



# Report of Documentation of Climate Change Resilience Initiative and Strategy Development

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## *URBAN PARTNERSHIP FOR POVERTY REDUCTION PROJECT*

Prepared for: Ministry of Local Government, Rural Development and Co-operatives,  
Local Government Engineering Department and  
United Nations Development Programme

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## **1. Assignment Background, Purpose and Methodology**

The Urban Partnerships for Poverty Reduction (UPPR) has been implemented over a seven year period (2008-2015) with funding from participating communities (15 percent), City Corporations/ Town Municipalities (20 percent) and UKAid and UNDP (65 percent). The goal of UPPR was to reduce urban poverty in Bangladesh by improving the livelihoods and living conditions of 3 million urban poor and extremely poor people, especially women and girls, living in 23 cities and towns. The theory of change behind the project was that the urban poor are best placed to judge their own needs and to identify who is most in need of support. As poverty in Bangladesh is the consequence of multiple and at times inter-related causes, i.e. is multi-dimensional, the objectives of the project were broad-ranging and aimed at better connecting the poor to basic services, the job market and livelihood opportunities, and the wider city and the political-economy relationships and decision-making processes by which limited resources are prioritized and allocated amongst residents<sup>1</sup>:

- i) Urban poor communities are mobilized and supported to form representative, inclusive and well-managed groups;
- ii) Poor urban communities are supported to create healthy and secure living environments (including planning and constructing community driven infrastructure);
- iii) Urban poor and extremely poor people are supported to acquire the resources, knowledge and skills needed to increase their incomes and assets; and
- iv) Development and implementation of pro-poor policies and practices are supported in partnership with others, including the formation of town level partnerships.

UPPR originally was scheduled to close in August 2014. In order to ensure the sustainability of its interventions and results, a 12 month extension to the project was approved to a new closing date of 31 August 2015 (when the project did close). Specifically, the purpose of the extension was to allow for the completion of all core activities, to develop and implement a comprehensive sustainability plan, and to allow more opportunities to effectively communicate UPPR's results, experience and recommendations to those taking over and supporting urban poverty reduction strategies in the future. The extension would allow UPPR to strengthen its approach and sustainability in six areas, namely:

- i) Further strengthening community organisations and capacity of local government institutions;

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<sup>1</sup> The predecessor Local Partnerships for Urban Poverty Reduction Project (LPUPAP) implemented in 11 cities/towns over the period 2001-2007, concentrated solely on slum upgrading/basic services provision. Building on the lessons learned from LPUPAP, the UPPR scope of support was extended to livelihoods and policy.

- ii) Integrate communities it has lifted from urban poverty into the wider urban structure through government ward level planning initiatives in a number of towns;
- iii) Assess the resilience of poor urban communities, particularly around climate change in a number of towns;
- iv) Enhance cooperation with the private sector in relation to poor urban communities;
- v) Pilot models for security of tenure and access to housing and document successes; and
- vi) Build on measuring and reporting project results and effectively communicating more comprehensively evidence-based results, lessons learned, and proven tools for urban poverty reduction planning and sustainability in order to address widely held misconceptions among policy makers about slums and how to assist the urban poor.

The purpose of the assignment (Documentation of Climate Resilience Initiative and Strategy Development) is to address sustainability area iii) above. It provides a review and analysis of the work steps, methodology and process of climate change resilient arrangements introduced by the UPPR from mid-2014 onwards in the four pilot towns of Chittagong, Rajshahi, Sirajgonj and Comilla. Based on an identification of emerging issues from the analysis, a strategy is recommended for further building the capabilities and understanding of communities and responsible local agencies for climate change adaptation and resilience strengthening measures. The strategy, in keeping with the UPPR approach, targets low income groups, seeks to incentivize community-led resilience measures to reduce vulnerabilities, and recommends ways in which to integrate such considerations into future programming of interventions by a proposed UPPR-successor programme, namely the National Urban Poverty Reduction Programme (NUPRP).

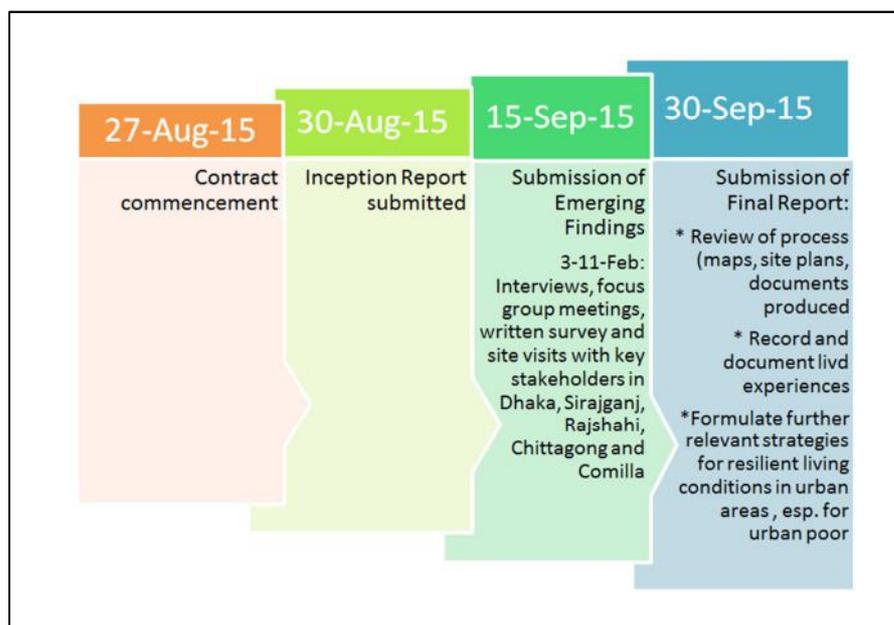
A contract for the assignment was signed on 18 August 2015 with a start date of 27 August 2015. An Inception Report was submitted on 30 August 2015. Site visits were made to each of the four cities/towns from 3-11 September 2015 by an international Urban and Climate Resilience consultant Dr. Colleen Butcher-Gollach and UPPR national consultant for Coordination of Land Tenure, Housing and Resilience Building, Md. Washim Akhter. A presentation of preliminary emerging issues was made to UNDP-UPPR programme specialists in Dhaka on 10 September 2015. A Report setting out the emerging issues identified and preliminary recommendations regarding possible entry-points for strengthening of climate change resilient interventions by and for low income groups under the proposed NUPPR was submitted on 16 September 2015. Comments were received from the UPPR Review Team on 16 and 21 September 2015.

This full Report now documents and analyzes the effectiveness and efficiency of the UPPR climate resilience activities and processes, explores specific case studies in the four pilot cities/towns in order to comeo emerging issues, and identifies improvements that could be made when delivering similar activities in the future. Wherever relevant, it draws on 'best practice' from the Region and

internationally for engaging in pro-poor climate resilience strengthening. Although the assignment TOR were limited to a review of the processes in the four cities/towns of Chittagong, Comilla, Rajshahi and Sirarjgonj, a rapid field assessment also was undertaken of climate induced migration in Karail, Dhaka. Rapid desk assessments were made of the Gopalganj Mandartola resettlement of two evicted communities to safer areas, and the multi-hazard risk assessments and Climate Resilient Action Plans prepared with the communities of Khulna City Corporation, Barisal City Corporation, Narayanganj City Corporation and Dinajpur Pourashava.

The assignment timeline and deliverables are set out in Figure 1 below.

**Figure 1: Documentation of Climate Resilience Initiative and Strategy Development**



The field-based methodology used for the assignment, within the constrained available time, was an iterative, comparative analysis of largely qualitative and some limited quantitative data that was collected or observed and immediately analyzed to generate emerging findings (or ‘theories’), i.e. a grounded theory approach. The emerging issues from the field were then further analyzed and future strategies developed on the basis of a more detailed desk review of relevant Project, sector and country documents.

Data were collected from a number of sources:

- i) Desk study at the start and throughout the course of the assignment of relevant background project and sector documents including Settlement Land Maps (SLMs), SLM Atlases (maps) and Community Contract documents produced through the UPPR process at the community, city/town and project levels. *(Please see Bibliography at the end of the Report)*

- ii) Perusal of open-source global climate change data sets for Bangladesh including the Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report for South Asia (Overseas Development Institute and Climate and Development Knowledge Network, 2014) and broad identification of anticipated climate change impacts in the four pilot cities/towns<sup>2</sup>.
- iii) Orientation meetings in Dhaka with technical specialists (National Project Coordinator (male); Coordinator of Land Tenure, Housing and Resilience Building/Urban Planning Specialist (male); Environment & Sustainable Development Specialist (male); Urban Poverty Reduction Specialist (male); and Monitoring and Evaluation Coordinator (male) and post-field presentation and discussion of emerging issues.
- iv) Semi-structured interviews with responsible town-level agencies and officers involved in implementation, including five UPPR Town Managers (4 males, 1 female), two Mayors or Mayor's representative (2 males); three Local Government Institutions (Engineering Departments) (3 males); two Ward and one City Disaster Management Committee members (3 females, 3 males).
- v) Focus group meetings with community leaders – City/Town Federation executive members, Community Housing Development Fund Committee members, Community Development Committee (CDC) Cluster members, UPPR Slum Upgrading Officers and Nutrition Volunteers in order to record and document the experiences of people involved in the process in each of the four pilot cities/towns. Discussions focused on what has worked well and not so well and to glean the level of understanding of the technical aspects of building resilience within the control of communities and households, as well as to identify lessons learned and priorities to inform a future stage of support. (Approximately 50 females and 4 males).
- vi) A limited (short) quantitative individual survey of the above community leaders (46 females and 1 male) was carried out to measure subjective resilience at a household level, i.e. a self-evaluation by individuals of their own household's capabilities to respond to and cope with natural hazards and risk. (*Please see Annex 2 for details on the quantitative survey*). As time did not permit for a statistically significant sampling methodology, the survey data has been used to anecdotally further inform the emerging issues from the group discussions and is supplemented by data obtained from the Census of Slum Areas and Floating Population (Bangladesh Bureau of Statistics, 2014).
- vii) Field transect walks and observations through five of the community/UPPR selected vulnerable wards and three other UPPR-active wards, inspecting the Settlement Improvement Fund (SIF) grant-financed small works (infrastructure) and improvements to houses of extremely vulnerable households, and CHDF housing improvement loans and the use livelihoods grants from the Socio-Economic Fund (SEF). The consultant made use of her

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<sup>2</sup> <http://sdwebx.worldbank.org/climateportal/index.cfm> and <http://www.climatewizard.org/>

previous operational experience in climate change adaptation measures (both structural and 'soft solutions'), post-disaster reconstruction and low income services and housing delivery approaches and projects to assess the design, construction and ongoing maintenance of the infrastructure and building works. The field walks also provided an opportunity to cross-check (either confirm or question) points that had been made during previous interviews and meetings.

## **2. Background**

### **A Changing Climate**

The findings of the most recent Intergovernmental Panel on Climate Change (IPCC-13)<sup>3</sup> confirm that the warming of the earth's climate system is unequivocal; our planet is profoundly altered as a consequence of both natural processes and human activities. The changes in temperature in turn are linked to well documented impacts of long term climate change, including rising sea level and coastal erosion, increased height and frequency of storm surges, increased cyclone frequency and intensity, increased rainfall in some regions and reduced rainfall in other regions, saline intrusion into groundwater and soils, and degradation of coastal and marine ecosystems (Government of Bangladesh, 2010). Across the planet, changing climate, population growth and consequent increasing exposure to risk, all present significant challenges. Over the past decade, globally, more than 700,000 people have lost their lives, over 1.4 million were injured, approximately 23 million were made homeless, and more than 1.5 billion were affected by natural disasters (both dramatic or slow-onset), amounting to an estimated US\$1.3 trillion in economic losses. Between 2000 and 2008, the Asia Region suffered almost 30 percent of the global losses and experienced the most number of weather- and climate-related disasters in the world (Overseas Development Institute and Climate and Development Knowledge Network, 2014).

Bangladesh, with its population of around 160 million people living within a landmass of 147,570km<sup>2</sup>, is one of the most densely settled countries in the world. A large part of the country (80 percent) is low-lying and in the floodplains of the three major rivers - the Padma, Jamuna and Meghna Rivers, or the 300-plus smaller rivers and channels. Floods and riverbank erosion affect some one million people annually; once every three to five years, up to two-thirds of the country is inundated by floods. Some 22 percent of the population (35 million people) lives along the southern coastal belt and so routinely susceptible to coastal flooding and storm surge every year. Conversely, seasonal droughts commonly affect the northwestern region and have a devastating impact on crops and food security of the subsistence farmers. Annex 1 quantifies the total number of people

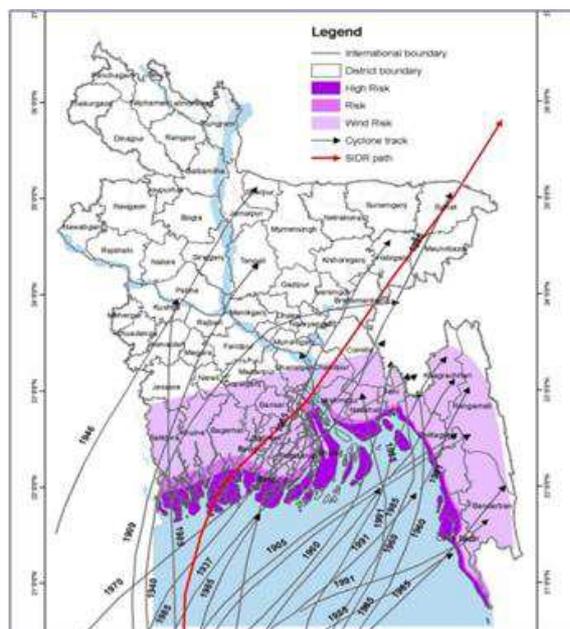
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<sup>3</sup> The IPCC was formed in 1992 to provide a better understanding of climate science and increased knowledge of vulnerabilities in different parts of the world. The IPCC's *Fifth Assessment Report* was prepared by 830 experts from 85 countries with findings being released between September 2013 through November 2014.

(9.5 million) by rural or urban location who were affected by one or more natural hazards in the 'normal' year of 2010 (Awal, 2015).

The northern and eastern regions lie in a seismically-active region and are particularly susceptible to earthquakes<sup>4</sup>.

Over the period 1980-2000, 60 percent of cyclone-related deaths worldwide occurred in Bangladesh which is located within an active cyclone belt. For example, in 1970, Cyclone Bhola killed 300,000 people and resulted in US\$2.5 billion worth of damage to property. More recently, Cyclones Sidr (2007), Aila (2009) and Mahasen (2013) have all resulted in loss of life and damage and losses to communities and the national economy.



**Figure 2: Incidence of Significant Cyclones in Past 100 Years** (Source: CGIES)

The downscaling of the Global Climate Models to specific countries remains an inaccurate science<sup>5</sup>. However, notwithstanding these limitations, the IPCC-13 Working Group II provides the following advice regarding the major potential impacts of future changes in climate the South Asia Region and in some cases on Bangladesh specifically, according to a range of scenarios:

- **Bangladesh - Sea-level rise of between 26cm – 98cm by 2100 and increased risk of storm surge for coastal settlements:**
  - Sea-level rise of 45 cms (Mid-range scenario) and under no adaptation measures: Potential land loss of 15,668 km<sup>2</sup> (10.9 percent of total) and 5.5 million people (5 percent of population) exposed.
  - Sea-level rise of 100 cms (at the extreme range of High scenarios) and under no adaptation measures: Potential land loss of 29, 846 km<sup>2</sup> (20.7 percent of total) and 14.8 million people (13.5 percent of population) exposed.

<sup>4</sup> Disasters can result from hazards such as earthquakes but earthquakes are not linked to climate or climate change.

<sup>5</sup> Given amongst other parameters, the size of the earth, the different layers in the atmosphere and the massive number of local variables, long-term climate simulations (using General Circulation Models, GCMs) are presently calculated at relatively coarse scales. Down-scaling the low resolution global models to higher resolutions suitable for country-specific planning, is undertaken by using either statistical or dynamical downscaling methods. However, there remains 'knowledge uncertainty' regarding climate processes, 'model uncertainty' in being able to fully identify and account for all real world variables and 'scenario uncertainty' associated with projections attempting to cover decades or centuries of time in the future (ACE CRC (ANTARCTIC CLIMATE and ECOSYSTEMS COOPERATIVE RESEARCH CENTRE), 2008).

- **South Asia Region - Extreme rainfall events related to monsoons.** More frequent and heavy rainfall days are projected (*low confidence*) including the Padma River flood plain. Conversely, there is increased risk of drought and related food and water shortages causing malnutrition (*high confidence*).

Taking the above together (let alone a number of further predicted impacts), the riverine, coastal and urban floods linked to extreme rainfall events, rising sea level and cyclones over South Asia (in particular, Bangladesh and India) could cause widespread damage to infrastructure, livelihoods and settlements (*medium confidence*). High (and low) river levels are linked to higher incidences of dengue fever. Another key risk for the region therefore, is increased mortality due to **rising temperatures and extreme temperatures** (*high confidence*), leading to public health risks including cholera and diarrhea.

The availability of probabilistic risk modelling for different return periods (i.e. frequencies within a given set of time, e.g. 10, 50, 100 years) for one or more hazards so as to inform detailed local level planning in Bangladesh at District, City/Town or Ward levels is extremely limited. In part, this is due to the relatively high costs of such modelling (for example, obtaining LIDAR-based digital elevation models on which to base accurate flood modelling), and the dearth of long range (historic) hydro-meteorological and other data. Recently, the cost of satellite-based imagery has been declining. Open-source mapping (for example, GoogleEarth) is increasingly available and useful for urban mapping of infrastructure and buildings, land cover and land use mapping, digital elevation models (to ascertain flood and landslide risks), land subsidence and similar. However, spatial analytical tools to accurately interpret the information can be complex. It has been undertaken for some areas and hazards (for example, as listed in Figure 3 below) but is at risk of becoming outdated.

**Figure 3: Excerpt from "Flood and Erosion Monitoring Monsoon 2001", EGIS Technical Note 30, May 2002**

The other reports in EGIS Technical note series	
1.	Technical note-1: Bangladesh Transverse Mercator Projection, May 1993
2.	Technical note-2: North Central Region Digital Elevation Data, August 1993
3.	Technical note-3: Area Elevation Curves for BWDB Southwest Regional Projects, February 1993
4.	Technical note-4: GIS Atlas for Tangail Area Study, November 1992
5.	Technical note-5: GIS Installation Summary, October 1994
6.	Technical note-6: Tangail Area Digital Elevation Model, August 1993
7.	Technical note-7: Bangladesh National Digital Elevation Model, August 1993
8.	Technical note-8: National Database for Bangladesh, August 1993
9.	Technical note-9: A Semi-Detailed River Database for Bangladesh, March 1995
10.	Technical note-10: Datum and Map Projections for GIS & DPS Applications in Bangladesh, May 1996
11.	Technical note-11: River Resources Database, September 1996
12.	Technical note-12: A Semi-Detailed Water Body Database for Bangladesh, February 1997
13.	Technical note-13: Mosaic of TM images of Bangladesh, April 1999
14.	Technical note-14: Mapping the 1998 floods, June 1999
15.	Technical note-15: Blue Accounting, February 2000
16.	Technical note-16: DGPS System Calibration Report
17.	Technical note-17: STREAM, Development of Flood Module
18.	Technical note-18: Blue Accounting, comparing WRSs in Bangladesh and the Netherlands
19.	Technical note-19: Case Study IEM
20.	Technical note-20: Decision Support Systems
21.	Technical note-21: Applications of ERS-2 Images in Monitoring Water and Land uses
22.	Technical note-22: STREAM: An instrument for River Basin Environment Analysis and Management
23.	Technical note-23: Flood 2000: Pilot study for Regular Flood Monitoring.

Remote sensing to observe the earth's surface, at relatively low cost per unit of area, similarly could be useful for local level planning. As but one example, the Asian Development Bank (ADB) makes use of remote sensing and high resolution satellite imagery for planning or monitoring in a number of supported projects, including the Strengthening the Resilience of the Water Sector in Khulna to Climate Change (TA 7197-BAN) and the Jamuna-Meghna River Erosion Mitigation Project (Loan 1941-BAN) (Asian Development Bank (ADB), 2012). However, on the whole, the available data appears to be limited in geographic coverage being linked to specific donor-funded projects.

## **Climate Change Adaptation**

In light of the enormity of the global challenge, the IPCC has cautioned that “**Adaptation is the only effective option** to manage the inevitable impacts of climate change that mitigation cannot reduce” [emphasis added]. It goes on to describe adaptation as “the process of adjustment to actual or expected climate and its effects” (Overseas Development Institute and Climate and Development Knowledge Network, 2014, p. 14). The concluding section of this Report makes a number of recommendations on a possible strategy for further incorporating and strengthening measures for adaptation and for building the resilience of the urban poor and extremely poor communities under the NUPPR.

## **Poverty**

Poverty data in Bangladesh is collected by means of the in-depth but limited sample Household Income Expenditure Surveys (HIES) conducted every four to five years and the total coverage but limited topics of the Population Census carried out every **ten** years. Poverty mapping is available at the sub-national (*zila* and *upazila*) level. It makes use of a robust ‘ELL method’ which has been widely tested and validated in many countries. The Bangladesh Poverty Maps and Extreme Poverty Maps, most recently updated in 2010 with forward projections, draw on data collected from both the HIES and Population Census (The World Bank, Bangladesh Bureau of Statistics, World Food Programme, 2010) and have been generated using both an upper and lower poverty line as established in the HIES 2010.

In the past few decades, Bangladesh has made significant social and economic gains for its people. Strong economic management has led to a national economic growth that has increased by one percentage point every ten years for the past four decades (The World Bank, 2013). The proportion of the population living below the National Poverty Line (poverty rate) has been reduced from 56.7 percent in 1991-92 to 48.9 percent in 2000 to 31.5 percent in 2010 to an estimated 25 percent in 2015, allowing the country to achieve its halving-of-poverty (MDG1) target. According to Bangladesh Bureau of Statistics GDP per capita is US\$1,314 in 2014. According to the World Bank, the purchasing power parity (PPP) adjusted value was US\$2,991 per capita in 2014. On 1 July 2015, Bangladesh was formally upgraded to Lower Middle Income Status by The World Bank. The country also has achieved its MDG targets for gender parity in education, child mortality, and maternal health as well as HIV/AIDS, malaria and tuberculosis.

Notwithstanding these achievements, the Government of Bangladesh recognizes that addressing poverty among its citizens remains an on-going challenge. Past regional disparities persist between the rapidly growing eastern and lagging western areas of the country<sup>6</sup> in terms of growth and development outcomes. However, there are signs of an equalization taking place from 2005 onwards with a more ‘pro-poor’ growth policy was having an effect (The World Bank, 2013). As per the 2015 estimate, around 40 million people continue to subsist below the National Poverty Line. Of these, the large majority lives in rural areas where employment opportunities and delivery of basic services are seriously constrained. A elsewhere, the large rural to urban income differential drives urban in-migration. In the absence of an explicit Urban or National Housing Policy, the resources and capacities of locally responsible City Corporations and Municipalities to manage rapid urban growth is well documented as being seriously constrained. The national poverty figures therefore, tend to mask another emerging and challenging trend. According to the most recent Census of Slum Areas and Floating Population (Bangladesh Bureau of Statistics, 2014), the total number of slums increased fourfold from 2,991 in 1997 to 13,943 in 2014 and the population living in slums almost doubled. Some of the more salient findings of the Census of Slum Areas are summarized in Table 1 below.

**Table 1: Census of Slum Areas and Floating Population 2014 - Summary of Salient Findings**

Finding	1997	2014
<b>Total number slums</b>	2,991	13,943
<b>Total population living in slums</b>	13.91458m	22.32114m
<b>Floating population<sup>7</sup></b>	32,081	16,621
<b>Top reason for coming to slums:</b>		
<b>1. Seeking job</b>	39.5%	51%
<b>2. Poverty</b>	20%	28.8%
<b>3. River erosion</b>	17%	7%
<b>Main types of dwelling:</b>		
<b>1. All tin or bamboo stick walls with thatch roof</b>	28.3%	62.5%
<b>2. Brick walls with tin roof</b>	3.1%	26.4%
<b>3. Makeshift low shacks</b>	41.4%	6.2%

(The Daily Star, 2015)

The large number of people subsisting within a narrow band of consumption close to or below the poverty line, are highly vulnerable to falling into deeper poverty when confronted with even small

<sup>6</sup> The 2010 Poverty Maps show that Rangour And Basiral Divisions have the highest incidence of poverty and Chittagong and Sylhet have the lowest.

<sup>7</sup> ‘Floating population’ refers to “rootless landless, poor and unemployed people ... so destitute that they lived a floating life being unable to obtain shelter even in slum areas ... [and] construct unauthorized shanty houses in abandoned or private land , khas or Government land, along the highway sides or along the side of railway tracks or industrial belts” (Bangladesh Bureau of Statistics, 2014, p. 03)

shocks. As described above, the impact of climate-related natural disasters are severe in Bangladesh and would be felt particularly acutely by the poor and extremely poor sections of the population. There is, thus, a vicious cycle of disaster and poverty and each new event serves to further deepen poor people’s vulnerability, loss of livelihoods and shelter, and shrink their overall levels of well-being.

## Resilience

The term ‘resilience’ is used in different situations to mean different things and is measured in many different ways by different people and organizations. The term has been borrowed from the ecological sciences to assess the capacities of natural systems to absorb changes but still maintain their core functions. In the social sciences, resilience is defined as a measure of the capacities of communities to prepare for and withstand shocks and stresses from a range of different hazards, whether environmental, social or economic (U.S. Indian Ocean Tsunami Warning System Program, 2007). It has been defined as “the ability of a system and its component parts to anticipate, absorb, accommodate, or recover from the effects of a shock or stress in a timely and efficient manner” (Mitchell & Harris, 2012, p. 2).

Based on extensive work by the Rockefeller Foundation, a recent and increasingly accepted definition defines resilience as the ability to ‘bounce back’ or: “The capacity of any entity – an individual, a community, an organization, or a natural system – to prepare for disruptions, to recover from shocks and stresses, and to adapt and grow from disruptive experience” (Rodin, 2015, p. 3).

## Climate and Disaster Resilience



(Source: OECD, 2012)

Natural hazards are everywhere around us and are particularly felt in a country such as Bangladesh with its specific geographic location and setting. A hazard cannot be reduced and is not constrained by national or administrative boundaries. It is when natural events meet with human settlement and land use that a disaster may follow. Disasters are the result of a combination of *not only* exposure to a particular hazard (natural or person-made) but also the conditions of vulnerability (susceptibility to be

adversely affected) that are present, and compounded by insufficient capabilities or measures to reduce or cope with the potentially negative consequences of that hazard. Disaster risk, including climate-related risk, has been summarized by the United Nations Office for Disaster Risk Reduction (UNISDR, 2009) in the following formula:

$$\text{Risk} = \text{Hazard (frequency and severity)} \times \text{Vulnerability (exposure / capacity)}$$

Poverty is one of the strongest determinants of the extent of disaster risk – a disaster can destroy the asset base of a poor household far more than that of a wealthier household, and so pushing it further into poverty . Poor families are extremely limited in their options as to where they live, how they cope and their capacity to recover and reconstruct after an extreme event. The poorest people in a community therefore, are often affected disproportionately by disaster events, particularly when more than one disaster occurs in a given period of time. For this reason, Bangladesh has been cited as one of 11 countries in the world most at risk of disaster-induced poverty (Shepherd, et al., 2013).

However, poverty is only a subset of wider vulnerability which is related to social, institutional and political factors that govern different communities' and different individual's access to services, resources and information. Vulnerability (which in some respects is the opposite of resilience) is a function of many variables, including economic activity/ livelihoods (poverty), socio-economic status, education, household size and structure, and attachment to or detachment from family and community support systems. The root cause of vulnerability therefore, is linked to a marginalized position in society. As such, an argument is sometimes made that poverty and socio-economic vulnerability of the extremely poor in a country such as Bangladesh, far outweighs the long term threat of climate change – that poor people currently are dying of preventable diseases and that this should be the priority for immediate support interventions rather than pondering the long term, uncertain impacts of climate change.

By bringing the issues of disaster risk resilience and climate change adaptation<sup>8</sup> to the fore, there might be a tendency to emphasize extreme weather events or 'nature' as the major threat being faced by a community. The resultant resilience-strengthening solutions to this limited definition of the problem tend to be limited to scientific and engineering interventions. Such interventions ignore the social and political processes that give rise in the first place to the exclusion that underlies the vulnerability of certain individuals and communities and that are beyond the resources of either the cities/towns or urban poor communities themselves to manage. Undoubtedly, overcrowded living conditions, on low value hazard-prone land, and lack of basic services compounds the vulnerability of the urban poor to extreme weather events. For example, heavy rainfall may often result in damaging localized flooding due to no drainage or blocked and unmaintained drains; lack of secure or recognized tenure discourages household investments in durable construction materials making buildings prone to failure during strong winds or earthshaking; and fire or environment-related diseases (such as dengue or malaria) are rapidly transmitted through dense, poorly laid out settlements.

Within the context of UPPR, predicated on the underlying principle that the urban poor are best placed to judge their own needs and to identify who is most in need of support, a definition of building resilience therefore, might usefully include the concept of enabling individuals and urban

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<sup>8</sup> Disaster risk management is concerned with existing hazards and past disasters, including their return periods. Climate change adaptation takes into account how these hazards might **change over time**.

poor communities to identify, mitigate, cope with and adapt to their own risks, i.e. that it is possible to be vulnerable but still be resilient. However, whilst this holds true (and should be encouraged) for a certain level of risk, it seems iniquitous to expect that the urban poor can or should deal with the catastrophic impacts associated with extreme weather events – and events which, due to the impacts of climate change, are increasing in frequency and intensity over the coming decades and frequently exceed the boundaries and resources of a single community. Their ability to manage that level of risk would be as constrained as, for example, a poor (or any) community’s ability to build and maintain a main road for residents to travel out to work in a distant garment factory or brickfield.

For the purposes of future interventions such as NUPPR therefore, it is proposed that building ‘**climate resilience**’ (as opposed to individual and localized general ‘resilience’), requires a multi-layered approach to risk management and would require “building the policies, strategies and tools that empower individuals, communities and states **to effectively manage their own layer of risk**” (OECD, 2013, p. 1) [own emphasis].

## 2. UPPR Transformational Outcomes

The outcomes of the UPPR that has been implemented over seven years in 23 cities/towns and using a participatory approach that has facilitated the mobilization, establishment and empowerment of 2,700 community development committees representing the interests and needs of approximately 3 million poor and extremely poor urban residents (in particular women) are the subject of a separate assessment. In brief summary, activities under the project have been implemented under three components, namely Socio-Economic Development<sup>9</sup>, Settlement Improvement (infrastructure services), and Land Tenure and Housing Improvements. According to the UPPR Progress Report for July to December 2014, measurable impacts include:

- Reduction in poverty from 33 percent in 2013 to 23 percent in 2014 in 12 UPPR towns and cities (Multidimensional Poverty Index);
- 10 percent increase in the availability of three basic services - water, sanitation, and infrastructure conditions - in more than half of the households



**Figure 4: Community Development Organizational Arrangements** (Source: National Project Coordinator, 3 Sep 2015)

<sup>9</sup> Socio-Economic activities included: apprenticeships for skills development, block grants for small business start-ups, education support, rehabilitation of fire affected families, adult literacy, eye treatment, vaccination for Hepatitis B, community resource centre, cultural programme, solid waste management, health assistance, urban food production (discontinued), education support for children with disability and adolescent blooming centre.

adopting the Community Development Committee models with improved access to water reported by 84 percent of households surveyed (Settlement and Living Condition Index);

- 90 percent of 2,700 community development committee women members rated with a score of above 40 (moderate to high) empowerment in the areas of economic conditions, agency, personal development, social status and group participation (Women's Empowerment Scorecard);
- Community federations formed in all 23 UPPR towns and two of these were officially registered with municipal authorities, making them eligible for state financing and oversight by government departments;
- Tenure security and housing improvements for over 300 households in 13 towns through the Community Housing Development Fund including (i) resettlement on government-owned land with long-term lease arrangements (e.g. 99 years); (ii) land readjustment of private owners' land where mid-term lease arrangements have been entered into; (iii) on-site upgrading in communities' own land; and (iv) on-site upgrading on land owned by LGI/organizations.

During the course of the assignment interviews, many respondents spoke to the transformational achievements of the project, in particular regarding the empowerment of hitherto 'voiceless' poor urban women who are now recognized as increasingly equal partners in the decision-making processes regarding the identification of needs, setting of priorities and allocation of city resources. This is further evidenced by the fact that in a recent local government election, 14 of 26 CDC members stood for and were popularly elected as City Councilors in the formal local government structure. In this respect, it seems intuitive that the empowerment of poor and extremely poor women will contribute to achieving the climate resilience outcome of individuals and communities as being better able to manage their own level of risk. Also raised, was the transformational change in attitudes and some practices of City Corporation Councilors and technical staff in recognizing the poor as an integral part of the city with the same right to services and resources as higher income urban groups. Once again, this would contribute to better management of own level of risk by communities and a growing awareness and knowledge of their responsibilities and the responsibilities of the local governments in addressing climate risks.

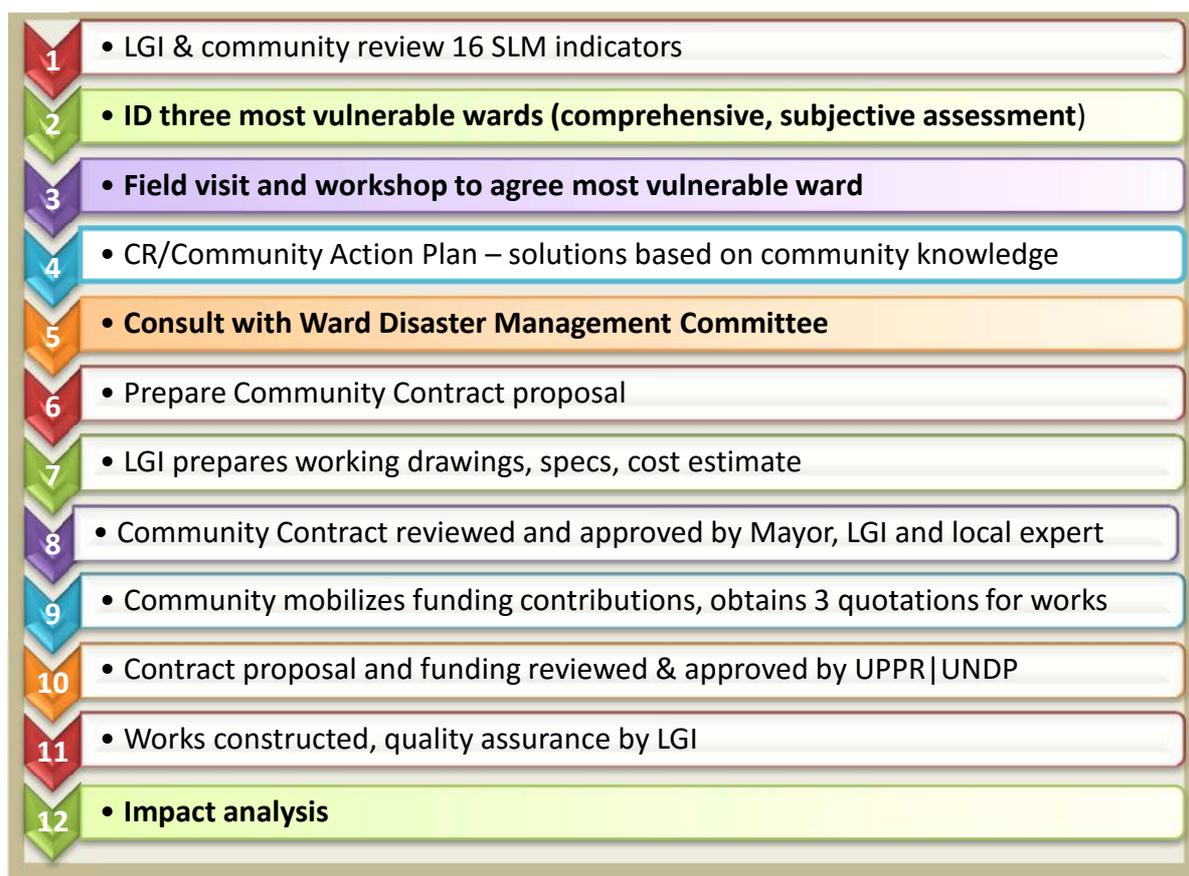
### **3. UPPR Climate Resilience Building**

#### **Climate Resilient Ward Planning**

In October 2013, in addition to on-going UPPR activities and as one of the reasons subsequently to extend the project to August 2015, it was agreed that Climate Resilient (CR) Plans would be prepared on pilot basis in Sirajgonj, Rajshahi, Chittagong and Comilla. Specifically, this would entail conducting "vulnerability assessments" based on the existing town and ward level Settlement and Vacant Lands Mapping (SLMs). The CR plans were to be prepared by participatory means and include "measures for adaptation to climate change and enhancing the resilience of poor communities ... including risk and vulnerability to environmental pollution, epidemics, and natural calamities, both man-made and natural" (UPPR Concept Note, 7 Oct 2013).

The participatory climate resilient planning process followed from August 2014 onwards in the four pilot cities/towns is set out in Figure 5 below. The process in the main followed the tried and tested processes for preparing Community Action Plans in all wards. Steps 2, 3 and 5 were specific to the preparation of the Climate Resilient Action Plans. Whilst Step 12 (post-construction impact analysis) was planned it was not undertaken in any formal way.

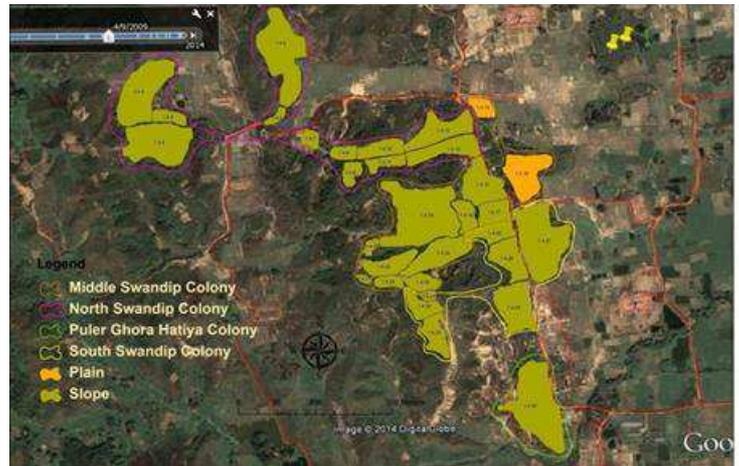
**Figure 5: Climate Resilient Ward Level Planning Process**



The first step in the process entailed the setting up of a Working Group comprising the Local Government Institution (LGI) and other local experts and the community (through the representative CDC structure) to revisit the Poor Settlements and Vacant Lands Settlement Land Mapping prepared in all 23 UPPR participating cities/ towns in November 2011. Each SLM had an associated Poverty Analysis prepared on the basis of 16 indicators, namely:

- |                        |                        |                                     |
|------------------------|------------------------|-------------------------------------|
| 1. Land ownership      | 2. Land tenure         | 3. Nature of housing                |
| 4. Water supply        | 5. Sanitation/hygiene  | 6. Drainage facilities              |
| 7. Access road         | 8. Electricity supply  | 9. Solid waste management           |
| 10. Educational status | 11. Employment status  | 12. Access- civic facilities        |
| 13. Household income   | 14. Savings and credit | <b>15. Risk and vulnerabilities</b> |
| 16. Social problems    |                        |                                     |

The second step in the CR planning was for the community to identify the three most vulnerable wards in the city/town based on the previously assessed SLM Indicator no. 15 (Risk and vulnerabilities). Indicator no. 15 involved the community making use of their experiences and oral histories of past events if they existed, and so identify climate-related risks such as flooding and waterlogging, strong winds, and similar. An assessment also was made of the level of threat regarding forced evictions by the authorities. All of the risks were assessed in terms of how the events impacted the Settlement, Households and House Structures.



**Figure 6: Topographical analysis to inform the risk assessment of Swandip Colony, Chittagong City Corporation**

It should be noted that this was a **subjective assessment** by the community with a rather limited amount of technical advice provided by local experts (engineering technicians and town planners). No detailed scientific data was used or modelling undertaken on the probabilities and return periods of different natural hazards specific to each highly vulnerable ward. The assessments used available satellite imagery and in many cases this was open-source (e.g. GoogleEarth kml files) and whilst high resolution (and cost-free) and are tremendously useful for many forms of land mapping, they are only suitable for moderate-resolution spatial analysis - for example, to measure a setback from a river bank, pond or coastline subject to inundation and only in low density peri-urban areas due to horizontal positional (in)accuracy. The level of horizontal accuracy tends to falloff even farther in developing countries (Potere, 2008). Similarly, for vertical analyses, LIDAR (high cost but with vertical accuracies of 1m) or lower cost, lower resolution elevation data was not available for assessments in settlements facing extreme flooding or landslide risk. Figure 5 above illustrates an example of the professional commitment and effort made by local experts but also the constraints they faced in being able to adequately advise communities regarding the landslide risk in a highly vulnerable ward.

In some cases, scoring of the assessed risk and vulnerabilities was carried out solely on the basis of the community's subjective knowledge of local hazards and its self-assessed ability to mitigate the risks identified as shown in Table 2 below.

**Table 2: Risk and Vulnerabilities Assessment - Comilla SLM, 2011**

Score	Description/Assessment	Settlements		Households		House Structure	
		Number	Percentage	Number	Percentage	Number	Percentage
1	High risk – 75% or more of the community cannot mitigate the risks that are faced	80	9.42	3241	12.80	1933	11.49
2	Medium risk – At least 50% of the community cannot mitigate the risks that are faced; evictions can be delayed	283	33.33	9870	38.99	6362	37.81
3	Low risk, Fewer than 25% of the cannot mitigate the risks that are faced; disasters and eviction can be avoided	427	50.29	11594	45.81	8027	47.71
4	No risk and onsite improvement possible	59	6.95	606	2.39	503	2.99
<b>Total</b>		<b>849</b>	<b>100.00</b>	<b>25311</b>	<b>100.00</b>	<b>16825</b>	<b>100.00</b>

In other cases, a larger group of stakeholders, including UPPR technical specialists facilitated a more detailed ranking of the known hazards, as shown in Figure 7.

**Figure 7: Assessment of Hazards, Capacity, Risk and Vulnerability in Swandip Colony, Chittagong**

Sl. No.	Hazards	Ranking
1	Land/Hill Slide	1
2	Run off Rain Water	5
3	Soil/Hill Erosion	3
4	Landlessness/Unsecured Land Tenure	3
5	Lack of Infrastructure and Safe Drinking Water	4
6	Collapse of Mud House	2
7	Fire Hazard	6
8	Earthquake and Cyclone	7

*A three day long workshop held in Swandip Colony to assess Hazards, Capacity, Risk and Vulnerability in Swandip colony in August, 2014. 34 Stakeholders and 11 UPPR staffs taken part in the workshop.*

Once the three most vulnerable wards had been identified, the Working Group then carried out a site visit in each of the three wards to verify the desk-ranking. The overall findings were discussed and agreed at a workshop to single out the most vulnerable ward. In three of the four cities/towns, the group’s priority ward went forward for further plan preparation; in one case, there was intimation that the priority ward might have been replaced by a decision by the Mayor. A detailed CR Community Action Plan (CAP) was then prepared. The CAP was based on the community’s own priorities and mapped not only main features of the selected ward (ponds, schools, mosques, access roads and footpaths, drains, etc.) but also highlighted a number of small works that the community

put forward to address one or more of the risks and vulnerabilities identified. The nature and concept design of the works was once again identified by the community on the basis of its own past experience. Figure 8 below provides an illustrative example of the Community Action Plan prepared by the Sirajgonj CDC members.

**Figure 8: Community Action Plan prepared for Sirajgonj Vulnerable Ward**



If the city/town had an active City or Ward Disaster Management Committee (DMC), the DMC was consulted when preparing the CAP. The DMCs were established in around 2013 with voluntary members. They once received limited training from the Fire Brigade in how to respond to natural and man-made disasters (e.g. conflict situations). They have little to no personal protective or safety equipment and rely on the public media (television) to receive emergency warnings such as for example, flood predictions.

With assistance of the LGI - typically an Assistant (Technician) Engineer, a contract proposal for the proposed small works was prepared, comprising construction drawings, specifications, and bill of quantities with engineer's cost estimate. Unusual for any works contracts, the cost estimates did not allow for physical or price contingencies<sup>10</sup>. In the event that actual costs exceeded the approved budget, the community had to pay for the shortfall. In the event that the actual construction costs were below the budget, the unspent funds had to be returned to the UPPR project account; they could not be used to extend the works. Costings were only prepared for the capital investments to be made; no provision was made to calculate or incorporate future operations and maintenance costs into the proposals.

<sup>10</sup> Depending on the nature of the site, contingencies in seven small works contracts typically can range from 10-40 percent.



In the case of drains and footpaths, standard detailed designs were prepared by UPPR engineers and provided to the LGIs. When asked how high a footpath would need to be raised or the size of drain needed to address site specific drainage problems and to take into account possible increase (or decrease) in flooding due to the effects of climate change, the LGIs stated that they made use of local knowledge (“communities know best”) as to the highest flood level plus 18 inches. The Community Contract proposal and funding arrangements were reviewed by a

City/Town level working group (the Mayor, the UPPR Town Manager and one other local expert, e.g. a Health Officer). Once approved, the contracts were forwarded to the UPPR/UNDP for final approval and funding.

Under the UPPR, the Climate Resilient Action Plans prepared for the most vulnerable ward in each of the four pilot cities/town (Sirajgonj, Rajshahi, Chittagong and Comilla) were all designed as small works contracts funded through the Settlement Improvement Fund (SIF) - primarily drains, footpaths and slope protection.

In keeping with SIF procedures, the project provided 65 percent of the works costs. The City Corporation/Municipality was required to provide 20 percent and the community to provide 15 percent. The communities typically raised the 15 percent funding from those residents immediately abutting onto the improved infrastructure. In one case, the CDC Federation successfully negotiated with the City Corporation to fund not only its (Corporation’s) 20 percent contribution but the 15 percent from the community, arguing that it (the Federation) had brought in 65 percent of the costs from outside) for the benefit of the City.

Once the project was approved by the Mayor and by the UPPR, the CDC would obtain three quotations from local builders to undertake the works. Construction of the works was required by the project to be completed within six months of signing the contract with a local builder. None of the CDCs consulted found this to be too short a time to complete the works. The quality of construction was periodically supervised by the LGI.

Only one of the cities/towns (Chittagong) made mention of a final step evaluate the completed works. In the event, there had been insufficient time and resources under UPPR to formally carry out an evaluation. However, the following impacts were **perceived** by the Town Manager to have been achieved:

1. Reduction of hill erosion due to organized drainage system
2. Reduction of hill erosion due to use of Rip Rap and Step footpaths
3. Confidence growing of community people by contributing money
4. Strengthen the relation and understanding with the Chittagong City Corporation.

As can be seen from the Rajshahi City example provided in Table 3 below (and the same was found in the other three pilot cities/town), the interventions aimed at building climate resilience in what were subjectively identified as the most vulnerable wards were no different from other small works funded through the SIF (save for the river course protection constructed in Swandip Colony). A total 1, 277m footpaths, 50m stepped footpaths, 163m drains and 332m slope protection were constructed in the vulnerable wards.

**Table 3: UPPR Settlement Improvement Fund Activities, Rajshahi City Corporation (2008-2014<sup>11</sup>) (BDT 263.27m)**

Description	All Wards	Vulnerable Ward – Asham Colony Robermore North Settlement	Char Satbaria East, Sabana’s Settlement
<b>Total households mobilized</b>			
Extremely poor	27,800		3.987
Poor	33,000		
Not poor	12,000		
Footpath (sq m)	64,174m	220m	128m
Stepped footpaths	0		
Drains (linear m)	14,658m	75m (+ 133 cover slabs)	133m
Slope protection (linear m)	332m		
Hand tube-wells (no.)	2,821	12	
Tube-well platforms (no.)	15		
Twin Pit Latrines (no.)	12,200		
Solar street lights (no.)	76		
Soak-wells (no.)	5		
Solid waste bins (no.)	21		
House improvement loans (floor area sq m)	287		
Community cluster resource centres (no.)	11		
Improved cooking stoves (no.)	2,322		

<sup>11</sup> Excludes LPUPAP.

Some of those interviewed acknowledged that the climate resilient activities had been introduced late in the project and so there had been too little time to explore alternative types of investments. Also, that climate resilience had been undertaken somewhat ‘unconsciously’ without an in-depth understanding of what additional risks, if any, should be addressed when taking into account climate change and how to effect disaster risk reduction.

Although not all explicitly implemented in the name of climate resilience activities, in addition to the Climate Resilient Ward Planning and small works investments, the UPPR supported a range of other activities that would all contribute towards building the climate resilience of poor and extremely poor urban households. A number of such examples as noted during the course of the Climate Resilience Ward Planning documentation and assessment are briefly described and assessed in Section 5 of the Report and, as appropriate, included in the concluding Section 7 of the Report on Strategy Recommendations.

#### **4. Climate Resilience in Vulnerable Wards - Emerging Issues**

A number of emerging issues were identified during the course of documenting the climate resilient initiatives undertaken by urban poor communities through the UPPR. The issues are summarized in the sections below. Recommended strategies for addressing the issues and for strengthening the climate resilience outcomes of a proposed successor NUPPR project are provided in Section 7.

##### **Relevance**

*(Alignment with community priorities)*

As with most UPPR activities, a participatory approach was used to engage communities in self-assessment of hazards facing particular parts of the city/town and to identify priority interventions to address the associated risks. Communities were responsible for identifying the highest priority vulnerable ward through facilitated discussions with local experts, identifying the most pressing risk and then formulating a preferred solution. As such, there was a strong sense of community



ownership of all the activities, as evidenced by the willingness to pay 15 percent of counterpart funds (or, in one case, negotiating with the City Corporation to provide the funds).

In a small number of cases, if a footpath or drain served a larger population, the CDC attempted to raise funds from other nearby residents but this proved difficult to do. Also, the same rate of contribution was charged for abutting residents, irrespective of whether they ran a business or only

lived in a house next to the improvement. In some cases, if an extremely poor resident could not pay their share of the costs, the (also poor) CDC Federation member or the (potentially poor) Ward Councilor would pay the shortfall. All cities'/ towns' Federations stated that the 15 percent was onerous on the extremely poor communities and that in the event of additional works being undertaken in the same wards, it was unlikely that they would be able to continue to raise the additional required counterpart funds.

**Issue 1:** *The ability and willingness to pay 15 percent of costs should be monitored and if necessary re-assessed if the cost of the proposed works needed to address a particularly high risk hazard exceeds the affordability levels of extremely poor and poor households<sup>12</sup>. There were instances noted where, for example, drains had to be curtailed due to lack of funding, resulting in more rather than less erosion. Options should be discussed for internal cross-subsidy of the costs, for example by charging a slightly higher rate for businesses than residential uses and for charging users from the wider community. Where home improvement loans are available, priority might be given to allocating loans to poor residents who are adjacent to proposed resilience strengthening works on the understanding that they will in turn, for example, move an outside wall on an existing building so as to allow for a wider footpath, drain or emergency evacuation route.*



**Issue 2:** *All four Town Federations stated that whilst the communities appreciated the drains and footpaths constructed, a higher priority in most communities was the issue of lack of secure tenure. In the future, residents requested a scale up in the number and size of home improvement loans and assistance to negotiate with either private land holders or the Government to obtain vacant land (well-located and close to jobs) for landless residents<sup>13</sup>. International experience has shown that for resilience to increase, strengthening is needed on four fronts – risk reduction, increased readiness or preparedness, strengthened response capabilities and equitable recovery and reconstruction (sometimes known as the '4Rs'). Security of tenure is a prerequisite in almost all countries for individuals to invest in improvements to their houses and so reduce risk ab initio.*

*Future project assistance might more proactively (i) identify vacant land in less hazardous locations and close to employment opportunities and (ii) assist the*

---

<sup>12</sup> This raises the further issue with respect to the feasibility of scaling up activities in the future. Whilst it seems feasible to scale out UPPR activities including Climate Resilient initiatives to new, additional cities and towns, there may be real limits to which communities are able and willing to meet larger and longer term counterpart funding commitments for more public infrastructure investments and this would need to be closely monitored.

<sup>13</sup> As part of the UPPR Land Tenure and Settlement Land Mapping exercise, vacant lands were identified throughout all cities/towns. However, the detailed ownership of these lands is not known in many cases due to the time taken to extract the information from official land registers. Furthermore, the SLMs should overlay the vacant land and land ownership layers with information regarding low hazard risk so that future location decisions by poor households could take this into account.

CDCs to negotiate secure tenure for extremely poor households on such land. This would provide poor households with options regarding where they live and provide an incentive for building from more durable materials – both would contribute to risk reduction and so greater resilience. Case studies of the above two approaches undertaken through UPPR are briefly described in Section 6.

## Efficiency

*(How well resources were used to achieve results i.e. cost efficient, on-time, etc.)*



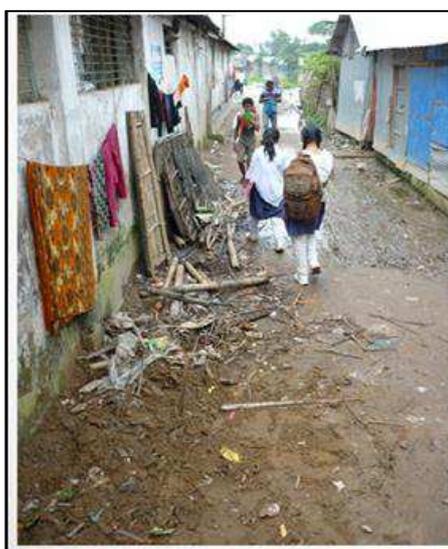
Overall, the efficiency of the constructed works provided value for money. *(However, please read in conjunction with Issue 7 below)*. Costs were well- controlled based on fixed price estimates prepared by the LGI and a clear understanding that cost shortfalls would not be met by project funds but would be the responsibility of the community. This discipline led to the effective use of obtaining competitive quotations for works and technical support was provided to the CDCs in all cities/towns by the LGIs who carried out timely supervision of the quality of construction which, in most cases was to a satisfactory standard.

## Effectiveness

*(Extent to which the results were achieved and any unintended outcomes)*

As shown below, the ‘before’ and ‘after’ situation of the small works clearly demonstrates the improvements to the public living environments in the vicinity of the footpaths and drains in the vulnerable wards. In a number of instances, the CDC members highlighted that prior to the footpaths being constructed, pregnant women and elderly people had struggled to walk through the settlements and that this connectivity had been improved.

**Before**



**After**



However, there were too, a number of negative, unintended outcomes that could have been avoided.



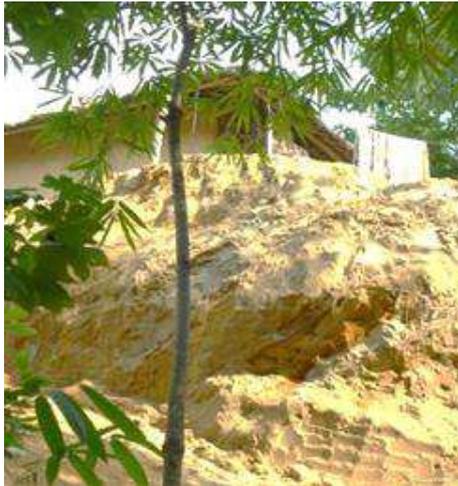
*Issue 3: Poor design of some works. The UPPR has clearly demonstrated that the urban poor are best placed to identify and prioritize their own needs and to identify who in the community is most in need of support. However, the LGIs and UPPR staff may have been overly confident (or too hands-off) in expecting communities to be able to design some of the works that needed a higher level of technical knowledge that could reasonably be expected to be found within the communities themselves. For example, when preparing detailed drawings and specifications for drains, the LGIs and UPPR staff should have provided technical advice on the need to reshape and stabilize slopes above the drains (see photo to left) to prevent further landslide and erosion. Additional non-structural measures also could have been encouraged, such as the planting of vegetation to hold the soil in addition to the preferred visible structural solutions.*

*In other cases, a raised, filled footpath was proposed for construction by the community but in fact this contributed to further ponding and water inundation during heavy rains. This risk is not uncommon and in fact is raised by the IPCC-13 in its guidance to all countries on the selection of adaptation measures. It is recommended that in future, at least two to three alternative design options should be put forward for consideration at an early stage particularly in hazardous locations and before the works are detailed. Typical adaptation strategies are sometimes considered are on the continuum of Do Nothing → Protect → Elevate → Retreat → Transform. This may require outside technical advice for the communities to consider and is in line with recommendations of “Making Cities Resilient, My city is getting ready”, produced by Ministry of Disaster Management and Relief with support of the UNDP assisted CDMP.*



*Issue 4: Risk of piecemeal interventions and lack of integration with city-wide infrastructure main networks. The risk of ward-level only works is that they may not be fully integrated into city wide systems (e.g. primary drains) and run the risk of exacerbating a problem in an adjacent ward by transferring, not addressing a risk. A number of examples were seen in the field of drains that collected runoff and directed it into an adjacent property rather than to a primary collector. Integration of community-led, local-scale works into city-wide infrastructure networks is notoriously challenging (and for example, was identified as a shortfall of the Kampung Improvement Programme in Indonesia which is*

*recognized as one of the first successful slum upgrading programmes.) To be successful, it requires an explicit checkpoint in the procedural steps required to be followed.*



*Issue 5: In a highly disturbed and sensitive natural environment subject to landslide risk - a risk that will be exacerbated by ongoing human settlement and by likely higher levels of intense rainfall and flash-floods in the future as a result of climate change, the community and LGI advisors nonetheless felt (understandably) more comfortable in only attempting to address ‘lesser’ risks such as slippery and poorly drained footpaths and using known technologies, such as constructing stepped and RCC footpaths and covered drains. In such cases, a ‘blind eye’ is turned to the higher risk and this may result in considerable damage or losses in the future<sup>14</sup>.*

*If resilience is the ability of individuals, communities and agencies to each manage their own level of risk, it may be prudent for project facilitators to question whether some risks should be referred ‘up-the-line’ rather than be attempted to be solved at the level of an extremely poor community. If this is agreed to for the future, the project also would need to develop and make use of more structured (and less subjective) guidance to communities and agencies regarding an initial screening of the level of ‘acceptable risk’ of the probability of different hazards over different return periods, based on the likelihood of it occurring and the resulting consequences. The assessment could be translated into a simple ‘traffic light’ acceptable risk matrix where **Risk = Likelihood X Consequence** as shown in Figure 9 below.*

**Figure 9: Acceptable Risk Matrix for Decision-Making**

<b>Potential damage descriptor</b>	<b>Insignificant</b>	<b>Very Light-Light</b>	<b>Moderate</b>	<b>Heavy</b>	<b>Very Heavy</b>
<b>Potential risk descriptor</b>	<b>Very Low</b>	<b>Low</b>	<b>Moderate</b>	<b>High</b>	<b>Very High</b>



*Issue 6: Possible limits to community knowledge. When attempting to address a potentially serious water course erosion risk, the Swandip colony (Chittagong) community proposed to make use of geo-fabric and riprap, a solution that has been used elsewhere in Bangladesh and is successfully used for coastal protection in many high energy coastlines around the world. However, inadvertently, the geo-fabric was placed over the riprap and not under it, rendering it of marginal use and easily*

<sup>14</sup> Similarly, the Government of Bangladesh’s Disaster Report 2013 noted that: “High level of tolerance comes naturally to the people of Bangladesh, causing them to ignore safety measures in their day-to-day lives.”

torn. Furthermore, the anti-erosion works undertaken at this site may result in compounded damage to residents in the event of a flash flood. Once again, more proactive outside technical advice might be advised by UPPR staff to LGIs and local communities to consider.

## **Sustainability**

*(Whether the benefits will continue at the close of UPPR and environmentally sustainable)*

- Organization and funding - Likely
- Appropriate design solutions (options) to complex natural processes (e.g. flooding) requires attention including opening (not closing) drains and soft eco-based solutions where appropriate.

*Issue 7: Asset maintenance is poor to non-existent. This not only puts at risk the capital investments made with UPPR funding but also the long term effectiveness of the resilience works themselves. Extremely poor and poor communities cannot be expected to assume the cost and responsibility for ongoing operations and maintenance of the works which are City Corporation assets – this is clearly a local government responsibility. Consideration could be given to City Corporations placing part of their capital contributions (20 percent) into a sinking fund to cover long term maintenance responsibilities. In addition, in light of the expressed burden of communities having to contribute 15 percent of the costs in cash, consideration could be given to a lower cash contribution of for example, 5 percent and the remaining 10 percent contribution being clearly recognized and recorded as ‘sweat equity’ for ongoing maintenance on a ‘lengthmen’ basis – i.e. a household is responsible for maintenance (to agreed and documented standards including regular planned maintenance) for the portion of footpath or drain along the length of their lot.*



*Issue 8: Given the small nature of the works and that in many cases the footprint is within existing works (e.g. footpath or drain), the City Corporations have waived the requirements for obtaining an environmental license and the Community contract documents do not include construction environmental management plans (CEMPs). This is not good practice and it is recommended that environmental impact is assessed (making use of simple, standard checklists) prior to approval of all small works and that mitigation during construction and during ongoing operations requires more dedicated attention.*

## 5. Other UPPR Activities that have contributed towards building climate resilience of poor and extremely poor urban households

### Multi-hazard risk assessment – city level

#### Purpose:

To pilot robust multi-hazard risk assessments at city level in Khulna, Barisal, Narayanganj and Dinajpur.

#### Approach:

Stepped approach similar to the CR Ward resilience planning but with higher level commitment (Mayor and CEO lead a Committee on Climate Resilient City) and with stringer inputs of technical specialists in addition to the CDC Cluster/Federation leaders.

#### Strengths:

- Establishes a local champion (Mayor) at start
- Makes use of Magnitude X Likelihood assessment
- explicitly assesses the capacities and roles of stakeholders (which contribute to social capital → resilience)
- well-developed methodology to overlay Hazard, Vulnerability and Risk
- explicitly calls for phased solutions (now, soon, later).

#### Weaknesses:

- As in the case of the Ward Level, vulnerability assessments are largely subjective albeit with some technical inputs from academics and NGOs. Given the level of hazard risk in some areas of Bangladesh, more costly base imagery and scientific and engineering inputs may be required.
- Lacks explicit resources for implementation.
- The participatory approach may be beyond the time constraints of the Mayor, academics and technical specialists and may need to be streamlined to retain their engagement.

## Community Housing Development Fund

(e.g. Mandartola Gopalgonj, Rajshahi church land.)

### Purpose:

To provide at scale, home improvement loans and assist households or groups of households to negotiate with either private land holders or the Government to obtain secure tenure over land and/or facilitated to relocate to less hazardous vacant land (in cases of eviction).

### Approach:

Security of tenure is a prerequisite in almost all countries for individuals to invest in improvements to their houses and so reduce risk *ab initio*.

### Strengths:

- One of the highest priorities expressed by community representatives in all field visits.
- Security of tenure allows extremely poor households to incrementally extend and improve the build quality of their houses with no further funds needed from Government.
- An additional room can be used by a poor family to rent out (to repay the loan and other expenditures) and the availability (unconstrained supply) of rentable rooms assist extremely poor people to house themselves.
- The majority of poor residents already rely on the inputs of local builders for some or all of the construction (see Annex 2). This is an entry point (by targeted training of small builders) to good build quality and more durable buildings able to withstand strong winds and flooding.

### Weaknesses:

- Although Town Managers and other local experts refer to the home improvements and new houses that have been constructed as 'climate proofed', many would not stand up to strong winds. Three simple and low cost improvements should be taught to local builders and owners – tie down roof to support columns; diagonally brace all walls; dig deep foundations. (Annex 3 provides an example of visual training leaflets for small builders in Vanuatu, Pacific, the most vulnerable country in the world.)
- The standard designs for new houses prepared under UPPR could be much improved (both to be able to withstand strong winds, flooding and earthquakes through simple low cost techniques) and livability (in terms of ventilation and reducing the ability for domestic violence).
- Currently, housing loans (CHDF) and housing grants for vulnerable families or individuals (SIF) are dependent on the beneficiary proving secure tenure. Highly marginalized families will continue to be excluded and need explicit and proactive collective assistance to access vacant land in less hazardous locations (but close to employment opportunities).

## Socio Economic Fund Activities (SEF)

### Purpose:

To assist poor people with micro-credit and skills training for jobs .

### Approach:

Provision of small grants for businesses; apprenticeships training; six month skills training for self-employment

### Strengths:

- Highest priority of poor and extremely poor people
- Assists poor people to gain market entry (even in informal sector)
- Increases in incomes lead to poor people having great options regarding their location decisions (need not be on low value hazardous land and/or could begin to afford transport costs associated with living farther away from jobs but on less hazardous lands.

### Weaknesses:

- Subsidy to some individuals may result in unequal competition with unsubsidized small businesses.
- Types of training and types of business loans should explicitly assess whether climate-dependent and so may be risky.
- Types of businesses and training have not used the opportunity to encourage the emergence of building materials suppliers and trained small builders for more durable housing stock.

## Support for Internally Displaced Climate Refugees

e.g. UPPR activities in Korail, Dhaka and in secondary towns.

### Purpose:

To facilitate the entry/absorption of climate displaced individuals and families once they arrive in large slum areas such as Korail and to encourage

### Approach:

Vulnerability is a consequence of social marginalization. Poor and marginalized people may either (i) have been displaced by climate events and can be assisted to reform social and economic networks in new settings or (ii) not know where to go and how to react when an extreme weather event occurs and so need additional support.

### Strengths:

- Well established and proven approaches developed and implemented under UPPR.
- Facilitating in-migration to secondary towns by climate refugees will over time relieve the primacy of Dhaka.

### Weaknesses:

- Requires scale up to be effective
- Requires more targeted approaches to reducing vulnerability (marginalization) in the event of a climate shock.

The UPPR has an effective component that addresses livelihoods. By way of example, Table 4 below illustrates the achieved outputs provided by the Rajshahi City Corporation UPPR Town Manager.

**Table 4: UPPR Socio-Economic Development Outputs, Rajshahi City Corporation**

Year	Block Grant	Apprenticeship	Education Grant	Social Development	Blanket Support	Urban Food Production
<b>2001-2007<sup>15</sup></b>	36	562	0	1143	0	656
<b>2008</b>	0	270	0	300	0	0
<b>2009</b>	812	417	2035	1520	0	345
<b>2010</b>	920	967	1054	18552	0	1648
<b>2011</b>	5750	1470	4000	448	8200	6605
<b>2012</b>	1653	1098	3324	607	6000	3952
<b>2013</b>	881	692	2144			
<b>TOTAL</b>	<b>10052</b>	<b>5476</b>	<b>12557</b>	<b>22570</b>	<b>14200</b>	<b>13206</b>

<sup>15</sup> i.e. LUPAP

*Issue 9: In the face of a growing reality of ‘climate refugees’ (see Strategy section below) to urban areas as a result of both dramatic and slow onset natural disasters in the rural areas, the continuation and possible scale-up of the Socio Economic Fund is an important climate resilience activity and anecdotally (from discussions with a small number of such individuals during the field walks) be of far greater priority to extremely poor ‘bridge-header’ families first moving to the city than are infrastructure investments.*

## **6. Overall Impact of UPPR Climate Resilience Activities**

*(Long term changes in climate resiliency status produced at household, community and national levels)*

### **Resilience at Household Level**

The climate resilience of the urban poor and extremely poor at household level continues to be precarious. As discussed in the above sections, many of the UPPR supported activities have contributed in one way or another to building resilience even if not intended, i.e. not only the small works in the most vulnerable wards (SIF) but also the home improvements grants (SIF) and loans (CHDF), the assistance to regularize and obtain security of tenure, the SEF livelihoods and skills training and the empowerment of extremely poor and poor women and men to participate in the resource allocation decisions of the City Corporations. However, from the Emerging Issues section it can be seen that more needs to be done and in a more targeted and scientifically informed way on project interventions ranging from more robust hazard assessments, consideration of more design options, better design themselves and identifying ‘entry points’ such as more resilient houses, meeting the priority livelihoods needs of climate refugees, etc. Furthermore, the individual surveys point to ongoing challenges in how households perceive they could cope and recover with extreme weather events.

### **Resilience at Community Level**

At the community level, it has been shown in the sections above that many of the UPPR activities have resulted in higher levels of community resilience. With regards the SIF funded activities alone, there are documented and highly visible improvements in the public environment and target communities have benefitted from better drainage and footpaths. However, as discussed in the section on Emerging Issues, there are notable challenges regarding works undertaken and a high risk in many instances that by relying solely on community-based knowledge, hazard risks have not been addressed but merely moved (to a neighbouring community) and possibly even exacerbated by poor design. Ongoing support to the small works is needed as basic services (water supplies, sanitation, solid waste management) are widely recognized as being the ‘first line of defense’ against climate change. However, whilst the benefits of scaling these out to more cities and towns is indisputable, the scaling up in existing towns and cities will need to be carefully monitored against the limits to the communities’ and CDC leaders’ own financial and time resources which in some cases, appear to be stretched by the UPPR. It is suggested too that a new project make more explicit financial

allowances for providing support to bringing in additional 'science' and engineering skills and ideally also would support some targeted city wide infrastructure (primarily landfill sites and collection/transfer equipment and primary drains).

## **Resilience at National Level and Policy Development**

The Government of Bangladesh has recognized the country's high vulnerability to natural hazards and climate change as important national issues with the likelihood of increasing frequency and intensity of extreme weather events. It has adopted a National Adaptation Programme of Action (NAPA) (2005) and a Climate Change Strategy and Action Plan (CCSAP) (2009) as medium- to long-term national frameworks for enhancing resilience to climate shocks and facilitating low carbon and sustainable growth.

*Issue 10: The national climate change and adaptation policies provide high-level guidance on adaptation and resilience strengthening measures regarding the urban poor. The UPPR is consistent with or has supported many of the high level prioritization criteria set out in the NAPA, including:*

- *Poverty reduction and sustainable income generation of communities*
- *Enhancement of adaptive capacity in terms of skills and capabilities at community and national levels*
- *Gender equality*
- *Cost effectiveness.*

*However, the NAPA (p. 23) explicitly notes that some two thirds of the 40 million labour force is engaged in rural and water-dependent agriculture and so most likely to be hardest hit by climate change. One of eight "Intervention Type Measures" recommends "Enhancing resilience of urban infrastructure and industries to impacts of climate change including floods and cyclone" (Government of the Peoples' Republic of Bangladesh, 2005, p. 22).*

*The CCSAP more explicitly recognizes that climate change impacts will be felt the hardest by the poorest and most vulnerable communities. Actions on the central Government-led "Climate Action Plan" include to "Increase the resilience of vulnerable groups, including women and children, through developing community-level adaptation, livelihood diversification, better access to basic services, social protection ... and scaling up" (Government of the People's Republic of Bangladesh, 2011, p. 27)*

Over and above extreme weather events that may result in the displacement of people and assets, there are less visible slow-onset disasters. Among the impacts of climate change are droughts, increased salinity of ground water and increasing temperatures, all posing a risk for food security as a result of low crop productivity. Urbanization is driven by the differential in rural : urban incomes as poor people come to cities and secondary towns in search of opportunities, particularly some form of employment. Under a scenario of declining crop yields, climate induced rural : urban migration therefore is becoming increasingly likely. The prospect of increasing numbers of 'climate refugees' fleeing to the urban areas is gaining increasing legitimacy as evidenced by, for example, the forthcoming (October 2015) International conference to be hosted by Pacific Small Island

Developing State of Kiribati. There is an evident gap between what is an increasingly visible reality and national policy.

More in-depth research is needed to forecast the ‘multiplier effect of climate change on the underlying urban growth rates; to identify which cities and secondary towns growth could be directed towards (to break through the primacy of Dhaka)

Vulnerability for the urban poor is fundamentally a function of two variables:

- Poverty and lack of income which limits the options available as to where a household may locate; and
- Insecurity of tenure – which, as widely researched and documented around the world, directly impacts the willingness and ability of households to incrementally invest in the house structure (consolidation) and make it durable to extreme weather events.

In the absence of a well-articulated Urban and National Housing Policy that addresses both of these variables, addressing climate resilience will remain a challenge.

## **7. Proposed Strategy**

Based on the above findings from the field and drawing on ‘best practice’ from the Region and internationally, a number of observations and recommendations have been made throughout the Report. Figure 10 overleaf summarizes the proposed recommendations under a discreet set of entry points to build climate resilience under the NUPPR.

### **Figure 10: Summary of Proposed Recommendations to Address Climate Resilience under NUPPR**

## Annex 1 : Number of People<sup>16</sup> Affected by Climatic Shocks in Bangladesh in 2010 (Rural | Urban)<sup>17</sup>

Category of people/ Division	Type of climate shocks										
	Cyclone/Tornado/ Tidal surge etc.		Drought/ Irregular rains		Floods		Landslides/ Erosion		All type of climatic shocks		
	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Total
<i>Number of total population affected</i>											
National	1,253,573	134,051	3,950,974	635,201	3,038,659	141,476	421,189	70,232	8,542,129	956,138	9,498,267
Barisal	92,199	16,763	134,107	33,527	92,199	8,382	-	-	318,504	58,672	377,176
Chittagong	127,690	25,538	76,614	-	280,918	-	63,845	-	497,991	25,538	523,529
Dhaka	132,152	13,215	1,717,978	290,735	436,102	52,861	277,520	13,215	2,537,321	356,811	2,894,132
Khulna	476,065	8,656	1,055,999	147,147	276,983	-	-	-	1,800,392	155,803	1,956,195
Rajshahi	81,256	34,824	452,711	139,296	46,432	23,216	-	-	568,791	185,728	754,519
Rangpur	195,966	12,248	502,162	24,496	1,677,955	-	-	-	2,351,587	36,744	2,388,331
Sylhet	148,245	22,807	11,403	-	228,070	57,017	79,824	57,017	467,543	136,842	604,385
<i>Number of poor affected (people lived under upper poverty line)</i>											
National	555,044	42,696	953,537	156,551	1,181,248	28,464	142,319	14,232	2,817,916	227,711	3,045,627
Barisal	25,256	17,109	25,256	25,256	17,109	-	-	-	66,805	42,365	109,170
Chittagong	39,311	-	25,271	-	129,163	-	14,040	-	190,937	-	190,937
Dhaka	51,402	-	504,673	79,439	130,841	28,037	144,860	-	817,758	107,477	925,235
Khulna	250,564	-	172,749	34,239	112,054	-	-	-	536,924	34,239	571,163
Rajshahi	-	10,997	93,478	-	10,997	-	-	-	104,475	10,997	115,472
Rangpur	61,094	-	134,719	-	747,221	-	-	-	943,033	-	943,033
Sylhet	46,093	-	-	-	56,881	-	-	11,768	102,974	10,788	113,762
<i>Number of extreme poor affected (people lived under lower poverty line)</i>											
National	384,261	28,464	455,421	42,696	768,523	-	99,623	-	1,693,596	71,160	1,764,756
Barisal	25,256	8,147	8,147	25,256	8,147	-	-	-	42,364	33,403	75,767
Chittagong	39,311	-	14,040	-	50,542	-	14,040	-	101,084	-	101,084
Dhaka	42,056	-	266,355	-	14,019	-	93,458	-	411,215	-	411,215
Khulna	155,630	-	51,358	9,338	68,477	-	-	-	277,021	9,338	286,359
Rajshahi	-	10,997	58,653	-	10,997	-	-	-	69,650	10,998	80,648
Rangpur	36,030	-	-	-	-	-	-	-	686,127	-	686,127
Sylhet	34,325	-	-	-	46,093	-	-	-	79,437	-	79,437

<sup>16</sup> Estimated on the basis of the Population Census 2011.

<sup>17</sup> Source: (Awal, 2015, p. 90).

## Annex 2: Subjective Assessment of Individual Resilience

The UPPR is based on the theory of change that that the urban poor are best placed to judge their own needs and to identify who is most in need of support. It is in keeping with this to therefore make use of an approach that is based on the grounds that people have a good understanding of the factors that contribute to their ability to anticipate, buffer and adapt to disturbance and change. Subjective household resilience, therefore, relates to an individual's cognitive and affective self-evaluation of their household's capabilities and capacities in responding to risk.

### Purpose

The purpose of the questionnaire was to elicit information concerning household subjective assessment of personal resilience.

### Method

A self-administered survey instrument was completed by 47 individuals in all of the four pilot towns. The individuals were not randomly selected – they were executive members of the CDC Federations or CDHF structures. 46 were female and 1 male. Before completing the survey questionnaire, it was explained to each respondent that their participation in the survey was entirely voluntarily, that the information provided would be used in aggregated form and only for the purposes of the current assignment. The information provided could not and would not be associated with a particular individual. Each respondent signed that they acknowledged this and were willing to voluntarily participate in the survey.

There were a number of limitations to the methodology:

1. Respondents were not randomly selected and may represent individuals with a higher than average awareness of climate and disaster risks in their communities.
2. Time did not permit for a 'mock run' on the questionnaire to iron out misunderstandings – questions concerning the number of times that an extreme weather event had been experienced was in the case of the first city (Sirajgonj) replied as merely "Yes" or "No".
3. The questionnaires were in English – time did not permit for a written and accurate translation into Bangla. Therefore a facilitator (well experienced UPPR staff member) facilitated the individuals to complete the forms by providing a verbal translation of each question and subsequently translating the Bangla written replies into English.
4. The respondents sat together in a room after the earlier focus and completed the



individual questionnaires. As such, there may have been some collaboration on the answers.

However, within these limitations, the replies submitted do provide additional insights into some of the issues emerging from the focus group discussions and semi-structured interviews with experts.

## Key findings

### 1. Build quality of house to risks faced

Row Labels	Sum of Hvy fld	Sum of Fld
<b>Chittagong</b>	<b>1</b>	<b>1</b>
Brick	1	0
Mud	0	1
(blank)	0	0
<b>Comilla</b>	<b>0</b>	<b>37</b>
Brick	0	31
Tin	0	6
<b>Rajshahi</b>	<b>46</b>	<b>27</b>
Brick	46	27
Tin	0	0
<b>Sirajgonj</b>	<b>7</b>	<b>4</b>
Brick	3	1
Tin	4	3
<b>Grand Total</b>	<b>54</b>	<b>69</b>

Row Labels	Sum of V strg wind
<b>Chittagong</b>	<b>33</b>
Thatch	7
Tin	21
(blank)	5
<b>Comilla</b>	<b>6</b>
Brick	4
Tin	2
(blank)	
<b>Rajshahi</b>	<b>39</b>
Brick	5
RCC	17
Tin	13
(blank)	4
<b>Sirajgonj</b>	<b>2</b>
RCC	0
Tin	2
<b>Grand Total</b>	<b>80</b>

## 2. Method of house construction to risks faced

Row Labels	Count of Builder assist	Count of Cont ractor	Count of Fndtn mats	Sum of Hvy fld	Sum of Fld	Sum of Earth shkg
Chittagong	11	1	13	1	1	45
Comilla	2		2	0	8	3
Rajshahi	3	6	12	46	27	61
Sirajgonj	8	1	11	7	4	8
<b>Grand Total</b>	<b>24</b>	<b>8</b>	<b>38</b>	<b>54</b>	<b>40</b>	<b>117</b>

Row Labels	Sum of V strg wind	Count of Builder assist	Count of Cont ractor
<b>Chittagong</b>	<b>33</b>	<b>11</b>	<b>1</b>
Thatch	7	3	
Tin	21	7	1
(blank)	5	1	
<b>Comilla</b>	<b>6</b>	<b>2</b>	
Brick	4	1	
Tin	2	1	
(blank)			
<b>Rajshahi</b>	<b>39</b>	<b>3</b>	<b>6</b>
Brick	5	1	
RCC	17	1	3
Tin	13	1	3
(blank)	4		
<b>Sirajgonj</b>	<b>2</b>	<b>8</b>	<b>1</b>
RCC	0	1	1
Tin	2	7	
<b>Grand Total</b>	<b>80</b>	<b>24</b>	<b>8</b>

### 3. Resilience coping capacity<sup>18</sup>

(My hhd could cope)

### 4. Resilience adaptive capacity

(My hhd would adapt even if have to change)

### 5. Resilience financial capital

(financial resources?)

### 6. Resilience social capital

(family and friends)

<sup>18</sup> The survey questions relating to household resilience (key findings 3-7) were sourced from (Jones & Tanner, 2015, p. 15).

## 7. Resilience knowledge and information

Row Labels	Average of Can cope	Average of Can adapt	Average of Frnds spt	Average of Lsns learnt
Chittagong	#DIV/0!	1	4	7
Comilla	1	3.25	1.75	1
Rajshahi	4.67	1	2.83	1
Sirajgonj	6.4	7	1	1
(blank)				
<b>Grand Total</b>	<b>4.38</b>	<b>2.14</b>	<b>2.52</b>	<b>1.48</b>

## 8. Unimportance of early warning systems

Row Labels	Count of DR trg locn	Count of DR trg how	Count of DR msg	Count of DR where	Count of DR drill	Average of EWS effectv
Chittagong						6.57
Comilla		1	1	1	1	1
Rajshahi						1
Sirajgonj	11	11	11	11	11	1
<b>Grand Total</b>	<b>11</b>	<b>12</b>	<b>12</b>	<b>12</b>	<b>12</b>	<b>3.228571429</b>

# Annex 3: Targeted Messages for Small Builders

Visual Training Leaflets for Low Cost Shelter Improvements to withstand strong winds -



International Federation of Red Cross and Red Crescent Societies

## KEY PRINCIPLES SHELTER CONSTRUCTION

1.

Bonem smol botom end blong post we bai yu putum i go long graon 1 mita olsem

Perem stone bottom blong hol wetem graon mo.

Filimap hole gud mo ramem gud la strong.

2.

Yu save joinem timba wetem nail o bolt.

Yu save katem post mo fixm wetem wan metal strap.

Glo holem taet timba wetem post u save usum rope blong fasem taet

3.

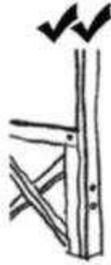
Bracem taet tufala post wetem 2 timba olsem.

Leta X mo nilim taet i go long post.

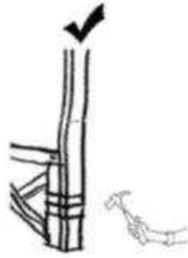
\* Stret ples blong yu buildm haus: no mas buildm haus closap long solwota o closap long hill/clif werston i save roll i kam daon



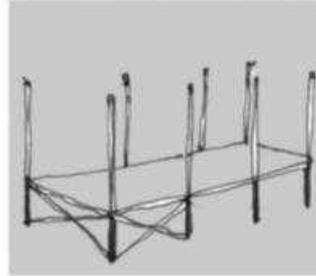
4.



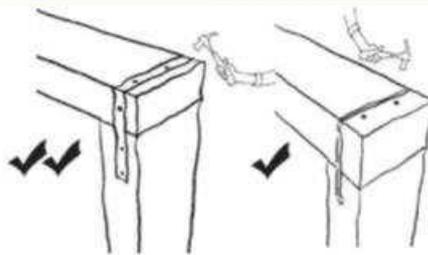
Nilim timba blong sapot wetem nil mo strapem wetem iron strap.



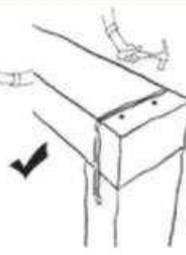
O fasem taet wetem rope.



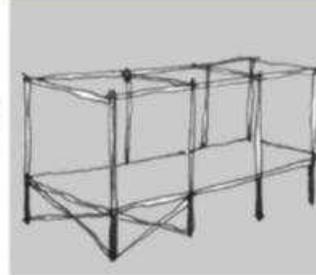
5.



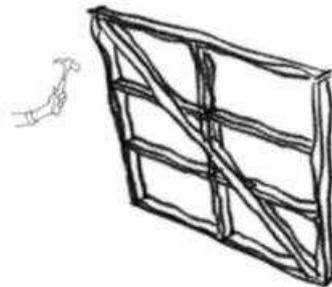
Fasem taet gud join blong timba wetem wan iron strap.



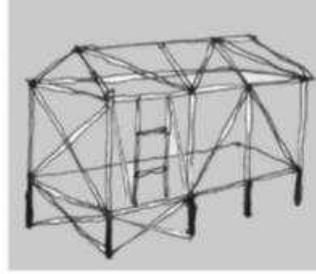
O fasem taet wetem rope.



6.



Nilim taet ol cros brace blo wol mo ruf i go long ol supot post mo post.



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