Built-in resilience: learning from grassroots coping strategies for climate variability
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What is This?
Built-in resilience: learning from grassroots coping strategies for climate variability

HURAERA JABEEN, CASSIDY JOHNSON AND ADRIANA ALLEN

ABSTRACT Significant lessons can be drawn from grassroots experiences of coping with extreme weather for reducing the vulnerability of the urban poor to climate change. This paper examines the household and community coping strategies used by low-income households living in Korail, the largest informal settlement in Dhaka. This includes how they use physical, economic and social means to reduce risk, reduce losses and facilitate recovery from flooding and high temperatures, and shows how grassroots adaptation differs according to the level of risk from flooding. The paper also discusses how local planning and governance mechanisms aimed at adaptation can support these coping strategies, including mainstreaming them into adaptation plans that can be scaled up to the citywide level.

KEYWORDS adaptation planning / Bangladesh / built environment / climate variability / grassroots coping strategies / urban poor

I. INTRODUCTION

It is now widely acknowledged that the effects of climate change will disproportionately increase the vulnerability of the urban poor compared to other groups of urban dwellers. Studies of coping strategies for the physical and built environment highlight several common features of poor urban populations under risk. For example, the risks arising from living in vulnerable sites; increased vulnerability to flooding as a result of the lack of basic infrastructure; and increased heat-induced hazards due to a lack of open spaces and green areas. Understanding existing local coping strategies, their scale and nature has been highlighted by different authors to support initiatives that build resilience at household and community levels to develop adaptation plans.

The central argument of this paper is that significant lessons can be drawn from examining how the urban poor are already coping with conditions of increased vulnerability induced by changing climate as well as extreme weather events such as floods, heavy rains, landslides, heat and drought, and understanding how they respond to hazards caused by them. The aim is to contribute to our current understanding of urban coping strategies by examining the strategies developed and adopted by the urban poor in Dhaka, Bangladesh, and to contribute to the discussion of how knowledge of grassroots coping strategies can be used to inform...
adaptation planning at the local level. While significant attention has been given to exploring “traditional” coping strategies for climate change in the rural context – with a focus on agricultural responses and livelihoods diversification – with few exceptions, less work has gone into deepening our understanding of the ways in which the urban poor are adapting to climate variability. Knowledge of these existing coping capacities for disaster risk reduction can help to strengthen planning strategies for adaptation to climate change in cities, as they draw on existing grassroots governance mechanisms and support their knowledge systems.

Conceptually and methodologically, the research comes from the disaster management perspective, drawing on a background of vulnerability and resilience literature and published case studies about coping mechanisms in urban areas and/or coping mechanisms for the built environment. Primary data collected by the authors in Korail area – the largest informal settlement in Dhaka, Bangladesh, observes household and collective adaptation strategies for existing environmental hazards such as flooding and heat. The origins of Korail date back to the 1980s and it is located in the low-lying flood-prone area of the city. It provides fruitful ground to explore the existing “built-in” resilience of a poor urban settlement that would normally be considered extremely vulnerable and at risk.

This paper is organized in three sections. It first outlines some of the literature on coping capacities and explores how knowledge of coping strategies can potentially be fed into the institutional level responses adopted by local governments. The next section details the findings from the empirical work conducted in Korail settlement in Dhaka, showing different types of coping capacities that people use, such as physical modifications, savings and access to credit, diversified income sources, social networks and accumulation of assets to reduce loss and increase resilience. The final section reflects on how grassroots coping strategies in urban areas can be actively supported by local governments’ and external agencies’ efforts on adaptation planning in a way that addresses the environmental injustice of the disproportionate vulnerability of the urban poor to climate change, while acknowledging and supporting their knowledge and experience.

II. GRASSROOTS AND INSTITUTIONAL COPING STRATEGIES

a. Making the links between coping capacity and adaptive capacity

There is growing integration of disaster risk reduction and climate change adaptation, as these two fields come closer together in understanding that reducing socioeconomic vulnerability to hazards or the effects of climate change amount to similar schools of thought. The two fields use subtly different language to describe similar activities. From the field of disasters, the term “coping capacity” is concerned with the means by which “... people or organizations use available resources and abilities to face adverse consequences that could lead to a disaster.” Coping strategies are centred on the assumption that an event will follow a familiar pattern and that previous coping actions are a reasonable guide for similar events. In the climate change field, the Intergovernmental Panel on Climate Change...
BUILT-IN RESILIENCE: LEARNING FROM GRASSROOTS COPING STRATEGIES


4. Throughout this paper, we refer to "climate variability" and "climate change" as forms of climate stress, which affect the vulnerability of the poor both

(IPCC) Fourth Assessment identifies coping ranges as “…the capacity of systems to accommodate variations in climatic conditions”, (8) and discusses how under the scenario of a changing climate, risks may increase but adaptation actually expands a system’s coping ranges. Following on this, the IPCC uses the term “adaptive capacity” as the ability of a system to adjust to climate change (including climate variability and extremes), to moderate potential damage, to take advantage of opportunities, or to cope with the consequences (emphasis in the original). (9) Satterthwaite et al. relate this definition to the urban scale, thus describing “adaptive capacity” as “…the inherent capacity of a system (e.g. a city government), population (e.g. low-income community in a city) or individual/household to undertake actions that can help avoid loss and speed recovery from any impact of climate change.” (10)

b. Types and scales of coping strategies of the urban poor

Wisner et al. (11) make the distinction between “preventative” and “impact-minimizing” strategies. Preventative strategies – at the individual and community level – implies people making choices so that they will not be affected by an event, such as avoiding dangerous places at certain times or choosing safe residential locations. By contrast, impact-minimizing strategies are those strategies adopted to minimize loss and to facilitate recovery in the event of a loss. Very simply, this should imply improving access to a minimum level of food, shelter and physical security so that people will be less vulnerable in case a disaster or climatic event does occur.

Existing case studies identify several different types of coping strategies, some of which correspond to strategies used by the urban poor: (12)

• Modifications to the physical and built environment: this may include modifications within the house or to the house structure so that it is not impacted. Also improvements outside the house or at the neighbourhood scale, such as retaining walls, drainage facilities or sandbags.

• Building up stores of food and saleable assets: storing food may be more common in rural areas, but urbanites living in a cash-based economy may use similar strategies such as keeping items of value that can be sold if necessary.

• Diversifying income sources: in cities this may mean illegal or quasi-legal work, such as street-hawking and waste-recycling. Having more than one, or sometimes several, income earners in the family also allows for diversification. This sometimes means taking children out of school to help generate extra income. If families have contributed to savings groups, this can offer a form of income during hard times.

• Development of social support networks: this is the ability to call on the resources of others during difficult times. Networks can be within the household, between extended family members (living near or far), within neighbourhoods, and with wider groups that have a shared identity (religious, geographical, commercial, etc.). Assistance can come in many forms – financial help, emotional
support, shelter in time of need, or physical help of any kind. These types of networks may be less prevalent in urban settings due to the erosion of traditional systems that govern social interactions. Also, transience is quite common in urban settings, so families may not have the opportunity to establish these important networks.

Coping strategies operate at different levels: individual (e.g. household), community (e.g. neighbourhood) or institutional (e.g. citywide or beyond). Cooperation beyond the household – at the community or institutional level – is usually necessary for the neighbourhood level coping strategies. Investments in roads and pathways and drainage and sanitation systems, and improvements to open spaces can reduce the frequency and magnitude of disaster events, but require collective action. Much of the risk-reducing infrastructure can only be implemented at the institutional level, i.e. neighbourhood drains require a larger stormwater system to feed into. Thus, some of the most effective adaptation strategies at scale may be beyond the control of the local community and must be implemented at the institutional level.

c. Institutional responses to support grassroots coping strategies by local planning and governance mechanisms

Supporting grassroots coping strategies at the institutional level necessitates the presence of a local government with a pro-poor perspective. However, adaptation to climate change is a relatively new issue for local government staff and this means that more often than not they engage with it through spontaneous responses triggered by urgent events, but require collective action. Much of the risk-reducing infrastructure can only be implemented at the institutional level, i.e. neighbourhood drains require a larger stormwater system to feed into. Thus, some of the most effective adaptation strategies at scale may be beyond the control of the local community and must be implemented at the institutional level.

While it is useful to bear in mind the distinction between “spontaneous” and “planned” adaptation, the former approach should not be underestimated or overlooked, as it constitutes the typical “learning-by-doing” mechanism by which local governments can make good use of indigenous knowledge systems built up from the historical experience of urban dwellers and passed on from one generation to another one. These play a crucial role in contextualizing the adaptation process, generating community-wide ownership and commitment. Planned adaptation allows local governments to draw on scientific knowledge to map and predict climate risks.

There are a number of ways in which the two aforementioned approaches can be effectively articulated. The first step towards the development of pro-poor local adaptation to climate change in urban areas requires promoting democratic and accountable local governance structures to raise awareness, ensure the exchange and integration of various knowledge and skills, identify needs and priorities, evaluate scenarios and build collectively negotiated strategies. Local adaptation plans can be meaningless unless community organizations of the poor.

in the short and long term. For instance, droughts and heat waves are highly likely to reduce access to water for productive and reproductive purposes, imposing short-term negative impacts born out of water scarcity, such as higher water costs, but also long-term health problems.


10. See reference 3, Satterthwaite et al. (2007), page 5.
are systematically engaged and their short- and long-term responses to climate variability are understood, valued and supported.

A second area where local governments can play a crucial role is by ensuring that land use planning and the development of buildings and infrastructure take account of climate change risks. This poses several challenges, as it requires planning and regulatory frameworks that not only prevent further development in high risk areas and support mitigation efforts but also reduce the vulnerability of the urban poor and of collective infrastructure without imposing additional costs on the poor or obstructing their right to the city. Furthermore, infrastructure adaptation in the context of the developing world is compounded by the very large deficits suffered in urban areas and the poor quality and lack of maintenance of existing infrastructure. This implies that local adaptation to climate change cannot be divorced from a wider development perspective that simultaneously focuses on tackling risk through lifeline infrastructure in areas where such risk has historically accumulated while planning to reduce disaster risk in future urban development.

III. CASE STUDY: KORAIL, DHAKA

a. Vulnerability of Dhaka

Bangladesh in general is vulnerable to climate variability and climate change because of its geomorphologic location. The capital city, Dhaka, has experienced nine major floods in the last 55 years, and those of 1988, 1998 and 2004 were severe due to overflowing of the surrounding rivers. The city also experiences incidental water-clogging from excessive rainfall, mainly due to drainage congestion and inadequate pumping facilities. The problem becomes severe in certain parts of the city, which stay inundated for several days after such occurrences. The increasing heat is causing concern about building up “heat islands”, where temperatures may become a few degrees higher than in the surrounding areas. These affect infrastructure including water systems, housing and settlements, transport networks, utilities and industry as well as human health. The 3.4 million urban poor living in Dhaka with limited or no access to services and with poor living conditions are considered highly vulnerable among all the city dwellers. For them, in addition to physical impacts, vulnerability increases through unsecured livelihoods, increased health risks and constrained economic activities.

b. General description of Korail

The informal settlement of Korail is considered to be the biggest slum in Dhaka and started to develop during the late 1980s on vacant higher grounds. Eventually the settlement expanded, encroaching on the highly vulnerable water edges. At present, Korail covers an area of approximately 90 acres, with an estimated population of more than 100,000. The eastern and southern edges of the area are defined by Lake Gulshan, a main water reservoir for the adjoining areas. Because of its location near the high-end residential and commercial areas of Gulshan, Banani and Mohakhali, the settlement has attracted low-income people engaged
mostly in service jobs, for example cleaners, household help and rickshaw pullers as well as workers in the ready-made garment industries. The high population density, the lack of proper services and the location close to the vulnerable water’s edge impose threats from climate variability and climate change. Almost every year, the people of Korail experience climatic hazards from excessive rainfall, increased heat and flooding.

Security of tenure is one of the major concerns for the area, and people living there face a constant threat of eviction. Ownership of the land is disputed between the Ministry of Telephone and Telegraph, the Public Works Department (PWD) and various private owners. As the government acquired the land from the original owners for use by the Telephone and Telegraph Board through the PWD, any new development plans other than for the original intended use raises legal disputes. High density self-help housing in the area developed without any government intervention. Given the precarious tenure situation, inhabitants are unwilling to invest in improving their living conditions, even though some of them have lived in Korail for as long as 20 years. This insecurity has also meant that service-providing authorities are reluctant to give legal access to the citywide infrastructure system, and thus inhabitants...
pay higher prices for water and electricity to illegal providers. Different NGOs work in the area, developing localized drainage and sanitation systems that serve groups of houses, as well as garbage disposal and non-formal education and health care facilities.

c. Methodology

A small qualitative survey was undertaken among 35 households to identify their experiences of climatic variability, hazards and coping strategies. The households were chosen at random based on location, housing conditions, ownership and length of residency in the area. Of the 30 households finally documented, 14 lived near the water’s edge, which were highly susceptible to flooding, while the other 16 lived on higher ground in high density areas with or without drainage facilities. Housing conditions varied between permanent and temporary, and length of residency varied from less than one year to more than five years. The survey included interviews with at least two household members (male and female), when possible on different occasions. The survey questions were designed in consultation with local inhabitants and academics, with the options of flexibility and additions by the respondents. The interviews were carried out by Huraera Jabeen and five students from the Department of Architecture at BRAC University with the help of local community members. Responses from the completed questionnaires were compiled and analyzed using Microsoft Office Access, Excel and SPSS. Notes, photographs, videos and sketches provide an important basis for the documentation.

d. Findings

Population. The 30 households interviewed comprised a total of 163 people. Thirty-six per cent of the survey population were aged between 15 and 30, while about 17 per cent were aged between 35 and 45. Most of the earning members were either employed as service providers or were self-employed in various service sectors. Climatic hazards, especially floods and water-clogging, reduced their earnings because of missed working hours and days. Those who earned from either renting out rooms or running household-based small businesses also suffered from reduced income during the rainy season because of water-clogging and flooding. Almost 30 per cent of the studied population were under the age of ten. This raises two major concerns for the future: a large proportion of the population may be vulnerable during any disaster; and the high dependency rate on a smaller number of earning members reduces the possibilities of investing in education, health and skill development. There is also a high rate of illiteracy and low formal educational qualifications and these limit their access to information, thus increasing vulnerability.

Economic activities. There seems to be a wide variation in income across households in Korail. Of the 30 households, 19 earned less than US$ 1 (BDT 70)\(^{(16)}\) per day per person, but 40 per cent of households have combined earnings of BDT 5,000–9,000 (US$ 71.50–128.50) per month, indicating availability of livelihood opportunities. Twenty per cent of households have combined income of more than BDT 17,000 (US$ 243) per month, which is quite high compared to other informal settlements in

Dhaka. Thirty-six per cent of individuals earned up to BDT 3,000 (US$ 43) per month. The average working hours for working individuals was 10.5 hours, and 26 days per month. But due to the large proportion of young people, almost 59.5 per cent of the total studied population is dependent on the households' working members.

**Tenancy and migration.** Households chose to move to Korail from other parts of the city because of the availability of vacant land, familiarity with the area and proximity to livelihood opportunities, with an aspiration to move to a comparatively permanent location. Ninety per cent of households had had some experience of eviction in the past. In general, most households had migrated to the city from their original villages, with the hope of a better life, and moved with their families. Only seven per cent of households identified river erosion and loss of livelihood as one of reasons for migrating from the villages to Dhaka. Most of the households tried to settle near to their extended families or to people from the same village or region.

**Experience of disaster and perception of climate change impacts.** Climate change is not a phenomenon evident to the inhabitants of Korail; rather, they recognize climate variability. They suffer from water-clogging and flooding during the regular monsoon as well as from rainfall at unexpected times. Most of the older respondents felt that there had been a reduction in the amount of rainfall compared to their childhood experiences. As shown in Table 1, increased heat was the most perceived climate change impact identified by the respondents. People reported that heat increases the occurrence of diseases that result from water shortages, such as typhoid and diarrhoea, which puts pressure on household income because of medical emergencies.

### TABLE 1
Perceptions of environmental risks

<table>
<thead>
<tr>
<th>Environmental changes</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increased heat</td>
<td>26</td>
<td>86.7</td>
</tr>
<tr>
<td>Increased rainfall in shorter time period</td>
<td>13</td>
<td>43.3</td>
</tr>
<tr>
<td>Untimely rainfall</td>
<td>12</td>
<td>40.0</td>
</tr>
<tr>
<td>Elongated flooding</td>
<td>11</td>
<td>36.7</td>
</tr>
<tr>
<td>Less rainfall</td>
<td>10</td>
<td>33.3</td>
</tr>
<tr>
<td>Flash flooding</td>
<td>8</td>
<td>26.7</td>
</tr>
<tr>
<td>Air pollution</td>
<td>8</td>
<td>26.7</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Impacts</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Damage to home</td>
<td>26</td>
<td>86.7</td>
</tr>
<tr>
<td>Damage to infrastructure</td>
<td>23</td>
<td>76.7</td>
</tr>
<tr>
<td>Water clogging</td>
<td>22</td>
<td>73.3</td>
</tr>
<tr>
<td>Increased waterborne disease</td>
<td>22</td>
<td>73.3</td>
</tr>
<tr>
<td>Damage to possessions</td>
<td>20</td>
<td>66.7</td>
</tr>
<tr>
<td>Loss of working days</td>
<td>19</td>
<td>63.3</td>
</tr>
<tr>
<td>Increased health-related expenditure</td>
<td>19</td>
<td>63.3</td>
</tr>
<tr>
<td>Damage to access facilities</td>
<td>18</td>
<td>60.0</td>
</tr>
<tr>
<td>Loss of livelihood/business capital</td>
<td>17</td>
<td>56.7</td>
</tr>
<tr>
<td>New disease (e.g. malaria/dengue/tuberculosis)</td>
<td>12</td>
<td>40.0</td>
</tr>
<tr>
<td>Increased respiratory disease</td>
<td>6</td>
<td>20.0</td>
</tr>
<tr>
<td>Displacement</td>
<td>6</td>
<td>20.0</td>
</tr>
</tbody>
</table>

*SOURCE: Data analysis from household surveys.*
e. Various coping strategies adapted before, during and after the disaster

i. Physical coping strategies – before the disaster

As mentioned earlier from Wisner et al.,(17) coping strategies for the urban poor can be preventative as well as impact-minimizing. In Korail, choosing a safe location in order to avoid danger, such as away from the water’s edge, is not an option for most of the inhabitants, as building new rooms is only possible through encroachment of the water’s edge, which is susceptible to flooding. Some of the renters do move to higher lands by purchasing possession (not title) of land from older inhabitants. In that sense, most of the households take few preventative actions before any disaster. Most impact-minimizing actions have become an integral part of regular practice, generated through experience. For example, they build barriers across the fronts of doors (53.3 per cent), increase the height of furniture (43.3 per cent), build higher plinths (30 per cent) and arrange higher storage facilities (30 per cent). Only five out of the 30 households said that they had changed to weather-resistant building materials before the rainy season, or stored food and water before predicted flooding.

FIGURE 1
Typical house arrangement

SOURCE: Documented by Huraera Jabeen during household survey.
Some of the households joined initiatives with NGOs working in the area, constructing drainage facilities connected to the lake.

Families living on higher ground away from the water’s edge constructed a minimum five-inch barrier at the door to safeguard rooms from water-clogging from regular rainfall, where drainage facilities are unavailable. Households increased the height of the furniture by at least 6–9 inches (2–3 bricks) depending on the location and on the height of regular flooding. In Korail, most of the rooms are arranged in a courtyard-type pattern, with adjoining rooms facing a narrow passage-like shaded courtyard (Figure 1). Typically, one household occupies a single room, whereas better-off households occupy two rooms. To reduce the heat in the rooms, which are made of corrugated iron sheets, creepers (leafy vines) are grown in the courtyards to cover the roofs. Furthermore, most of the households use some form of false ceiling material or canopy made out of cloth to reduce the heat. This is a popular practice in rural areas that has been adapted in urban houses.

Households living near the water’s edge usually build on stilts. The platform for the floors is made higher, considering the flood level. These stilt houses have better ventilation and experience reduced heat compared to the houses inland. Wooden plank flooring is preferred as they suffer less...
from water-clogging once the water subsides after heavy rainfall. With stilts there is the flexibility to increase the height every time households rebuild, depending on the water level. The techniques used in the joints between roof and floor partitions enhance ventilation, as shown in Figure 2b. Also, the stilt houses have the option of incremental expansion out over the water (Figure 3b).

**ii. Physical coping strategies – during the disaster**

In Korail, temporary relocation to a safer area during a disaster is not a preferred option, as this potentially means losing the option to return later to assets and social and livelihood networks. Many people accept their risk fatalistically and rely on their faith to get them through the crisis, which has been argued by Wamsler to be “...emotionally oriented strategies of adaptation.”(18)

During flooding or water-clogging, the most practiced option is to sleep on furniture above flood level and to use a moveable cooker for food preparation. Fourteen out of the 30 households shared services (e.g. toilets) with unaffected neighbours. Some temporary measures were also taken, for example erecting higher barriers across doors, creating outlets from houses for the easy flow of water, developing alternative means of access to the buildings, and building temporary higher stilt structures even inside the rooms. There are also community level initiatives where homeowners get together to clear the drainage facilities and remove clogging, in some cases assisted by NGOs working in the area, which are

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helping to construct and maintain the drainage facilities. People also took initiatives to move most affected families to safer spaces within the neighbourhood. Thirty per cent of the households had suffered from food shortages during the previous flooding and longer water-clogging events. Only 16 per cent shared food with neighbours, while 27 per cent borrowed money from their savings and others in order to tackle hardship.

Most of the households (70 per cent) increased their power usage in order to cope with the increased heat. Instead of paying for only one electricity point for a light, they might pay for two, to accommodate an electric fan. The extremely poor families often traded off between a light and a fan in order to keep the same payment, as they pay vendors in terms of the number of points rather than total kilowatt hours used. Generally, the closely spaced structures create shaded courtyards that are used as open space for ventilation and for holding outdoor household activities during the frequent power shortages. Also, in order to reduce the heat from corrugated iron sheet roofing and partitions, people use different insulating materials such as recycled paper, styrofoam, packing boxes, cement bags, bamboo mats and old clothes.

**iii. Physical coping strategies – after the disaster**

After a flooding and water-clogging event, 18 out of the 30 households make alterations during the rebuilding of their structures, such as changing building and plinth materials, increasing plinth levels, and changing structural, roofing and walling materials. Thirty per cent of households took loans and got help from household members or neighbours for such alterations. The changes were incremental, for example changing the plinth material first, then the partitions to the roofs. Also, it is common practice among households not only to save money but also building materials throughout the year for rebuilding after any future disaster.

**iv. Economic strategies**

Savings is seen as a main coping strategy for most of the households. Fifty per cent saved regularly with savings groups or an NGO, with the intention of being able to take a loan from their savings during and after any disaster. Usually, savings groups are formed within extended families, neighbourhoods and wider groups who have a shared geographical identity. They create a social and livelihood network through savings. The amounts saved varied between BDT 200 and BDT 2,800 (US$ 2.85–40.00) per month, forming 3–17 per cent of total household income (Figure 4). The analysis indicated that households with more than one earning member and who were employed in diversified livelihoods were doing better than those dependent on only one family member or who were engaged in similar types of work. Diversification ensured minimum earning loss during any disaster.

**v. Social networks and safety nets**

Respondents expressed their dependency on social networks as their first point for getting help. Typically, Korail developed through people migrating
FIGURE 4A (above)
Income and savings pattern

FIGURE 4B (below)
Percentage income saved

SOURCE: Data analysis from household surveys.
from the same area who tended to stay near people they knew (56.6 per cent). Twenty-three out of the 30 households had relatives or friends living in the city, and 14 of them felt they could seek assistance in the event of an emergency. Service sector employment in the private sector also requires having professional and livelihood networks, which act as a safety net during emergencies. More than 46 per cent of households acknowledged having an acquaintance with a professional group (Table 2). Because of the courtyard-style living, with shared services, there is also a strong bond among households sharing the same spaces. Furthermore, households that rent out rooms as an income source often act as guardians for the tenants. Households tend to be self-sufficient but have an attitude of sharing with neighbours.

**vi. Accumulation of assets**

Although most of the households have very basic physical possessions, there is a practice of accumulating assets in various forms, ranging from building materials and saleable household items, to investing in skills development, children’s health and education. The interviews revealed that people perceived the accumulation of assets as a means of increasing their resilience, and usually, it is the women in the households who take the major initiative in this regard. This gradual accumulation of assets helps in the incremental improvement of the physical structures, in diversifying livelihood opportunities, in reducing health-related expenditure and in increasing household earnings. One householder reported that she took a loan to improve part of her house and was able to accommodate a small shop where her previously unemployed husband started to work. She also got increased rent from the better rooms, and within a year had managed to improve the rest of the house with the extra earnings as well as being able to send the eldest child to college.

**IV. CONCLUDING REMARKS: SUPPORTING GRASSROOTS COPING STRATEGIES**

As highlighted in the introduction, coping with climate change risks is not a new situation for the urban poor, and much can be learnt from their

<table>
<thead>
<tr>
<th>Social asset</th>
<th>Households with social asset</th>
<th>Households that can seek assistance in case of emergency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relatives/ friends living in the city</td>
<td>23 76.67</td>
<td>14 46.67</td>
</tr>
<tr>
<td>Relatives/ friends from original location</td>
<td>17 56.67</td>
<td>14 46.67</td>
</tr>
<tr>
<td>Member of social group</td>
<td>12 40.00</td>
<td>11 36.67</td>
</tr>
<tr>
<td>Member of professional group</td>
<td>14 46.67</td>
<td>11 36.67</td>
</tr>
<tr>
<td>Relatives/ friends living in the area</td>
<td>13 43.33</td>
<td>7 23.33</td>
</tr>
<tr>
<td>Member of political group</td>
<td>7 23.33</td>
<td>7 23.33</td>
</tr>
</tbody>
</table>

SOURCE: Data analysis from household surveys.
slowly matured autonomous responses in order to build local adaptation policies and plans on the evidence base of grassroots experience.

The previous section described the coping strategies developed by the poor in Korail, Dhaka. These range from physical adaptive practices in individual dwellings, through collective efforts to construct and maintain drainage facilities, to the use of local social capital, for instance by sharing food and cooking facilities, or moving to less-affected buildings in the neighbourhood during flooding or water-clogging. About 50 per cent of the households interviewed participated in saving schemes with the intention of taking a loan from their savings during hardship times. Furthermore, some of the strategies, such as the use of roof canopies or vegetation to reduce heat exposure, were identified as regular practices imported from the rural areas where many of Korail’s current dwellers come from. The physical and social strategies adopted are mutually reinforcing as shown in the wide use of courtyards, which not only provide shaded open space for ventilation but also for outdoor inter-household activities that strengthen solidarity bonds among neighbours. As noted by Wisner et al., and discussed previously, grassroots coping strategies may comprise preventative, impact-minimizing or post-event coping actions, all aimed at reducing vulnerability through various mechanisms of technology use, social organization, economic relationships and cultural arrangements.

This paper began by arguing that pro-poor adaptation to climate variability in cities demands a better understanding of the poor’s adaptive capacity and their autonomous coping strategies. This is because the urban poor are affected by the “double vulnerability” of climate change and poverty, which means that they are disproportionately affected both in terms of their exposure to climate-related risks and in terms of the limited resources at their disposal to respond to such risks. Thus, support to local adaptation must pay attention to the differentiated impacts of and responses to climate change among different groups in society. There is a series of issues to take into account in order to mainstream this consideration into municipal adaptation plans in an effective and equitable way:

- **Integrate local knowledge to define patterns of vulnerability.** This includes addressing uncertainties about the knowledge of observed short- and long-term climate effects in urban areas that affect the poor. Also, a consideration of the urban poor both as producers and consumers of such information in order to integrate risk management principles and mechanisms of knowledge production sharing into municipal adaptation policies and plans. The example of perception of change by the residents of Korail reveals concerns about vulnerability resulting from climate variability, rather than the climate change at a local level.

- **Develop adaptation plans in association with development strategies.** A fundamental problem lies in the fact that external support agencies are rarely set up to understand and support local governments and local community adaptation plans. Thus there is a mismatch between the areas where increased local capacity and competence in climate adaptation is urgently needed and the flow of development cooperation resources supporting adaptation. Sustainable adaptation measures should be seen as those at the intersection of poverty reduction and vulnerability reduction measures. The Bangladesh Poverty Reduction Strategy Paper (PRSP)
gives limited consideration to the impact of climate change on how to plan vulnerability reduction strategies. Also, Bangladesh receives a significant volume of overseas development assistance (ODA) to support development activities, amounting to US$ 1,739 million for 1998–2000. Out of this, it is estimated that the share for activities potentially affected by climate change risk – including climate-affected projects dealing with water supply and sanitation, renewable energy and hydropower, urban and rural development, food security and infectious diseases among other – has been as high as half a billion per year; while ODA that is committed to activities potentially affected by climate risk is considerably higher than that committed to specific projects for climate change adaptation.\(^{(21)}\) Thus, the task ahead is to incorporate not only a consideration of climate change impacts into urban programmes and activities but also a consideration of climate change vulnerability to any development intervention.

- **Instigate a combination of “structural” and “non-structural” approaches developed by partnerships of government, utilities and civil society.** Structural approaches used in reference to “…engineering interventions such as river channel modifications, embankments, reservoirs and barrages designed to control the flow of rivers and abate or control the spread of flooding” have gained over non-structural approaches, “…measures designed not to prevent floods but to reduce the short- and long-term impacts of the hazard…[including] formal flood warning systems and evacuation programmes, land use controls on flood-prone sites, building regulations to prevent incursion of flood waters and insurance schemes.”\(^{(22)}\) Government needs to coordinate projects such as the Dhaka Integrated Flood Protection Project with non-structural measures such as the banning of polythene bags, which has allegedly reduced the regular clogging of the city drainage system.\(^{(23)}\) Potential improvements to the area’s infrastructure by local dwellers are often deterred by the insecurity of land tenure and the threat of eviction. The merits of securing land tenure in informal areas have been discussed widely elsewhere but cannot be emphasized enough. In the case of Korail, most of the land belongs to the state and there is therefore considerable room for a comprehensive land regularization programme.

- **Support collective savings schemes and insurance.** As was found in Korail, community-managed savings groups constitute a widespread mechanism used by the urban poor to spread risk and accumulate assets. Local governments can support such saving schemes for developments that are climate risk sensitive. Also, local governments can play an active role in the development of collective insurance for low-income groups, which are typically unable to access the private insurance market because they face very high risks and have very low insurance premium payment capacity. In the last decade, there has been increasing interest in the notion of “collective risk transfer” instruments and their linkage with reconstruction and disaster mitigation programmes. Although the adoption of such instruments by local government is only taking place in a handful of cities worldwide (such as Manizales, Colombia), there is still considerable room for innovation in the development of municipal social insurance schemes targeting the urban poor. For example, the Bangladesh National Adaptation Programme of Action (NAPA) includes a consideration of micro insurance for the poor, using institutions involved in micro lending such as the Grameen Bank.\(^{(24)}\)


\(^{23}\) See reference 1, Alam and Rabbani (2007).

\(^{24}\) See reference 2, Satterthwaite et al. (2007).
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