begging (total)	*3*	*1.2*
Total (in work)	***260***	***100***
Unemployed	*138 (34.7 per cent of grand total)*	
Grand total	***398***	

3. Main challenges facing people living in *Supraghat*

3.1. Major problems and how people tackle them

Initial information on the main challenges facing people in *Supraghat* came from the participatory exercises. This, and the institutional structures and political economy dimensions (next section), provide a structure for examining a much larger body of material from our life history and key informant interview datasets in order to understand vulnerability of *Supraghat* dwellers. The main challenges are graphically presented in Figure 4, with more important challenges presented using bolder fonts and placed towards the centre. In addition, Figure 5 presents a cause-effect-solution diagram of some key problems.

Figure 4: Problems facing *Supraghat* dwellers



Note: The diagram is based on a participatory problem identification and ranking exercise in *Supraghat* settlement involving nine participants, each having 10 votes (18/02/11). The numbers in parentheses indicate the total votes assigned for the corresponding problem.

A) Eviction threat

Threat of eviction is the main problem for people in *Supraghat*. All of our household respondents complain that they live in constant fear of eviction. Part of the settlement belongs to the government and the rest to the Christian religious organisation. The dwellers believe that the Christian organisation has sold part of its land to a powerful local businessman. This person could come at any time to take possession of his land. Moreover, the Christian organisation could decide to sell the remainder of its land at any time. The government can also decide to evict people from land under its control. The area used to be low-lying, but now the residents have filled it in. The area has high commercial value, and many powerful people are vying to capitalise on this. The residents have limited power to overcome these powerful outside interests. They keep a watchful eye on the movements of current land owners and potential buyers. They keep in touch with political leaders and other powerful local people to keep them on their side. They react sharply to any hints of eviction, and organise demonstrations in front of symbolic places, such as the homes and offices of the City Corporation Mayor and Councillors, and if needed in front of the press club. They have done this twice in the past year. They also try to keep up to date with their payment of holding tax. They believe this strengthens their claim to the land.

B) Drug selling and addiction

This is the second most important problem identified by the participants. They report that in the evening drug addicts gather at different corners of the pond and over the bridge across

the ponds. Those who try to stop them are beaten on the spot. Lack of employment opportunity among young people has been pushing more and more into drug addiction. Residents can do very little on their own to stop drug users. They mostly keep quiet, but when the disturbance goes out of control they inform the police via local seniors/respectable persons. Police presence keeps the drug addicts off the area for a while, but they gradually start to return. Apart from informing the police, people sometimes raise the issue with a local influential shrimp trader. Using his influence, he calls the drug addicts to his office, sometimes forcefully, if needed. His influence keeps the addicts away from the settlement for a while, but again they return. There seems to be no permanent solution to this problem.

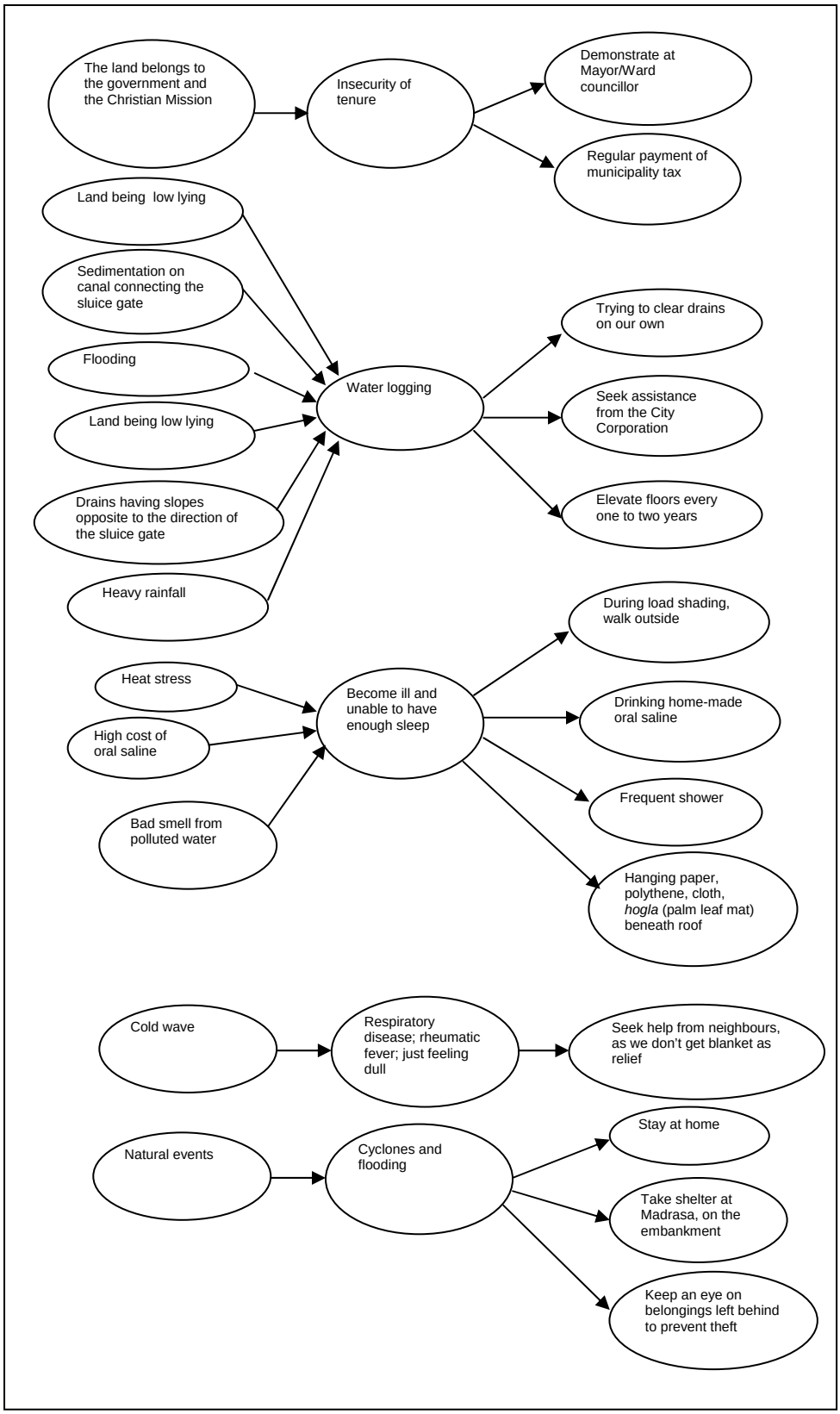
C) Blocked drains resulting in waterlogging

The drainage system is poor in *Supraghat* settlement. The majority of the drains lead to the ponds, and because the sluicegate is located far from the pond, the rainwater cannot escape quickly. Moreover, people put all sorts of garbage into the drains, which blocks them. The City Corporation does not regularly clear the drains, so they remain almost permanently blocked. To make matters worse, people have constructed dwellings on the drain that connects the ponds to the sluicegate system. Every time it rains heavily, the area surrounding the ponds becomes waterlogged. Dirty water enters people's premises, sometimes into the room. When this happens, members of the affected households take initiatives to clear the drain themselves. At the same time, some other members report their problem to the City Corporation, which sends people to clear the blocked drains. However, if the waterlogging happens during high tide, they cannot do anything. The sluicegate has to remain closed during high tide to prevent river water entering the settlement. In this situation, the waterlogging can last up to six or seven hours. Many people have now raised their plinths, so that dirty water does not enter their homes.

D) Inadequate/poor quality sanitation

The population density in most parts of the settlement is very high, and there are fewer toilets than required. One latrine is shared by as many as 20 households, resulting in big queues in the morning rush hour. People waste their time, and are late to work. Excessive use makes it difficult to keep the toilets clean. Some men and children go to the river bank to avoid being stuck in the queue. Some families have constructed hanging latrines on the ponds, although this practice has been made illegal by the municipal authority. Some families have taken the personal initiative to get assistance from NGOs to construct personal latrines.

Figure 5: Cause-problem-solution diagram for selected environmental challenges



E) Risk of fire hazard

Supraghat settlement was badly damaged by fire incidents twice – in 1996 on 27th *Ramadan*; and in 2005 on the day of *Eidul Azha.*[5] The 2005 fire burned 886 dwellings; many were destroyed by firefighters and local people in an effort to contain the fire. These two incidents have created a fear of fire in the settlement. The residents remain particularly worried during dry season, especially February and March. But, except during the monsoon months, there is a risk of fire at all times. To minimise the risk of fire hazard, a microphone in the mosque is used to broadcast reminders about the risk of fire. Since the second fire incident, one volunteer has been using a hand-held microphone once or twice a week to announce precautions that households should take to reduce the risk of fire,. The Fire Service and Civil Defence organisation holds a fire drill once a year. People are also barred from cooking upstairs. To enforce this, the members of *Bustee* Development Committee (BDC), a community-based organisation, have taken assistance from the Handling Labour Association, a claims group (Thorp et al., 2005). The City Corporation Mayor has also declared a penalty of TK5,000 (about US$60.00) for cooking upstairs, and a reward of TK500 (about US$6.00) to those who can help spot the culprits.

F) Inadequate/poor quality drinking water

Inadequate source of drinking water was mentioned as a common problem. Water from shallow tubewells is too saline to drink. As a result, residents try to collect drinking water from deep tubewells. At present, 50 families share one deep tubewell, resulting in a queue during rush hour. To avoid it, some households collect water in the early morning and late evening. Some people need to walk up to 15 minutes one way to collect drinking water. We have seen households paying people to supply their drinking water. In the rainy season, people harvest rainwater. One non-poor household has installed a deep tubewell with assistance from the NGO, with an agreement that the household has to allow neighbours to fetch water from this tubewell. This is rarely done in practice.

G) Polluted pond water

The water in the ponds is filthy. People throw all sorts of things into the ponds, such as household waste, shrimp shells, plastic bottles, medical waste and dead animals. The overflow pipes of the community latrines, constructed by NGOs, are connected to the ponds. A number of hanging latrines empty directly into the ponds. Polluted pond water causes several problems. It is a perfect breeding place for mosquitoes, which flourish in winter. In rainy season, during periods of waterlogging, people's homes and premises gather dirt, which causes irritation and skin diseases. In summer, the ponds generate a bad smell, adding to air pollution. As a solution, people are asked not to put waste into the ponds. City Corporation has also taken an initiative to destroy all hanging toilets, but some people have reconstructed them again. The City Corporation also arranged a garbage collection system, at a cost of TK2/month (US$0.02). But people did not pay this small amount, so the initiative

[5] People recall these dates in reference to religious festivals. Surprisingly, both incidents took place during Muslim festive periods.

was stopped. Nabolok, a local NGO, set up a community garbage collection committee, but the committee has been finding it difficult to keep going.

H) Indoor air pollution from cooking fumes

Due to high population density and a lack of open space in many parts of the settlement, many households are forced to cook indoors. This leads to the accumulation of black oily deposits on interior facades, furniture and clothing. People struggle to breathe, especially women, children and the elderly. Many households use mobile stoves, so that they can cook outside during dry periods. Very few households have installed fume-escaping pipes. Those who are forced to cook indoors hang a cloth canopy beneath the roof to catch the black deposits close to their source. Elderly people and children are advised to stay outside while food is cooking. Bedding and clothing are gathered together and wrapped in protective cloths to minimise the accumulation of black deposits.

I) Heat stress

Residents complain about excessive heat during the summer months. Frequent power outage exacerbates their suffering. People cannot stay indoors due to the heat and so stay outdoors until late at night, which makes them late for work the next morning. Higher temperatures also increase the spread of diseases, such as fever, diarrhoea and headaches. To minimise the impacts of heat stress, men and women of all ages spend time outdoors, with many sleeping outside at night. To avoid dehydration, people take oral saline solution. To avoid discomfort, they take frequent showers. At home, every household tries to put a layer of paper, cloth, polythene, *hogla* (matting made of palm leaf) beneath the roof to reduce the indoor temperature. Some people also grow edible vegetable plants on their roof tops. This acts both as a source of vegetables; and as a way of reducing the indoor air temperature.

J) Excessive cold

People complain about aggravated levels of respiratory disease during severe cold weather. The suffering of those with rheumatic fever worsens in the winter. Neighbours try to help each other by sharing blankets. Rarely do they receive blankets as relief.

K) High food prices

People have complained about higher food prices. One respondent reported:

> *we spend all money to buy food. In the past, TK100 (US$1.20) was enough to complete daily shopping, but now it takes TK300. As our income has not increased, we have reduced our spending. For example, in the past we had meat twice a week, but now we cannot eat meat – not even once a month.*

L) Other problems

Besides the above-mentioned problems, the following problems were also listed, but they received less priority when it came to voting. These problems are nevertheless relevant for people living in *Supraghat*:

- Financial stress
- Lack of employment
- Inadequate educational support
- Early marriage
- Lack of awareness among residents
- Poor mother and child nutrition
- Limited coverage of old age pension
- No community centre
- Limited income compared to need
- No widow pension
- Sedimentation in the channel connecting the sluicegate
- Inadequate primary health care
- No community clinic
- Higher rate of disability
- Problems of cadres and musclemen
- Lack of work all year round

4. Institutional structures and political economy

4.1. Identification of case study institutions

The ability of *Supraghat's* inhabitants to implement measures to reduce the risk of negative effects from shocks and stresses is closely related to the capacity and structure of the institutions that currently govern them and their settlement. The main issue is not that the institutions must be currently undertaking climate change adaptation *per se* in the settlement or involving the community. What is more important is whether the institutional structures support people's agency and promote social learning, and whether the institutions accommodate change as they learn. This in turn enhances the adaptive capacity of households, communities and the institutions themselves. We frame our examination of institutional structures and political economy using the following key questions:

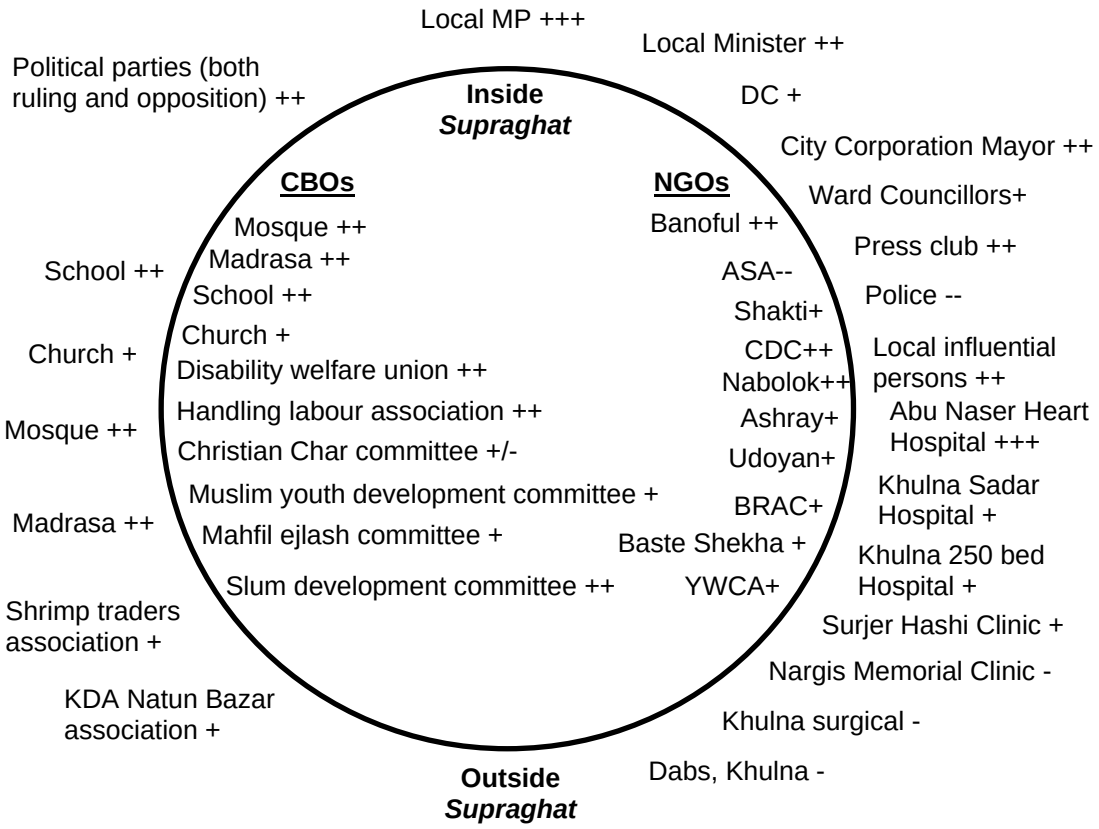
- What do they do?
- Who do they do it for?
- How do they do it?
- Do they do it well?

We perceive institutions broadly, encompassing both formal institutions (e.g. municipal authorities and NGOs) and informal institutions (e.g. community-based organisations [CBOs]

and cultural norms and values). Following Agrawal (2010) and Christoplos et al. (2009), we categorise institutions into three broad domains: governance; markets; and private.
In terms of identifying the relevant institutions, following Cash and Moser (2000), we went beyond the geographical limit of our case study site and define our investigation according to the scale of the decision-making unit, in this case the Khulna City Corporation and its Ward No. 22, within which *Supraghat* is located. We remain focused on the institutions that the inhabitants identify as having direct or indirect links to their settlement.

We have undertaken case studies of 12 out of over 30 institutions identified through a participatory institutional mapping exercise and through household life histories. The selection of institutions for case study was based on their level of importance to the settlement, measured during the participatory institutional mapping exercise (Figure 6).

Figure 6: Mapping of important institutions in *Supraghat* settlement



4.2. Government institutions

The participatory mapping of important institutions in *Supraghat* reveals a few government institutions providing services to residents, but they are all situated outside the boundary of the settlement. Our participants evaluate that, as in Figure 6, with the exception of the police department, the level of service of other government institutions is very good (marked as ++) or good (marked as +). The police department was judged as very bad (marked as – –).

Further details of the services that the inhabitants receive from these and other institutions are summarised in Table 2.

Table 2: Institutions providing services to *Supraghat* settlement

Institution	Service
Government	
Ward Councillor	Conflict resolution; certification and other citizen services; tax
Deputy Commissioner	Addressing eviction threat
Local MP and Minister	Addressing eviction threat
Hospitals	Medical treatment
Schools	Children's education
Police	Criminal case; reporting conflicts
NGOs	
Banaful	Mother and child health
Schools (World Vision, YWCA, CSS, BRAC, Hard to Reach)	Education for street and poor children
Nabolok	Water and sanitation
CDC	Infrastructure improvement
Micro-credit organisations (YWCA, BRAC, Bachte Shekha, Ashroy, Shakti, CSS, ASA)	Micro-credit
Insurance companies	Life insurance
CBOs	
Handling Labour Association	Welfare of handling labourers
Madrasa	Islamic education
Association for Disabled People	Welfare of disabled people
Bustee Development Committee	Welfare of mainly Muslim neighbourhood
Church Committee	Welfare of Christian households
Mosque Committee	Welfare of Muslim households
Muslim Youth Organisation	Welfare of Muslim households
Mahfil entejam committee	Organising of annual *Waz Mahfil* (recitation from the Quran)
Waste Management Committee	Overseeing waste management
Christian Char[6] Colony Committee	Welfare of Christian households
Rotating Savings and Credit Association (ROSCA)	Informal savings
Private	
Neighbours	Helping each other
Political leaders	Conflict resolution; support
Former Ward Councillor	Conflict resolution; support
Local elites	Conflict resolution; support
Owner of *Chabi fish ghar*	Conflict resolution; support

4.3. NGOs and CBOs

As many as 10 NGOs and an equal number of CBOs are operating from within *Supraghat* settlement (Figure 6). In general, the participants seemed to be happy with the level of services they receive from these organisations, with the exception of the NGO ASA. The services of the Community Development Committee (CDC)[7] and Nabolok have been

[6] *Char* is land created by sedimentation.

[7] CDC is a community group formed as part of the Urban Partnerships for Poverty Reduction (UPPR), which is a DFID-UNDP-Government of Bangladesh flagship project in Bangladesh to improve the livelihoods and living conditions of three million urban poor and extremely poor people, especially

particularly appreciated. Several of these institutions have also been identified as those that participants would approach first to deal with future weather events (discussed in Section 5 below).

A number of other institutions located outside the settlement were also identified. These include religious and educational establishments, labour associations (claims groups), hospitals, leaders of both ruling and opposition parties, and other local economic elites and powerful people. These institutions and private individuals offer a range of services and intermediary roles to people living *Supraghat* settlement (Table 2). In particular, economic elites and powerful people are an important means by which residents address their number one challenge – threat of eviction – and implement informal social control, such as internal social conflicts and disputes.

4.4. Markets

Life in *Supraghat* is governed by a range of market-based and market-influencing institutions. Three types of market operate from within the settlement: land and rental market; domestic economy; and small enterprises (Figure 7). These internal markets, and the settlement as a whole, are linked with other city-level markets. Some of these city-level markets draw on the natural resources of the southwest region of the country. Two of the most important resources are the land for shrimp farming and the mangrove, *Sundarbans*. Dependence on these natural resources increases the vulnerability of Khulna's regional economy and ultimately the markets on which life on *Supraghat* settlement depends. Boxes 1 and 2 present how life in *Supraghat* has been affected by cyclone Sidr (affecting *golpata* production and thus the traditional dwelling construction industry) and Aila (affecting the shrimp-processing industry).

Land and rental markets

The land market operates outside formal regulations and the knowledge of the actual owner. The rental market is informal, with rent varying between TK650 and TK850 per month (inclusive of electricity). Residents are not the legal owners of their land. The transaction process is completed in secret and involves signed declaration on stamps in the presence of witnesses (usually neighbours/relatives and members of the local power structure). The

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women and girls. It is a seven-year project (2008-2015) with a budget of $120 million. It succeeded the Local Partnerships for Urban Poverty Alleviation Project (LPUPAP, 2000-2007). UPPR project has set as its objective to support poor urban families in 30 cities (six City Corporations and 24 'A' category *pourashavas* (municipalities)). In Khulna, the project has set the target of doubling the number of communities supported through the LPUPAP,from 125 to 250 communities (a community is defined as 200-300 households). The households are categorised into a number of primary groups, each comprising 10-15 neighbouring households. Two leaders from each primary group (mostly selected) form a CDC. The leadership of a CDC operates through four office bearers (mostly selected): a president, a vice-president, a secretary and an accountant. The president and vice-president of each CDC within up to three Wards come to form a CDC cluster. There is a plan to form a CDC federation, involving representatives from all CDC clusters, but this has not yet materialised in Khulna. Each CDC maintains three accounts: a settlement improvement fund; an operation and maintenance fund; and a savings account for its members. In addition, a CDC cluster maintains a social and economic fund. UPPR allocated funds for settlement improvements and socio-economic developments through a Community Action Plan developed with participation of the CDC members (source: personal communication with the UPPR Khulna office).

informality of the market is reflected in the land value, which is substantially lower than other parts of the city. Every time there is a rumour of eviction, the land owners fear losing their investment. As one respondent says, '*Sometimes we think of selling the land, but fear that we won't get the price we paid*'. They are aware that wealthy businessmen are interested in buying this land at a higher price, as it is located on a prime site. In fact, a large part of the settlement has already been sold to a local businessman. He has made several failed attempts (thanks to residents' protection) to take control of his purchased land. Despite such eviction fears, many residents have invested in upgrading their dwellings, and some have even constructed two-storey buildings. One household respondent gave the following justifications:

- Having occupied the land for more than 12 years, they have become the land owner.
- They pay holding tax, so the municipality recognises them as the current occupiers of the land.
- Whatever happens will happen to everyone, and they believe that the government will make arrangements for resettlement before evicting them.
- After the second fire in 2007, the Ward Councillor verbally asked them to hold onto their possessions. Curiously, this verbal order helped one of our tenant respondents to become the owner of the land on which he was a tenant at that time.

Box 1: Impact of cyclone Aila on shrimp-processing activities in *Supraghat*

Cyclone Aila hit the southwest of Bangladesh badly, affecting Sathkhira and Khulna districts. Aila was the fifth most severe cyclone in Bangladesh, affecting 3.94 million people (Dasgupta et al., 2010). It also destroyed the *ghers* (earthen ponds) of numerous shrimp farms.

During the two years following Aila, shrimp-processing activities have fallen sharply. The number of shrimp traders remaining in the business has fallen from about 401 in 2009 to about 200 in 2011. On average, women engaged in shrimp cutting/cleaning have worked 160 fewer hours per month during this period, as the following estimate suggests:

> During 2008-2009, the 20 member companies of the *Supraghat* Shrimp Trading Association processed about 576,000 tonnes of shrimps of various types. This figure came down to 38,400 tonnes in 2009-2010. On average, one tonne of shrimp requires 100 hours of shrimp cutters'/cleaners' time. This gives a fall in demand of 1,920 hours @ 160 hours/month. Assuming an hourly rate of TK5, we get an income reduction of TK 800/month for all shrimp cutters/cleaners in *Supraghat*.
>
> *Source:* Interviews with Istiaq (a supplier of processed shrimp) and Anu (owner of a shrimp trading house).

While many of the destroyed *ghers* are yet to be rebuilt, our respondents (e.g. Anu) believe that the supply of shrimps will catch up with pre-Aila levels by 2011. This is partly due to the fact that shrimps are farmed over a vast area, and *ghers* in many areas remained operational. For example, in 2004 the total shrimp farming area was 115,900 hectares, compared to 1,330 hectares in 1975 (Sarwar, 2005). In comparison, Aila (2009) destroyed *ghers* of about 21,400 hectares (ARP, 2009). In addition, following the recent rebuilding of damaged embankments, many of the damaged *ghers* are also being reconstructed and returning to production.

Visiting the Dakop area of Khulna in February 2011, we noticed strong public antipathy amongst poor rural people towards a recurrence of shrimp farming. It remains to be seen whether people's resistance can stop powerful people. As Lönnqvist et al. (2010:17) observe, 'The shrimp farmers and investors use musclemen (hired thugs) to intimidate people to give up their land for shrimp'.

Thus, while shrimp production may be returning to pre-Aila levels, the temporary fall in supply during the two years following Aila has reduced the working hours of women engaged in shrimp cutting/cleaning activities. Shrimp suppliers working at the bottom level of the supply chain have also felt the consequence of the short-term fall in supply. According to Istiaq (one of our respondents), the only suppliers who have been able to remain operational during this difficult period are those who: (i) received good support from shrimp traders and exporters; and (ii) maintained good business ethics, such as considering the business as a holy activity and always returning the rolling credits as promised.

Domestic economy includes production of dresses using sewing machines, private tuition, and production of charcoal from *lakri* (fuelwood). Average monthly income from these activities varies from TK20 to TK1,000 (US$0.20-2.20). Some non-poor households also run money-lending businesses. We found the following types of home-based businesses: tree bark selling; tea stall and grocery shop; pickle production; shrimp cutting/cleaning; and turtle selling. Average monthly income from these activities varies from TK20-500 (US$0.20-6.10).

Small enterprises

We identified six types of small and micro enterprises within the case study area of *Supraghat* (Table 1), but our key informants report that only two of these types are most profitable: shrimp processing and generator-based electricity supply. Interestingly, we found just four shrimp traders and one electricity supplier within our case study area (more details in Section 5). Both of these businesses require substantial investment and connections with economic elites. The majority of the residents report that they simply do not have the money

to start more profitable shrimp-processing activities, and NGOs do not support the uptake of such businesses either.

Box 2: Collapse in demand for traditional construction materials

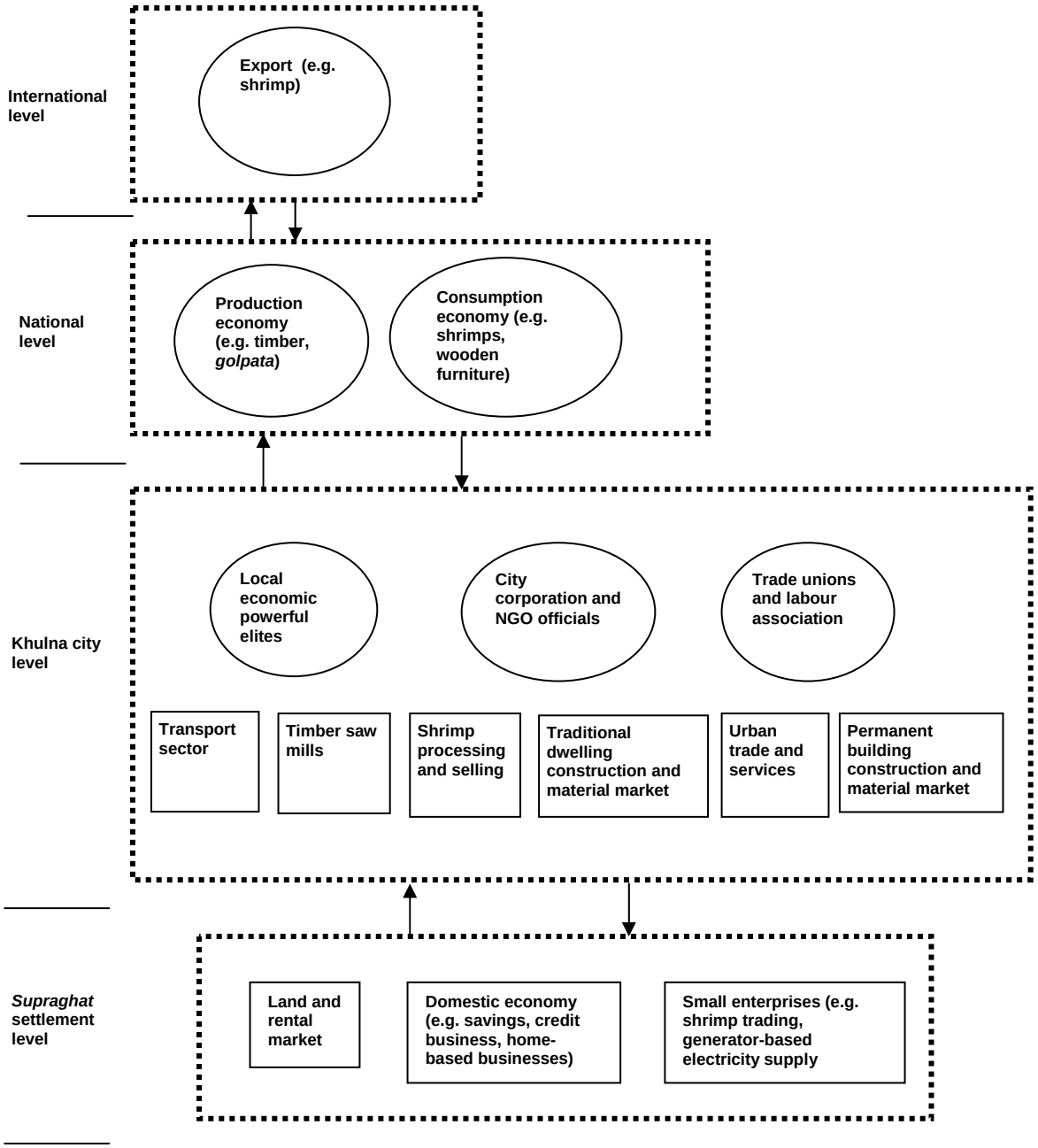
A number of factors have contributed to trigger a fall in the supply of traditional building materials, such as *golpata* (palm leaf), and ultimately a change in economic activities by people like Rafiqul in *Supraghat*. According to Amjad, a long-time wholesale trader of temporary building material, cyclone Sidr (2007) caused massive damage to the Sundarbans, especially affecting *golpata* production. In the following year, the government issued a one-year ban on *golpata* harvesting to allow the damaged *golpata* plants to recover. Meanwhile, the *chars* (land created by sedimentation) have begun to be increasingly inundated during high tide – perhaps a sign of sea level rise.

The combined effect of these three factors (destruction by Sidr, government ban and increased inundation) was a reduction of *golpata* supply in the years following Sidr. This happened at a time of increased demand for temporary building materials, as people needed to repair/reconstruct their damaged homes (caused by cyclones or due to normal wear and tear). The price of *golpata* rose sharply and many people opted for readily available, more durable materials, such as brick and tin (corrugated iron sheet).

For poor urban people, there were two other incentives to use these durable materials: (i) they are more fire-resistant than *golpata* – indeed, in *Supraghat*, after the last fire incident in 2006, the ward councillor led a campaign to replace *golpata* with tin/brick in order to reduce fire risk; and (ii) whenever people's dwellings are destroyed by critical incidents, such as fire or cyclones, an important component of external support tends to be the supply of durable building materials, such as tin.

All these factors meant that people like Amjad, who specialised in the construction of traditional dwellings, found it increasingly difficult to maintain their economic activities. For Amjad, after Sidr, there was simply not enough work. He was forced to give up dwelling construction work and picked up construction labouring work instead. But labouring in construction is less rewarding in terms of income. He earned TK150 per day as a construction labourer, compared to TK3,000-5,000 per individual dwelling (usually completed in three to four days by three workers) as a dwelling construction contractor. Unfortunately, Amjad sustained an injury while working as a construction labourer and incurred a massive debt financing his treatment. He never fully recovered – he is now able to walk, but cannot do hard physical labour. He had to give up the construction labouring work and has now become a beggar.

Figure 7: Structure of markets involving *Supraghat* settlement



Key: ▭ denotes direct and ⬭ indirect involvement of Supraghat dwellers.

4.5. Other forms of external support

We found three examples where institutions have brought non-financial support to low income people in Khulna: (i) a civil society organisation (CSO) advocating and acting as a pressure group for low income people to the city – as well as national-level service providers and policy makers; (ii) supporting community mobilisation to secure rights to improved services; and (iii) disaster preparedness through a Community Disaster Management Committee (CDMC). Key features of these are presented in Box 3.

Note that of the three activities, only CSO's support has so far involved a resident of the *Supraghat* settlement, although the resident himself is not the actual beneficiary of the support. In fact, he has helped a small neighbouring settlement established on a private land to receive water and sanitation services provided by Nabolok (NGO). People from the small settlement in question asked the *Supraghat* representative to the CSO to speak for them, which he did. The CSO has then successfully persuaded the City Corporation to authorise Nabolok to provide the service.

While the community mobilisation and disaster preparedness-related services have not yet directly involved anyone from *Supraghat* settlement, the nature of the support demonstrates how such support can also benefit *Supraghat* dwellers.

Box 3: Three examples of non-financial external support

A. Civil society organisation (CSO) acting as a pressure group for low-income people to city- and national-level service providers and policy makers:

- CSO is a WaterAid-funded initiative implemented in Khulna by Nabolok. It has a city-level and a central body based in Dhaka. Thus CSO can work both at the city level, such as negotiating with the City Corporation, and at the policy level, such as raising wider issues at the ministerial level. The city-level body includes local members of various professions, such as advocates, journalists, teachers and doctors. They meet once a month and listen to issues brought by members of the City Citizens Action Committee (CCAC). CCAC is formed from selected representatives of the Ward Citizens Action Committee, which is formed with representatives of Nabolok's community-based organisation.

B. Supporting community mobilisation to secure rights to improved services:

- This is an Urban Partnerships for Poverty Reduction Project's (UPPRP) Community Development Committee (CDC)-led citizen mobilisation. It took place when the CDC in question obtained a grant to improve the access road to the settlement. Unfortunately, the road was through private property and the owner declined to allow construction of a permanent road. This lead to a moblisation of citizens, followed by a demonstration in front of the City Corporation, ultimately involving the Mayor taking action that went in favour of the citizens.

C. Disaster preparedness through a Community Disaster Management Committee (CDMC):

- This has been initiated by World Vision. It involves training a group of volunteers from low-income communities on: (i) disaster management; (ii) disaster preparedness; (iii) disaster operation; and (iv) post-disaster recovery and rehabilitation.
- The training is conducted over a three-day period; participants are provided with actual travel cost, food and logistics.
- Participants' view is that *amra jhukipurno alakay thaki*, *ami shikhle amari lav* (we live in vulnerable area, it is my gain if I learn).

5. Understanding the vulnerability of *Supraghat* residents

Table 3 provides an overview of key factors, distinguished by their spatial context, in relation to three vulnerability domains – physical, politico-legal and socio-economic. The justification for the preferred typology of vulnerability is discussed in Roy et al. (2012; 2011). Our examination reveals that there are almost equal numbers of *Supraghat*-specific (internal) and

wider (external) factors constituting all three vulnerability types. Any effort to address vulnerability in *Supraghat*, therefore, must go beyond the specific context of the settlement.

In terms of physical vulnerability, there are an equal number (five) of settlement-specific and wider factors. The settlement-specific factors mainly reflect: (i) people's inability to elevate the land to the level of the surrounding area; (ii) poor quality of the local environment; and (iii) poor quality of the built environment.

Table 3: Factors contributing to vulnerabilities of *Supraghat* dwellers

Domain	National/city-level factors	*Supraghat*-specific factors
Physical	- Proximity to coasts - Reduced water holding capacity of rivers - City-wide ban on deep tubewell installation forcing people to rely on shallow tubewell water - Lack of solid waste management - Absence of waste water and sewerage treatment facilities	- Low land elevation and poor drainage - Proximity to polluted and contaminated pond waters - Poor sanitation and dirty environment - Poor quality dwellings - High population density and intensive land use
Politico-legal	- Invisibility in official plans and documents - Lack of a socio-political platform - Aid and NGO dependency	- Insecurity of tenure - Invisible land selling/grabbing practices - Informal development control - Financial opt-outs and politicised governance
Socio-economic	- Poor management of flood defence and embankments - Neglect of urban poor in national/regional ecosystem management activities - Falling nutrition levels and spread of disease in shrimp ponds - Open Market Sale (OMS) schemes, mainly offering rice, often of poor quality - Government failure to regulate price of essential food items - Lack of formal business credit to low-income people	- High dependence on shrimp-processing activities and weather-sensitive livelihoods - *Dadon* (advance business credit) culture keeps small entrepreneurs tied to powerful business people - Opportunity for creative use of green structures is often lost, due to too much densification - Theft and polluted pond water act as barriers to livestock rearing - Syndicate culture – newcomers need to build trust to enter into job syndicates - Petty businesses face competition, low turnover, and are exposed to 'buy now pay later' practices

While assessing these as settlement-specific factors, we underline that they are also an outcome of the wider social and political processes. For example, low land elevation may suggest people's financial inability to invest in land. But our respondents also express their confusion about whether to invest more, in case of eviction. Moreover, vested inside and outside interests act as an informal development control, so that residents cannot consolidate their claim on the land by making better dwellings and/or extending vertically. An example of inside interests operating is the way in which Christian settlers deliberately prevent Muslim settlers from expanding to their side or on the vacant pond banks. Outside interests are most striking in the attempts of the businessman who bought part of the land to evict settlers (using *mastaans*) as well as to enforce a ban (through lobbying with local powerful people) on the permanent construction of a first floor.

The wider/external factors relevant to physical vulnerability are related to the geophysical settings of the region and are subject to government policy and actions. Proximity to coasts, for example, in itself causes many problems, including exposure to salinity, cyclones and storm-surge. Some government actions, such as construction of the city protection embankment, have protected the settlement from direct impact of tidal influences. But poor management of this and other embankments meant that indirect impacts (e.g. embankment failure during Aila and subsequent fall in shrimp production) have been inescapable for *Supraghat* dwellers. All other external factors are related to either a lack of government services or the government's neglect of extending available services to low-income settlements like *Supraghat*.

In terms of politico-legal vulnerability, there are three wider and four settlement-specific factors. Once again, the wider factors reflect the neglect of low-income settlements by different types of institutions. There is no government policy on land for low-income settlements, and this is reflected in the exclusion of settlements like *Supraghat* from official plans and documents. Because of this, as our respondents report, they lack a socio-political platform. There is no duty bearer with whom they can have dialogues, as a normal citizen can, on legal issues such as land tenure. Likewise, while the level of NGO-provided services is increasing, the NGOs are organising dwellers into a delivery chain. This harbours dependency and neglects the opportunity to build community organisation.

These wider politico-legal factors underpin a range of local factors. Our data reveal four such factors – three tenure- and one governance-related. The tenure-related factors (insecurity, informal land selling and land changing hands without the knowledge of the dwellers, and informal development control) have already been noted above. The governance-related factors have two aspects – financial opt-outs and politicised governance.

The former is evident in the way the UPPR project involves the municipal government in project implementation – i.e. by involving the municipal officials in authenticating and endorsing project activities without any financial contribution, apart from some in-kind contributions (e.g. rent-free office space for the UPPR project office). This has given elected officials an opportunity to practise financial opt-outs. This allows local politicians to enjoy image enhancement without having to make a financial contribution, and donors acquire political support for their projects involving political settlements rather than political buy-in. The latter reflects the fact that while *Supraghat* residents can access political actors at almost all levels, as illegal occupants their links with rent-seeking local economic and political elites are built on dependency rather than citizenship rights. The residents feel that people view them as not belonging there. In particular, they felt their links with powerful people become ineffective in relation to their number one problem – eviction. They are forced to stage demonstrations in symbolic places, such as in front of the press club and outside the residences and offices of politicians and elected officials.

Finally, there are equal numbers (six) of settlement-specific and wider factors concerning socio-economic vulnerability. The wider factors, once again, reveal the extent and implications of the neglect of low-income populations in government policies. Some of these are closely linked with poor people's access to food (e.g. OMS schemes and food price rises)

and livelihood opportunities (lack of formal business credits). Others are more indirect, but equally damaging, such as poor management of flood defences and neglect of the urban poor in the ecosystem management activities. The settlement-specific factors, on the other hand, reveal some local manifestation of these external factors, as well as some factors that are unique in low-income settlements.

Local manifestations of external factors include: (i) widespread presence of *dadon* (advance business credit) culture and a proliferation of petty trading – these have links to the lack of formal business credit; and (ii) high dependency on shrimp processing – this has links with the promotion of shrimp-based ecosystem services (often supported by government export policies). Factors unique to low-income settlements include: (i) high population density, leading to high land-use intensity and the consequent opportunity cost – limited open and green space, poor ventilation and light, limited space for livestock rearing, etc.; and (ii) syndicate culture, especially amongst women employed in shrimp cutting/cleaning businesses. Although such jobs are difficult to continue for a long time (see Section 6.5), to *Supraghat* women the work enables them to smooth consumption on top of earning money. They receive shrimp heads (their main, if not only, source of protein) for free and/or for a token price. This has encouraged them to be very protective of these jobs by developing tight syndicates – newcomers are not allowed until they are introduced by a member of the syndicate.

6. Understanding the adaptation practices of people in *Supraghat*

In our analytical framework we argued that household- and settlement-level adaptation practices are a product of four factors: forms of climate change impacts; households and community resources; institutional structures; and, sometimes, external support (Roy et al, 2011). In this section we describe how the adaptation practices identified in *Supraghat* fit into the analytical framework. While our analysis reveals many positive contributions of these practices in reducing people's vulnerabilities, it also reveals enormous barriers to making the practices more effective and widespread.

6.1. Livelihoods-based practices

Our data point to five types of livelihood-based practices with adaptation benefits.

(i) Developing self-employment

Five of our 15 respondent household heads have successfully diversified into self-employment that has links with climatic factors in one way or another. The activities of three respondents are directly linked to the shrimp-processing industry, with two supplying processed shrimps to local trading houses (the entry point to the national/global shrimp supply chain) and the third supplying generator-based electricity to the same trading houses. The fourth and fifth respondents have developed vegetables and agro-product selling businesses, respectively.

All of the three respondents involved in shrimp-related activities have taken advantage of the settlement's proximity to a thriving climate-resilient[8] shrimp-processing industry, made good use of household and community resources, and been well supported by institutional structures. The two shrimp suppliers, for example, invested a good part of their lives in learning the trade before establishing their businesses. And, when they began the business, they opted to maximise household labour mobilisation – by involving their wives in shrimp cutting/cleaning while the husbands carried out the sourcing, processing and supplying duties. They received financial support (in the form of advance credit) from intermediate traders who they supplied. They also indirectly benefited from external support, for example, in the form of government reform of fishing policies and technical supports to revive the shrimp industry – Bangladesh's second largest export industry after textiles (FAO, 2011).

The generator-based electricity supply business, on the other hand, is remarkable in its own right. It shows a perfect combination of technical skills and entrepreneurship at the household level, marked by a clear strategy of making savings and subsequently investing them in initiating and then gradually expanding the business (see Box 3).

By contrast, the self-employment in vegetable selling may seem to be a common business strategy. But, for our respondent, Awal, it has been a means to escape a village life with a cyclone-inflicted disability, and therefore a highly effective form of adaptation. A common consequence of rapid-onset weather events like Aila is physical injury and consequent inability to continue hard physical labour. If the victim lives in village, where all forms of work include hard physical labour, the risk of being unemployed and a burden to family members increases. This is what happened to Awal and his family. In the end, for Awal, migration to urban areas and being able to start a lightweight vegetable-selling business was a much better alternative than being a liability to family members.

[8] The southwest region of Bangladesh, including Khulna, is where shrimp farming thrives, thanks to a flat landscape and numerous lagoons supplying salt water deep into the land. Climate change is likely to increase the salinity level, and the sea level rise means that more and more land will receive sea water. This may be bad for cultivation, but is good for shrimp farming (Sarwar, 2005). Shrimp from the entire southwest region are processed for export at trading houses and plants located along the embankment of the Rupsha river. Khulna, and particularly the *Supraghat* area, has thus become a hotspot of shrimp processing. The vulnerability and resilience of the shrimp processing industry to climate change is highlighted in Boxes 1 and 2.

Box 3: Innovation in developing a generator-based electricity supply business

The business idea was innovative and unique from the beginning. A generator-based electricity supply business could not be better placed than in an industry that requires continuous electricity amidst growing load shedding.

The start-up was accidental. Haleem was an apprentice learning how to fix and repair trawler engines. He was sent by his employer to attend a client in a neighbouring district town. His work was perfect, the client was impressed. The client coined the idea of the above business in partnership, with two of them buying two machine parts. Haleem agreed and a successful business venture began.

Haleem's wife was making monthly savings after the birth of their daughter, in order to gradually accumulate the marriage costs, such as dowry and wedding feast. These savings were invested in the business. The business was a success, and his wife began saving again.

Six months later, the business partner asked if Haleem would buy his share, so that he could go abroad. Haleem agreed, and again drew on his wife's savings. He also took some microcredit to pay the business partner the cost of his share.

Haleem with his generator

Within the last two years, Haleem has expanded his client-base from an initial 10 to 100. He has replaced his old machine with a new one to meet the increased demand. He has also bought a back-up automated generator. All these have come from their savings and strategic re-investments (e.g. selling the old machine when buying the new ones).

Meanwhile, the household has bought land, including a dwelling in Supraghat. They have reconstructed their house, showing excellent attention to climate proofing (Figure 9).

Awal was injured during cyclone Aila, when he was trapped beneath a house knocked down by a fallen tree. His recovery has been painfully long and costly – he could not move for almost a year, and spent over TK30,000 on treatment. Two of his three children dropped out of school – a daughter aged 17, who ended up being a victim of early marriage; and a son aged 12, now undertaking two jobs. Nevertheless, to Awal and his family, the freedom of earning a living that urban life has given them is invaluable. He has been well supported by his network of friends and family members, most notably the gift of a van rickshaw from his father, who is still living in the village. He missed out on external support made available to other Aila victims, as he had to move to Khulna. But he received some support from informal institutional structures: a mosque allowed him to open his first temporary vegetable selling stall in front of its gate, and later a market committee helped him acquire a rented space to relocate his shop to the main market.

Similarly, our fifth respondent's (Bashar) self-employment in selling agro-products also seems to be quite common in Bangladesh. To be successful as a mobile trader of seasonal agro-products, Bashar had to become very familiar with the crop calendar of the Khulna region in order to perfect the art of selling 'different products in different seasons'.

He started out selling fresh fish, but found it difficult to continue during the hot summer. As the fish was rotting fast, he needed to decide on the quantity of fish to purchase the next day based on information on the availability and cost of ice of the previous day, amongst other risks. He made the following changes to his business pattern to reduce the risk of making a loss due to increased exposure of his sales to climate variability:

- Selling fresh fish only in summer, but adding dried fish to the product list and reducing the amount of fresh fish in winter. He knows that there is no demand for dried fish in summer, as it causes discomfort if eaten in the heat;
- Selling seasonal products, such as melons and lychees, mainly in summer. He sells fish in the morning and other products in the afternoon;
- Buying and selling raw leather during *Eidul Ajha* (a Muslim religious festival of sacrificing cows and goats) to earn some quick cash;
- Home-based selling of river turtles (despite the practice being illegal), by treating the turtles as livestock and selling them throughout the year;
- Opening a home-based grocery shop, which he and his wife run in rotation.

Bashar maintains a list in his mobile of regular clients' phone numbers. Whenever he has something special to sell, he calls his clients – usually to make more profit and, especially in summer, to speed up sales to minimise the risk of products declining in quality or rotting. He says: 'mobile phone is very useful in summer, when I need to sell fish before it is rotten'. He has benefited from having a wider network of friends and family members, which has helped him to develop his local knowledge-based and climate-sensitive business strategy. He also benefits from the proliferation of mobile phones.

(ii) Switching employment away from climate-sensitive job categories

One of our very poor respondent, Rafiqul, had to switch from being a self-employed *ghorami* (builder of low-cost dwellings using traditional building materials, e.g. bamboo and *golpata*) to become a casual wage labourer in construction and, ultimately, a beggar. This was triggered by cyclone Sidr in 2007. Before then, Rafiqul had a successful *ghorami* profession, and had even built a two-storey house. Things have changed dramatically since Sidr. Box 4 describes the consequences of cyclone Sidr for Rafiqul.

Box 4: Collapse in demand for traditional construction materials

A number of factors have contributed to trigger a fall in the supply of traditional building materials, such as *golpata* (palm leaf), and ultimately a change in economic activities by people like Rafiqul in *Supraghat.* According to Amjad, a long-time wholesale trader of temporary building material, cyclone Sidr (2007) caused massive damage to the *Sundarban*s, (mangroves), especially affecting *golpata* production. In the following year, the government issued a one-year ban on *golpata* harvesting to allow the damaged *golpata* plants to recover. Meanwhile, the *chars* (land created by sedimentation) have begun to be increasingly inundated during high tide – perhaps a sign of sea-level rise.

The combined effect of these three factors (destruction by Sidr, government harvesting ban and increased inundation) was a reduction in *golpata* supply in the years following Sidr. This happened at a time of increased demand for temporary building materials, as people needed to repair/reconstruct their damaged homes (caused by cyclones or due to normal wear and tear). The price of *golpata* rose sharply and many people opted for readily available, more durable materials, such as brick and tin (corrugated iron sheets).

For poor urban people, there were two other incentives to use these durable materials: (i) they are more fire-resistant than *golpata* – indeed, in *Supraghat*, after the last fire incident in 2006, the ward councillor led a campaign to replace *golpata* with tin/brick in order to reduce fire risk; and (ii) whenever people's dwellings are destroyed by critical incidents, such as fire or cyclones, an important component of external support tends to be the supply of durable building materials, such as tin.

All these factors meant that people like Rafiqul, who specialised in the construction of traditional dwellings, found it increasingly difficult to maintain their economic activities. For Rafiqul, after Sidr, there was simply not enough work, so he was forced to give up the dwelling construction work and picked up construction labouring work instead. But labouring in construction is less rewarding in terms of income. He earned TK150 per day as a construction labourer, compared to TK3,000-5,000 per individual dwelling (usually completed in three to four days by three workers) as a dwelling construction contractor. Unfortunately Rafiqul sustained an injury while working as a construction labourer and incurred a massive debt financing his treatment. He never fully recovered – he is now able to walk, but cannot do hard physical labour. He had to give up the construction labouring work and has now become a beggar.

(iii) Labour mobilisation and employment diversifications

Having additional working family members makes a big difference to household income, especially for very poor and poor households. Our data show that 12 of our 15 respondent households have female earners, suggesting that most women in *Supraghat* are economically active. Only some non-poor households tend not to have their female members working. Indeed, in four out of five very poor households the wives are working; the fifth household consists of a single woman living alone. Similarly, the wives in five out of six poor households are currently working; the wife in the sixth household intends to return to work once the youngest son, aged three, goes to school. In contrast, two of four non-poor household heads see 'no need for their wives to work'. These two household heads (male) are self-employed in the shrimp-processing industry – one as a supplier of processed shrimp to exporting companies and the other running a generator-based electricity supplying business to fish processing premises.

While the presence of additional working family members (usually female) does not indicate a climate change driven adaptation, all 12 working women have begun to work during the last decade (see examples in Annex 2). This proves that poor *Supraghat* residents are finding it increasingly difficult to live on the husbands' income alone. Fortunately, *Supraghat*

dwellers have also begun to capitalise on the economic opportunities created by the locational advantage of their settlement.

(iv) Smoothing consumption

Our household life histories reveal the following ways in which *Supraghat* residents are smoothing their consumption:

- Women working as shrimp cutters/cleaners are allowed to bring home shrimp heads, sometimes free of charge and sometimes for a token cost. They use shrimp heads as their main, if not only, source of protein; we observed them having the same diet every time we visited.
- Home-based enterprises selling consumables such as tree bark help households to save on fuel costs, as they utilise the after-sale redundant barks.
- We found evidence of 'taking home of the evening meal' by women working as housemaids. This helps them save on fuel and food costs. Noushat's wife, a housemaid, hardly cooks at home.
- Creative use of urban green structures. People try to use every bit of open soil and roof top to grow edible vegetables. These serve the dual purpose of: providing vegetables (especially in periods of financial hardship) and acting as insulation (against heat in summer and cold in winter)
- Relying on NGO-provided services, including water and sanitation, children's education, and mother and child health.
- Using the pond to farm fish, some of which are consumed and the rest sold to make money. Note that the pond is managed by a co-operative formed only by the Christian households. Inevitably, this has become an issue of conflict between Christian and Muslim households.
- Rearing livestock.
- Rainwater harvesting to reduce spending on water. One terminally sick (with liver-related illness) female respondent even considers the rain water to be 'holy water' with health benefits, in contrast to drinking saline water, which is harmful for health.

(v) Maintaining power structure and job syndicates

Our analysis reveals the presence of a strong power structure and job syndicates in *Supraghat*. This is reflected in the following experiences of our respondents.

- Shrimp processing is a profitable business, but one has to have the backing of the local power structure to be successful. For example, Pintu, the owner of a fish-processing business, had to learn this lesson the hard way. Soon after starting the business in 2005, his freshly bought shrimp, worth TK20,000 (about US$250.00) was stolen. He could not trace it, even after spending a further TK10,000 bribing and entertaining the police and other political leaders (about US$125.00). He had to start afresh, this time securing the backing of a local shrimp trading house, and by taking advance business credit from the owner – a practice by which powerful shrimp businesses subordinate small suppliers.

- Shrimp cleaning, undertaken mainly by women, is both financially rewarding and helps smooth consumption. These women work as a small group led by a *sarderni* (female leader). Mitu, the wife of one of our tenant respondents, waited for six months after moving to *Supraghat* to be invited by the leader of such a group who lived next door. These groups operate with tight syndicates; newcomers are not welcome unless they are networked to the syndicate.

- The success of business owners, such as Haleem (noted above), rests on their effective maintenance of local power structures. Haleem provides free electricity to the local mosque to ensure its backing.

These experiences are not necessary bad for *Supraghat* residents. Rather, they imply an important mutual interdependence between them and the local elites. On the one hand, the political elites draw on the support of residents through syndicates and the economic elites benefit from the availability of cheap labour. On the other hand, residents draw on the backing of these local elites for their tenure security, informal social control and to earn their living. If the growing incidence of labour mobilisation and employment diversification is a sign that residents' livelihood challenges are intensifying (as noted above), then the presence of a power structure and job syndicates is helping them to face these challenges by being more deeply embedded within Khulna's informal economy.

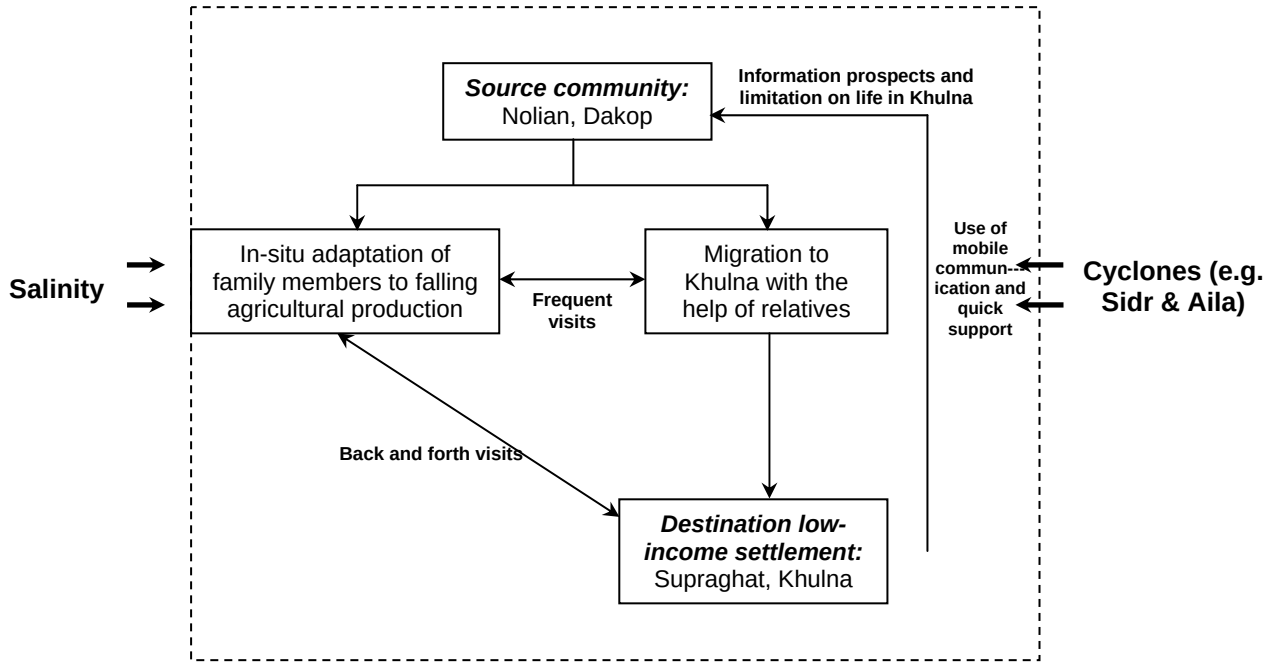
6.2. Distributing risks across space

Migration to urban areas while staying in touch with ancestral land in the villages is the most vivid example of how people distribute risks across space. There are two supporting examples in our data. Figure 8 is a graphic representation of the underlying process.

In one example, the son, Rahim, migrated to Khulna driven by falling levels of rice production due to increased salinity and river erosion in his village. His wife joined him two years later, and the family continued visiting back and forth between village and Khulna City. Then came cyclone Aila in 2009, when Rahim was in Khulna but his wife and daughter were in the village with his parents. Rahim was able to communicate with his family members using a mobile phone throughout the time that Aila was causing destruction. He was one of the first to bring food relief to his family. Clearly, Rahim's migration to Khulna has speeded up his family's recovery from the short-term effects of Aila. He is also supporting his parents financially, helping them to long-term recovery and loss redistribution.

The second example is Awal (noted above), who was injured during Aila and forced to move to urban areas in search of lightweight employment in an urban trade. Awal's family also visits the village frequently, but unlike Rahim, Awal received financial help from his father. To kickstart his vegetable-selling business, his father lent him his rickshaw van, as well as TK5000 (about US$60.00) as capital.

Figure 8: How rural-urban-rural movement is shaped by climate change impact



6.3. Distributing risks across asset classes

Our data reveal three main practices relating to the distribution of risks across asset classes.

i. Climate proofing of homes. We saw two examples. The first is described in Figure 9, which is an image-based analysis of climate-proofing elements incorporated within the living space of a non-poor household – that of Haleem (the owner of the generator-based electricity supplier, noted above). The second example is the house of Rafiqul, a *gharami*-turned-beggar. It is perhaps unsurprising that, given his experience and skill as an 'architect' of low-income traditional dwellings, Rafiqul's house features two interesting climate-proofing features: the floor is higher than all his neighbours – consequently he did not have to face problems associated with waterlogging or rainwater penetrating indoors; and the construction of a common gutter to channel rainwater from his neighbour's roof, which allowed him to share a wall with this neighbour.

Figure 9: Climate-proofing examples in Haleem's home

ii. Investment in basic infrastructure and services. All but one of 15 respondents have contributed in one form or another towards accessing basic infrastructure and services. However, it is one of the non-poor households that has exploited its access to powerful people to bring CDC- and Nabolok-provided water and sanitation facilities for personal use. The practice may indicate a porous bureaucracy (Benjamin, 2005) within the institutional structures of CDC and Nabolok; nonetheless, it has reduced the vulnerability associated with water and sanitation for the household in question.

iii. Securing informal mortgage. One household has made an interesting arrangement with an international NGO – World Vision. While the family continued to live in a substandard dwelling, it allow the NGO to construct a permanent building as per the following informal agreement. World Vision would finance the construction of the school building, use it for six years for free, and then pay a monthly rent of TK 1,500 (about US $ 18.00) to the landowner. We describe the practice as informal mortgage, which enabled the household to become the owner of an income generating (thus risk distributing) structure within six years.

6.4. Risk minimisation through networks

We observed three main risk reduction strategies involving social networks:

i. Diversification of networks. Different types of household diversify networks differently. For example, Table 4 shows that non-poor households make maximum diversification of network types, compared to very poor and poor households. The difference is particularly evident in the case of contacts with external people, such as employer/business links, political leaders, elected bodies and other powerful people. Non-poor households also diversify networks more evenly across space (i.e. within *Supraghat*, across Khulna city, and with rural villages and other regions) than very poor and poor households. Again, the difference appears to be significant in the case of networks with external powerful people.

Table 4: Access to support network in *Supraghat* by household type

Contact type	Contact location	Percentage of contacts by household type			
		Very poor (n=5)	Poor (n=6)	Non-poor (n=4)	Total (n=15)
Relatives	Rural	20	66.67	75	53.33
	Supraghat	100	100	100	100
	Khulna city	100	100	100	100
	Other regions	40	83.33	100	73.33
Community-based organisations	*Supraghat*	100	50	100	80
Work colleagues	*Supraghat*	60	50	100	66.67
	Khulna city	100	100	100	100
Employer/ business links	*Supraghat*	0	16.67	75	26.67
	Khulna city	20	100	100	73.33
Political leaders	*Supraghat*	60	33.33	100	60
	Khulna city	20	50	100	53.33
Other powerful people	*Supraghat*	60	83.33	100	80
	Khulna city	20	100	100	73.33
Elected bodies	Khulna city	20	66.67	100	60
Rotating savings and credit association	*Supraghat*	20	16.67	0	13.33
	Khulna city	20	16.67	0	13.33

All three types of household receive different forms of support from different types of contact, as Table 5 shows. All of them receive mostly long-term, grant-like support from relatives, whereas support from external elite groups and powerful people comes mainly in the form of short-term relief and rescue operations. From a climate change perspective, both forms of support are essential, with relief and rescue operations providing quick and immediate relief and long-term grants providing space for long-term recovery and loss redistribution.

Table 5: Nature of support by type of contact

Network type	Type of support received
Relatives	Grant from father as business capital or in times of financial difficulty; arranging and supporting girls' marriage Short-term, interest-free loan to help with micro-credit instalments; information on land/house for sale Short-term, rent-free accommodation; finding the first employment Cash and travel expenses to father from daughter; information on job opportunities elsewhere, such as in Dhaka
Community-based organisations	Improvement of level and quality of civic amenities; dispute resolution Credit facility in grocery shops
Work colleagues	Advice; interest free loan; information on land/houses for sale
Employer/ business links	Salary advance; providing on-the-job support Rolling credit for business Take-home food facility
Political leaders	Relief and rescue operation; dispute resolution; obtaining OMS card; addressing security of tenure
Other powerful people	Relief and rescue operation; dispute resolution; enhancing security of tenure; keeping musclemen at bay
Elected bodies	Relief and rescue operation; dispute resolution; improvement of level and quality of civic amenities
Service-providing institutions	Improvement of level and quality of civic amenities with minimum cost; awareness raising
Rotating savings and credit association	Cash savings

ii. Network consolidation: Table 6 refers to how the networks were/are kept alive – it tells us about people's strategies to consolidate networks. Consolidated networks are particularly important for enabling people to have repeated and mutual exchange of support (Chatterjee, 2010). Our analysis reveals that people make financial exchanges only with relatives and members of the community-based organisations to which they belong. When it comes to dealing with influential people, maintaining honesty and sincerity becomes more important. One of our respondents, who owns a shrimp supply business, notes that the following three strategies gave him more business contracts than other suppliers, especially during the post-Aila period, when there was a sharp dip in shrimp availability:

- Remaining honest and behaving well with exporting companies and trading agents to earn their trust.
- With trust from the exporting companies, the respondent could afford to buy at higher prices and could receive higher payments from the company.
- Good relationships with intermediary agents mean that these agents can recommend export companies to take good care of suppliers like him. This ultimately helped him to take the risk of buying at higher prices from the wholesale market.

iii. Prioritisation of contacts during potential extreme weather events: Table 7 tells us which contacts the respondents would use first in case of a potential extreme weather event. This in turn tells us how people prioritise networks in the face of weather-related shocks. Our analysis reveals that *Supraghat* residents would make relatives and neighbours their first

point of contact in all but two situations. They would prioritise the former Ward Councillor for events affecting jobs and businesses, whereas for events that would destroy their existing contacts they rely on their fate, and Allah would be the ultimate hope.

Table 6: Method of network consolidation by contact type

Contact type	Method of consolidation
Relatives	Exchanging visits; sending regular money for parents Exchanging visits; offering short-term interest-free loan Not doing anything other than exchanging visits Exchanging occasional visits
Community-based organisations	Participating in savings scheme; sharing cost of maintenance Regular payment of debts
Work colleagues	Exchange of advice; interest-free loan
Employer/ business links	Keeping one's word
Political leaders	Exchanging *salam* (greetings); election campaign
Other powerful people	Exchanging *salam* (greetings) every time we meet
Elected bodies	Exchanging *salam* (greetings) every time we meet
Service-providing institutions	Participating in savings scheme; sharing maintenance cost of facilities
Rotating savings and credit association	Keeping one's word

Table 7: Priority actions and choice of contacts by type of extreme weather event

Situation	What would you do first?	Who would you seek help from (times mentioned)?
Flooding and/or cyclone causing damage to your home and the need to take shelter outside	Stay at home and move in with neighbours and relatives in *Supraghat* Move to Mr Hanif's *madrasa* and seek his advice Contract Mr Manu (former Ward Commissioner) Move to government school Stockpile dry food, e.g. beaten rice and puffed rice Use rickshaw to relocate important goods to safety Put goods on elevated platform Gather family members and pray to Allah Strengthen the knot on the roof Move into the fish trading house that is most elevated Move to relatives living elsewhere in Khulna Contact current Commissioner of Ward 22 Contact the Christian Mission Priest Contact Mr Kuddus Mollah	• Neighbours and relatives (6) • Madrasa (4) • Former Ward Commissioner (4) • Govt. schools (2) • Fish trading association (2) • Relatives in Khulna (2) • Current Ward Commissioner (2) • Christian Mission Priest (2) • Mr Kuddus Mollah (1)
Your job/ business is affected by bad weather (e.g. heavy rainfall, cyclones, etc.)	Accept what Allah brings Contract Mr Manu (former Ward Commissioner) Consult the Christian Mission priest Consult the fish traders' association Safeguard business premises, material and equipment Keep customers informed	• Former Ward Commissioner (4) • Belief in Allah (3) • Christian Mission Priest (2) • Fish traders' association (2) • Customers (1)
You/your family members start to become sick due to heat stress	Keep the room open and use hand fan Consult the doctor, first the quack and then, if needed, the general hospital Keep oral saline at home Wipe body with wet napkins Contact relatives living in RGNBC colony Walk outside near the pond	• Neighbours and relatives in RGNBC colony (3) • Quack on the embankment (2)
You find it difficult to live here, due high population density, too much shouting and quarrelling	Advise people not to shout/quarrel and keep a cool head Do nothing, as doing anything will make matters worse: 'people do not even listen to the City Corporation Mayor, let alone listen to us'. Walk away from the gathering for a while Complain to household heads/ landlords Confront troublemakers	• Neighbours and relatives in RGNBC colony (3) • Landlords (2)
You notice a fall in the quality of living conditions, such as shortage or poor quality water; water-logging, blocked drains and bad sanitation	Consult with other affectees and try to solve the problems on our own Collect water from deep tubewell that does not have a salinity problem Accept the fate of everyone Contract current Commissioner of Ward 22 Adapt to new situation Harvest rainwater more	• Neighbours and other affectees (8) • Deep tubewell owners around the RGNBC colony (5) • Current Ward Commissioner (2)
You no longer get support from your network, maybe due to economic crisis caused by natural disasters such as Aila/Sidr	Rely on Allah Look for alternative job/income source Restore network through good behaviour Consult Mr Kuddus Mollah Contact the Christian Mission priest	• Rely on Allah (2) • Christian Mission priest (1)

6.5. Prospects and limitations for enhancement and diffusion of adaptation practices

a) Limited options for labour mobilisation

As noted earlier, there is high dependency on the shrimp industry. The industry may be benefiting from slow-onset processes (an increase in salinity), but it remains vulnerable to rapid onset events (cyclones). Those who operate high up in the business chain, such as exporters, trading houses, agents and suppliers, have shown resilience to short-term shocks. But the very poor and poor households remain highly vulnerable to any short-term dip in shrimp supply in the *Supraghat* area. The shrimp suppliers who directly employ the shrimp cutting/cleaning women recognise this very well, as one supplier calls for the: 'establishment of industries in Supraghat where people can work throughout the year without having to fear not having any work tomorrow/next week'.

The very nature of shrimp cutting/cleaning work is also a barrier to working long term in the job. It involves working at night to manually separate shrimp heads, which have razor-sharp parts. A local quack running a pharmacy shop informs us that during the main season (March–July) many women working in shrimp cutting/cleaning seek treatment for damaged fingers, and headaches due to lack of sleep and wet and soggy working conditions. They also complain about damaging their eyesight as a result of working under inadequate lights at night.

The temporary and periodic nature of the shrimp cutting/cleaning job also results in fluctuation of household income between main and quiet seasons. We have noted three cases where the women who used to work in shrimp cutting/cleaning have switched to other types of employment – one to housemaid, one running a home-based grocery shop, and the other running a home-based tree bark-selling business. Lack of work during quiet period/season also creates some social problems, such as a rise in women engaging in sex work, as one respondent notes.

While majority of our respondents believe self-employment in shrimp trading is highly profitable, this is not straightforward. This is evident in the fact that, while a range of home-based income-generating activities is emerging, only a few can be judged successful. Most of these activities involve small businesses, such as pickle selling, tea stall, furniture making and tree bark selling. In Bangladesh, such businesses invariably face high competition, low turnover, and are exposed to 'buy now pay later' practices. The majority of *Supraghat* residents report that they do not have the money to start more profitable shrimp-processing activities, and NGOs do not support the uptake of such businesses either.

b) Shocks and critical incidents

Shocks and critical incidents can severely limit households' ability to earn a living. Our data reveal three forms of shocks and critical incidents.

First, idiosyncratic shocks and incidents, which are unpredictable and household specific. Our examples cannot be directly attributed to climate change and variability, and the original shocks are covariant in nature. Nevertheless, their impacts have surely increased the vulnerability of the affected households differently. We found the following examples:

- There were two massive fire events in *Supraghat*, in 1996 and in 2006, each destroying the homes and other belongings of many households. On the surface there was good institutional and civil society relief for the affected households, and many households appreciated that. But we observe a correlation between these incidents and households taking massive loans to help them recover from their losses. One very poor householder could not afford a loan and could not rebuild his home after the second fire. He is 80 years old, has an old age pension and relies on his wife's income, in particular sharing the evening meal that she brings from the house where she is a maidservant. His children are grown up and do not look after him. He has no hope for the future: 'I have put one leg in the grave and am waiting for Allah to take me to Him*'.* He was only able to build a very basic shack with polythene and other relief materials.

Second, covariant shocks, which impact on the wider community. These shocks could be both location specific and linked to global processes. They often have links to global climate change and its impact on local climate variability. Our analysis reveals the following evidence:

- Although eviction *per se* has not happened yet, the dwellers of *Supraghat* remain under constant eviction threat, as noted above. Such insecurity of tenure has in turn led to differential levels of physical adaptation of the built environment. While some households have opted to go for double-storey dwellings, others have built their homes using temporary materials. But eviction remains a threat for all residents.
- Recent price increases of food items have been negatively impacting on all households. Several respondents have discussed their difficulties in managing household expenditure with a fixed and sometimes reduced (due to reduced working hours in fish cutting/cleaning) income. Whether global climate change is to be blamed for global price increases is open for debate, but their negative impact on the social vulnerability of residents of *Supraghat* is obvious.

Third, other household-specific events, such as marriage costs and illness. Six out of 15 households have reported incurring loans to arrange their daughters' marriage. Although they do not say they had to arrange a dowry, on average they have spent TK50,000 (over US$600.00) on girls' marriage. In addition, 10 of 15 households have had serious injuries/illness which have reduced their ability to maintain their livelihoods. For example, Noushat suffered from trauma and injured his eye during a fire. He had one eye operated on, but the other remained untreated due to lack of money. Awal broke his spine and two ribs when he was trapped under a collapsed house knocked down by a fallen tree during Aila; he spent TK30,000 (US$ 370.00) on treatment, and had to migrate to the city. Rafiqul broke his leg while working as building construction helper, and ended up being a beggar.

c) Constraining social structure

We found evidence of two predominant social patterns that limit the agency of people in *Supraghat*, especially women who are widowed, divorced or abandoned. Family break-ups in

the villages lead to the creation of female-headed households moving to urban areas. These women remain particularly vulnerable socially throughout their lives. They expect their children to look after them when they grow up, but this rarely happens. We found two cases where the sons have moved out, making their mothers even more vulnerable. Their houses are in very bad condition; they could not get to work; there is no widow allowance; they become dependent on neighbours.

As a coping strategy, we have seen evidence of the formation of new family-like relationships with those who offer them help. For example, one left-behind mother has established a *dhormo bon* (trusted like a sister) relationship with the wife of her neighbour. This new sister helps her in many ways, and in return our respondent has allowed her to cook on her land and share her latrine. The respondent has also established a 'father-daughter' relationship with a grocery shop owner, who allows her to buy goods in credit.

d) Attitude to risks

Our data indicate two forms of attitude that limit household agency:

- Fatigue and perceived inability to work. Rahim has been pulling rickshaws for over 20 years. He expresses that he has developed fatigue and a habit of 'drinking tea' too much. He tried only pushcart pulling for two months – but gave that up because it was more difficult than pulling rickshaws. He complains that rickshaw pulling has become difficult in summer as well as in rainy season. He has developed eye problems (as wind hits his eyes while pulling the rickshaw) for having been a rickshaw puller for so long.
- Loyalty to family profession. Carpentry is the predominant profession of most male members of the Christian community. While they recognise that the profession is facing a challenge from ready-made furniture, they believe that the shrimp processing industry is profitable, but not for them – 'those who work on land [i.e. with timber] cannot work in water [i.e. with shrimp]'. One of our respondents had tried to diversify into shrimp processing, but failed and returned to carpentry.

e) Limited use of land as a productive asset

Ownership of productive assets matters a lot to all three types of households. All but two respondent households benefit from informal land ownership, at least in the form of not having to pay rent and owning their dwellings. However, we find only two cases where land ownership has been used for income generating purposes, such as by renting rooms – one very poor household and the other a non-poor household. Our analysis reveals two observations: first, the Christian households (four out of 15) prefer Christian people as tenants, but there is a lack of Christian tenants; and second, most of the Muslim dwellings are very small, and so not suitable for subdivision. This was probably due to the fact that early settlers sold their land in small holdings. Thus, it is unlikely that *Supraghat* residents will be able to generate additional income by treating land as a productive asset.

f) Intra-community conflicts

The word 'community' refers to a homogenous socio-democratic unit, but this does not apply to *Supraghat*. We found the settlement to be quite divided into a Christian and a Muslim group, with separate organisations to represent these groups. The Christians see Muslims as invaders, and they maintain a power structure that extends up to ministerial level through the head of Christian Society in Bangladesh. The Muslims do not see the Christian households as the legitimate owners of the area that belongs partly to the Christian Mission. Indeed, the Christian families agree that they were given the right to live here with a view to keeping Muslim settlers away. But the Christian settlers were never given legal ownership of the land. Thus the Christian households resent not having legal ownership of land, as well as being impinged on by Muslim settlers. On the surface, the settlement seems to be peaceful, with some Christian and Muslim families living as neighbours and sharing facilities. But our key informants report the following difficult-to-resolve conflicts:

- The Muslim youths deliberately attempt to undermine the sanctity of the makeshift church, whereas the Christians Community Organisation (CCO) built the church strategically to restrict people from settling there.
- The creation of the pond was believed to have been influenced by the intention to protect the area being occupied by the Muslims. A signpost clearly states that outsiders are barred from the area beyond the front edge of the ponds .
- The ponds are used for fish farming. Only the Christian households can participate in and benefit from the initiative; Muslim settlers around the ponds are excluded. In return, Muslims youths try to catch fish at night and, in extreme cases, poison the fish stock. To prevent them from doing so, the CCO have organised a rotating night guard system.
- The Muslim settlers deliberately block drains to stop water from the 'Christian area' passing through the 'Muslim area'. The most visible expression of this is the blocked drain caused by constructing dwellings on the drain connecting the ponds to the sluicegate.
- When the outlet of a latrine constructed on the Muslim area was connected to the ponds, the CCO took the matter to court, but lost to a political verdict.

g) Institutional barriers

Outside institutions, such as UPPR project and Nabolok, have made many positive contributions to the settlement. However, our key informants identify the following limitations in the way these institutions operate and influence people's agency:

- The CDC-based structure of UPPR project is a delivery chain mechanism, rather than acting to develop and nurture community organisations. It is a mixture of aid attached to a savings plan and a minimum level household/collective contribution. The CDC members are mostly selected, and we found evidence of the wrong persons (e.g. a young educated female) being selected for the wrong purposes (e.g. as a mentor for a destitute person receiving a business development grant). It implements a prototype design and a fixed budget, which may not always fit the local context.

- The NGO Nabolok provides water points and community latrines. It too takes a community-based approach and a micro-finance style implementation structure, and possesses weaknesses similar to CDC. It may incorporate some local factors in its design, such as raised plinths and rain-fed water reservoirs in bathrooms, but it connects the septic tank overflow pipes to the ponds. Recently, the installation of tubewell-based water points by Nabolok have been stopped by the formation of the Khulna Water Supply Authority, with the aim of supplying piped water to the entire City Corporation area. It is not clear when this service will reach *Supraghat*.
- Larger projects (e.g. footpath wider than 1.5 metres) are dealt with by the City Corporation, and people find it difficult to get their priority problems dealt with by the Corporation. For example, a major source of waterlogging in the study area is the fact that the drain connecting the ponds to the sluicegate has been blocked by the construction of dwellings. The residents have been unsuccessful in attempts to get this drain cleared of dwellings and made permanent. Another problem that people mentioned is the defeat of the previous counsellor, who had done most work for the *Supraghat* settlement. The new councillor is less powerful in pushing pro-poor agendas.
- Limited coverage of disaster management programmes. The coverage of World Vision's community-based disaster management programme, for example, does not include Ward 22 where *Supraghat* settlement is located. The government's urban disaster management measures are still to be implemented.

7. Conclusion

Supraghat is the largest and one of the oldest low-income settlement in Khulna in terms of population size. It was established in the 1970s on land owned by a Christian Mission. Over the years it has turned into a diverse settlement, with a population belonging to different religious groups, with different geographical origins, staying for varying lengths of tenancy, and practising different types of livelihood. It is located within close proximity of a range of wholesale trading establishments, a large agglomeration of shrimp-processing industries, river port activities and other industrial activities. These establishments provide employment to a vast majority of the residents. The shrimp-processing industry itself provides employment in one form or another for close to 75 percent of the population. The settlement is also located close to public transport, and there is an increasing level of basic infrastructure and services provided by local NGOs and aid donors, in partnership with community members and the local government.

This does not hide the fact that people of *Supraghat* settlement are predominantly poor, and are exposed to triple forms of vulnerabilities: physical, politico-legal and socio-economic. Dimensions of physical vulnerability are manifested by the fact that the settlement: (i) is located on the bank of the river Rupsha, but on a much lower level land elevation compared to the city protection embankment; (ii) includes two ponds that are directly connected to the sluicegate via drains that remain mostly blocked, resulting in waterlogging; and (iii) suffers from water and air pollution. Dimensions of politico-legal vulnerability are mainly reflected in the high level of tenure insecurity. Dimensions of social vulnerability are manifested in the

fact that the settlement is home to 39 per cent very poor, 41 per cent poor and 20 per cent non-poor households; and that social conflicts are rife and drug trading and misuse are part of the social life.

People have identified many challenges facing them, with fear of eviction voted as the most important. While some of the problems are beyond easy solution, such as tenure insecurity, residents have been trying to address other problems as best they can. There are many success stories, with people showing different levels of adaptation potential, depending on their socio-economic condition, access to institutional structures and availability of external resources. Much of this success can be attributed to the processes by which the residents have established informal claims on their land and dwellings. This has helped them to become fully integrated within the informal economic, social and political life of the city. This in turn has created space and opportunity for a range of adaptation practices. But, with concern over tenure security sapping their enthusiasm, energy and aspirations, residents of public settlements are unable to realise their full potential.

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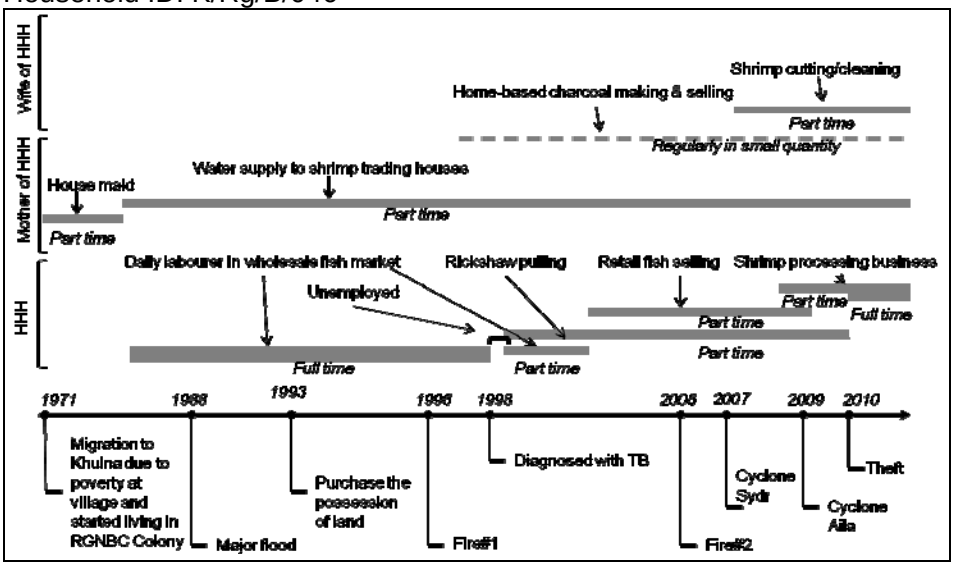
Annex 1: Households selected for life history interviews

ID	HHH name*	HH size	HHH occupation	HHH monthly income (BDT)	Place of origin	Year lived	Poverty class
4	Javeed	3	Carpenter	5000	Barisal	23	Poor
28	Rafiqul	3	Beggar	6000	Koyra	31	Very poor
25	Nannu	8	Day labour	7200	Paikgacha	31	Poor
31	Bashar	3	Shrimp business	10000	Morolgonj	17	Non-poor
46	Pintu	5	Rickshaw puller-turned-shrimp trader	6000	Koyra	31	Poor
52	Jwel	3	Shrimp business	2500	Dakope	3	Poor
55	Noushat	2	Unemployed	700	Pirojpur	13	Very poor
71	Jeebon	3	Carpenter	7000	Gopalgonj	25	Non-poor
83	Dulal	7	Autorickshaw puller	8000	Morolgonj	13	Poor
86	Gaus	3	Fish business	8500	Barisal	20	Non-poor
98	Awal	4	Vegetables selling	5500	Morolgonj	2	Very poor
122	Haleem	4	Generator business	12000	Morolgonj	16	Non-poor
126	Pakhi Begum	1	Day labour	500	Morolgonj	26	Very poor
135	Hasan	5	Rickshaw puller/wood business	6000	Rajapur	10	Poor
136	Manik	2	Private service	3500	Dinajpur	9	Very poor

* These are anonymised.

Annex 2: Employment diversity and timeline of key incidents in the lives of three selected respondent households

Household ID: K/Rg/B/046



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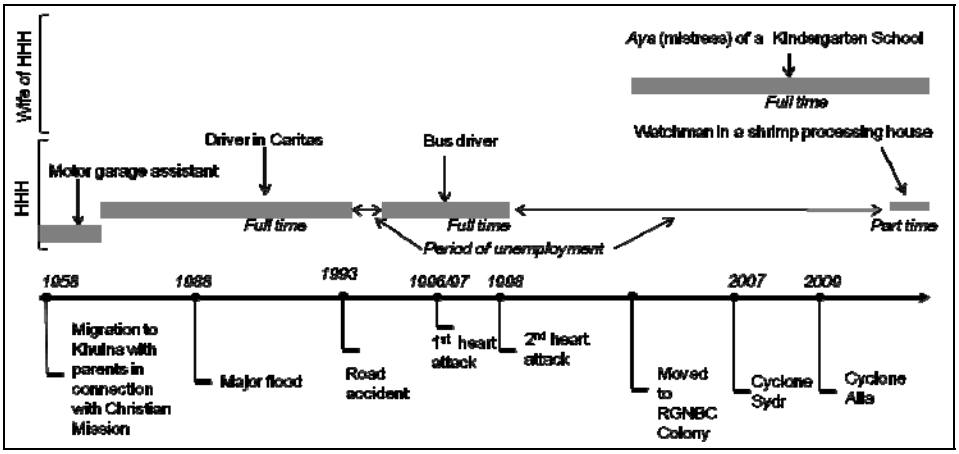

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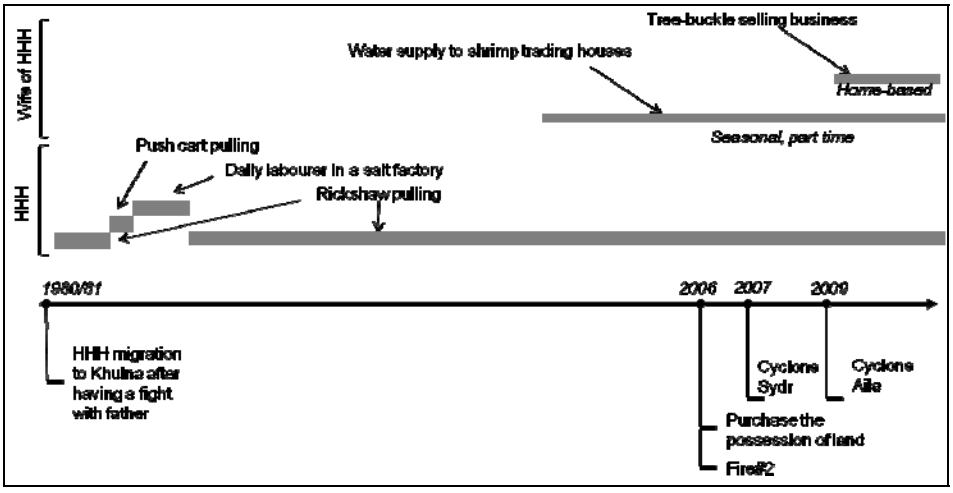

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