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Poverty and climate change in urban Bangladesh (CLIMURB): an analytical framework

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Abstract

Around 40 percent of Bangladesh's population are poor people for whom a variable and unpredictable climate can critically restrict livelihood options. This is true in rural and urban areas alike, but this study focuses on the latter. Urban poverty continues to be neglected in research, policy and action for climate change adaptation in the country. The study builds on three propositions: (i) poor urban communities are places where physical and socio-economic vulnerability coincide; (ii) urban areas are exposed to three forms of climate change impact: rapid-onset events, gradual-onset processes, and cascade effects; and (iii) poor urban people are already adapting to emergent climate change impacts by actively developing various practices. The analytical framework places a strong emphasis on poor people's adaptation practices in order to understand their agency, cultural resources and economic strategies and the structural factors that both support and constrain their agency. The practices are examined in terms of three key elements: the socio-economic resources of poor urban households and communities; institutions and political economy; and external actors and resources. Six low-income settlements have been chosen for case studies from three cities – Dhaka, Chittagong and Khulna. Data collection involves: mini-surveys; qualitative methods; dialogues with local academics, policymakers and civil society groups; and action research. Key analytical findings include the identification and analysis of existing practices under five broad themes (e.g. livelihoods, built environment, networks, institutions, and external supports).

Keywords: adaptation practice, Bangladesh, climate change, institutions, low-income urban settlements, political economy, poor urban communities, urban poverty

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1. Introduction

Two recent reports confirm that Bangladesh is at high levels of risk and vulnerability to severe climate events. The Germanwatch Long-Term Climate Risk Index (CRI) 2011 has identified Bangladesh as the country most affected by extreme climate events during 1990-2009 (Harmeling, 2010). Similarly, a WWF (2009) report finds that, amongst 11 Asian coastal mega-cities, Dhaka is the most vulnerable to climate change impacts. The report ranks Dhaka as having the lowest adaptive capacity, second highest exposure and second highest sensitivity. In effect, these reports offer a glimpse of what Bangladesh will face if global climate change follows current trends. Many of the projected impacts of climate change will reinforce the high baseline environmental, socio-economic and demographic stresses (Huq and Ayers, 2008; Khatun and Islam, 2010). Over the past decade, the national government has shown an increasing level of awareness to the importance of climate change, as well as to the country's historical sensitivity to climate variability in general, and there are several policy responses that relate to climate change. However, a review of policy, research and action with reference to climate change adaptation and poverty in the country reveals a general neglect of urban poverty and a bias towards rural and agricultural issues (Banks et al., 2011).

This reflects a lack of awareness amongst policy makers of the growing levels of urban poverty in the country – particularly to the fact that the tipping point at which Bangladesh's poor population becomes predominantly urban is likely to occur within this generation. It also reflects a lack of understanding of how even small shocks can damage the livelihoods of poor urban households and undermine national development prospects. For example, poor urban people have few assets to deploy to cushion themselves from negative impacts, and they lack access to formal risk-reduction mechanisms (Christoplos et al., 2009). A series of small shocks can often accumulate to trigger a collapse in household viability, with disastrous consequences for household members. This in turn may relate to broader economic and social processes that might have broken the inter-generational transmission of poverty. The Bangladesh Climate Change Strategy and Action Plan (GoB, 2009) acknowledges the impact of climate change on urban areas. But it does not spell out what needs to be done for poor urban people.

In addressing these knowledge gaps, the Economic and Social Research Council (ESRC) and the UK Department for International Development (DFID) have jointly funded a research project on '*Community and Institutional Responses to the Challenges Facing Poor Urban People in Bangladesh in an Era of Global Warming*'. It seeks to create policy relevant knowledge about how climate change impacts on the livelihoods and living conditions of poor urban people and communities in Bangladesh. It is a core project under the '*Poverty and Climate Change in Urban Bangladesh (CLIMURB)*' programme, led by the University of Manchester in collaboration with BRAC University, Dhaka. It will look closely at how the urban poor are adapting to increased vulnerability and at the ways in which public institutions and market forces help and/or hinder their strategies. It has four objectives:

1. To examine the key challenges facing poor urban people in Bangladesh and understand how these challenges are compounded by climate change.
2. To investigate current adaptive practices by individuals and communities to build, protect and maintain their livelihoods in the face of these challenges.
3. To examine the institutional structures which mediate the urban poor's livelihood practices, and assess their comparability across a selection of urban contexts.
4. To provide policy-relevant findings that help public, private and non-profit agencies contribute more effectively to support the urban poor, particularly with adaptation to climate change.

This paper presents the analytical framework for the study. It includes a brief discussion of the background concepts, a detailed presentation of the analytical framework and its theoretical underpinning, the methodology, and a conclusion.

2. Key background concepts

2.1 Urban poverty

There are two distinct approaches to understanding poverty, focusing on whether poverty is defined in absolute or relative terms. Urban poverty appears to be best understood through the relative perspective, but the absolute measure of poverty dominates the official and formal practices of poverty assessment and monitoring.

The absolute measure of poverty uses levels of consumption as a basis for classifying people (or households) as being poor or non-poor (a headcount measure). There are various methods of defining the consumption levels – in Bangladesh, for example, the Cost of Basic Needs approach is used to define poverty lines. This utilises a fixed food bundle, consisting of 11 key items based on a concept of 'minimum nutritional intake'. Food poverty lines are computed by pricing this bundle using the average price of each item for each of Bangladesh's 15 geographic areas (BBS, 2006). A number of critics, notably Satterthwaite (2004), Baud et al. (2008) and Bapat (2009), have argued that the absolute measure produces underestimations of poverty in urban areas. The main criticisms are:

- The national poverty lines do not reflect the costs of basic necessities in urban areas. Low-income urban households must meet all of their food costs, high monthly rent and transport costs, as well as the high costs of water and electricity, and health and education costs.
- Poverty lines do not capture the (lack of) assets that households have, which reduces their vulnerability in the long run. If consumption is steady, but assets are being depleted, then a household's vulnerability to future poverty is increasing.
- The health situation of family members can be an asset or a liability (when labour is directed to the care economy and ill family members cannot work).
- Spatial segregation and social exclusion among poor households are not covered in such approaches, despite the fact that they reduce household access to important state- and/or community-provided resources.

The relative approach, in contrast, assesses poverty in relational terms. It recognises that access to a variety of assets makes a household capable of producing wellbeing for its

members, or a lack of assets prevents them from doing so (Baud et al., 2008). These capabilities represent the set of alternative commodity bundles that the household can command in a society, using the totality of its rights and opportunities (Sen, 1999). They constitute various 'endowments' that people need to realise their full set of 'freedoms' as human beings. Mitlin and Satterthwaite (2004) observe that it is the lack of endowments of various kinds that characterises urban poverty. They identify multiple sources of deprivation that poor urban households experience and which hinder their efforts to obtain higher levels of wellbeing:

- Inadequate and unstable incomes;
- Inadequate, unstable or risky asset bases (e.g. lack of housing);
- Inadequate provision of public infrastructure (e.g. piped water, sanitation, drainage, roads and footpaths);
- Inadequate provision of basic services (e.g. health and education);
- Limited safety-nets for those unable to pay for services;
- Lack of access to natural capital (i.e. ownership of land, physical resources or water rights);
- Inadequate protection of poorer groups' rights through laws and other means;
- Powerlessness of poorer groups within political and bureaucratic systems.

Undoubtedly, such deprivation-based definitions of urban poverty touch on the conditions of poor urban communities experiencing multiple deprivations. But the understanding remains incomplete until we recognise that poor urban households and their members are actors in their own rights, not just passive victims. Indeed, when we view the poor as marginalised, powerless and hopeless, it is hard to imagine effective policy. But, if we analyse poor people's innovations and strategies for survival, we can see how development actions can support their personal and collective agency.

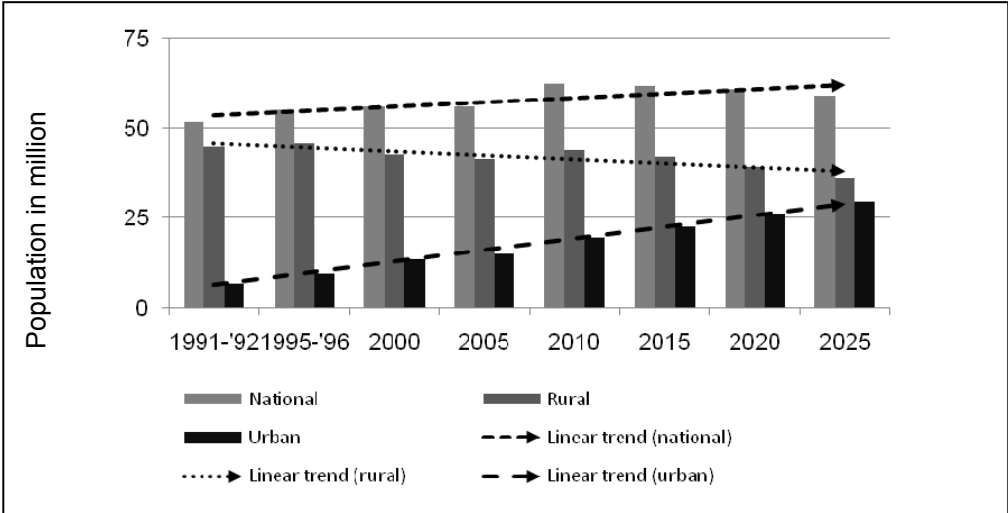
Thus we posit that poor urban people are innovative, diverse individuals, with their own agency, cultural resources and economic strategies. They constantly seek to improve their lives, sometimes individually and sometimes collectively. Collective actions often act as an enabler for individual actions, as poor urban communities must collectively negotiate major threats, such as eviction and access to basic services, to create space for individual actions. Thus the formation of, and belonging to, a collective identity or a network of friends, neighbours and families forms an essential platform on which poor urban people can mobilise their strategies to tackle problems and sources of deprivation.

Frequently, the physical manifestation of poor people's collective identity takes the form of a compact settlement cramped with poorly built shacks/huts. It is quite common for these settlements to illegally establish on government land, such as alongside railway lines or on embankments, and to be called slums or *bastees* (in Bengali). Recently, however, there has been a rise of poor settlements being constructed on private land due to scarcity of public land. The 4.3 percent annual growth rate of poor urban settlements (Chatterjee, 2010) has led to the emergence of a private rental market for poor urban people, controlled by urban elites. A survey found that in 2005 almost 90 percent of poor urban clusters in Dhaka were on private land, rising from 77 percent in 1996 (Angels et al., 2009). These settlements are usually named after their land-owners. Importantly, the growth trend of these settlements in Bangladesh is set to continue for some time. The number of poor people is rising in urban

areas, while it is decreasing in rural areas. And the tipping point at which the number of poor urban people will exceed the number of poor rural people is set to happen within this generation (Figure 1).

For our study, both forms of settlements (on government- and privately-owned land) are important. This is partly because both forms of settlements are common in Bangladesh’s cities and towns. But it is also because different forms of vulnerabilities and coping strategies take hold in different types of settlement. In accommodating the two types of settlements, we use the terms ‘poor urban communities’ and ‘low income urban settlements’, rather than slums. The negative inference of the term ‘slum’ makes it an inappropriate characterisation of the dynamic and innovative communities we are studying.

Figure 1: Population below the poverty line (by DCI method, absolute number)



Note: The 2010 to 2025 data have been projected based on BBS-HIES reported data from 1991 to 2005. Population data have been obtained from United Nations Population Division (Eusuf, 2010).

2.2 Vulnerability

Vulnerability is the degree to which a system or unit is likely to experience harm due to exposure to perturbations or stresses. It relates to the central concern in this research – how weather events and climate variability and change impact on poor urban people and communities in Bangladesh. Following Sherbinin et al. (2007), vulnerability is identified in terms of three elements: (i) system exposure to crises, stresses and shocks; (ii) system capacity (or lack of capacity) to cope; and (iii) consequences and attendant risks of slow (or poor) system recovery. This perspective suggests that the most vulnerable individuals, groups, classes and regions or places are those that: (a) are most exposed to perturbations or stresses; (b) are most sensitive to perturbations and stresses (i.e. most likely to suffer from exposure); and (c) have the weakest capacity to respond and ability to recover. This

conceptualisation of vulnerability helps us to identify two main reasons for increased vulnerability of poor urban communities to weather events and climate variability and change in Bangladesh.

- *First, drivers of urban change*: as Bicknell et al. (2009) note, the drivers of urbanisation and other aspects of urban change are some of the key factors behind increased vulnerability of poor urban communities to climate variability and change. In low-income countries like Bangladesh, urbanisation is overwhelmingly the result of people moving in response to better economic opportunities in the urban areas, to the lack of prospects in their home farms or villages, or both. It is recognised that climate variability and change will accelerate the process of urbanisation by displacing a greater number of poor rural households at a faster rate. Renner (2008) estimates that climate change will displace between 12 and 15 million people in Bangladesh by the turn of this century. The urban government structure in the country is usually unable/ unwilling to address issues in the existing poor urban communities (Banks et al., 2011), let alone developing in step with the process of urban change. So, much of the physical growth and economic expansion involving poor urban people takes place outside any official rules and regulations and in particularly vulnerable locations, e.g. floodplains. In addition to that, poor urban households are also more exposed to different process of globalisation and have access to increased knowledge – but such knowledge is often incomplete (Mendoza and Thelen, 2008). Also, residential and economic segregation based on income, access to resources, and facilities like good quality drainage and sewage disposal and shelter, contribute to creating inequalities and separate realities for poor urban people. This is reflected in every aspects of urban life, including flood risks and vulnerability to losses from weather events.
- *Second, coincidence of dual vulnerability*: poor urban communities are places where physical (spatial and external) and social (internal) vulnerability coincide (Simon, 2008). Physical vulnerability refers to those locations that are most likely to be affected by an extreme event, e.g. seashores to tidal waves, floodplains to floods, and steep slopes to landslides. It relates to the external dimension of vulnerability, and comprises the potential damage caused by external shocks or trends. Social vulnerability, in contrast, refers to the internal dimensions, namely household and community resources, institutions and relationships, and relates to how these are affected by external shocks/ trends and in turn how people deal with them (Duarte et al., 2007). As in most developing countries, poor urban people in Bangladesh generally live in vulnerable locations, where shelter is cheaper, or on vacant land available for illegal/informal occupancy. At the same time, they have high social vulnerability by virtue of poverty. The coincidence of vulnerable places and vulnerable people is a major concern in poor urban communities (e.g. Douglas et al 2008).

It is important to note that urban poverty and vulnerability do not coincide in the same way in all cases. Coetzee (2002) argues that people experiencing vulnerability are not necessarily poor. Amongst poor urban people there are varying levels and patterns of vulnerability, depending on the multitude of dynamic processes through which individuals and households

respond to changes in the environment, adopt and adjust strategies, and reconfigure their relative well-being. Hulme (2009) argues that people are vulnerable to climate change because they are poor; they are not poor because of climate change. Thus climate change brings an additional layer of stress for poor people. This suggests that both poverty reduction and vulnerability reduction measures should go side-by-side.

But these two objectives are not the same, although there are some common areas between them. Poverty reduction measures involve responses that range from promoting economic growth to increasing institutional capacity, securing livelihoods, empowering the poor and increasing freedom (Sen, 1999). Vulnerability reduction measures, on the other hand, may include responses that reduce biophysical risks, as well as addressing social and environmental factors that influence wellbeing and people's active strategies to secure this in the face of weather events and climate variability and change. In order to simultaneously address both vulnerability and urban poverty through policy responses and interventions, it is necessary to identify those measures that target the overlap between vulnerability and urban poverty. Eriksen and O'Brien (2007) identify three such ways:

1. Reducing risks to current ways of securing wellbeing resulting from climate stresses. This means, for example, reducing risks to people's livelihoods, and household and community resources, such as dwellings and civic facilities.
2. Strengthening the adaptation strategies of poor people in the face of climate stresses. This includes, for example, finding ways to support people's livelihood diversification, structural adjustments to the built environment and consolidation of support networks.
3. Addressing the causes of vulnerability, or specific factors and conditions that make poor people vulnerable to climate stresses, or which can push people into destitution. This includes strategies to reduce physical and social vulnerability.

These three ways refer to three broad areas, namely: people's livelihood practices (i.e. what people do to earn a living and how they live); how people adapt these practices (i.e. what people do to ensure that they can earn a living and manage to live in the face of extreme weather events and climate variability and change); and the broader structural and political processes that shape where and how people live (i.e. factors influencing their location choice and agency and structural characteristics).

2.3 Climate change impacts

There is a strong consensus within the scientific community that the global climate is changing. Some notable points of consensus include: warming of the climate system is unequivocal (IPCC, 2007); ignoring climate change will eventually damage economic growth, while the benefits of strong, early action considerably outweigh the costs (Stern, 2006). At the same time, there is still considerable uncertainty about the rates of change that can be expected (Karl and Trenberth, 2003). The process of climate change projections is inherently uncertain and the level of accuracy of climate models decreases as we move from the global to the national or city levels.

Another notable aspect of the climate change debate is how popular discourse distinguishes between climate and weather. As Hulme (2009) notes, the discourse moves between talk of 'climate' and talk of 'weather', depending on the relationship with the present. We can only assess 'weather' for the next few days or for the past few centuries. The further back in time we look, the more our reconstructions of the past rely upon notions of climate, rather than weather, and this process of understanding requires specialised knowledge. For the general public and politicians, it is the short-term and medium-range weather forecast that is more important and comprehensible. Our discussion of climate change adaptation in poor urban contexts, therefore, needs to focus more on weather events and climate variability than on long-term climate change.

It is nonetheless clear that changes in the global climate will be increasingly manifested in important and tangible ways, such as changes in extremes of temperature and precipitation; decreases in seasonal and perennial snow and ice extent; and sea level rise. The effect will be felt differently in different locations, and a particular concern is that extreme weather events will become more frequent, untimely and severe. Unfortunately, this is exactly what appears to have been happening in Bangladesh, especially during the last decade. Two devastating cyclones – Sydr (2007) and Aila (2009) – hit the country within a time span of two years, breaking all predictable patterns. Indeed, due to climate change Bangladesh is likely to face the following consequences (Huq and Ayers, 2008):

- Increased flooding, both in terms of extent and frequency, associated with sea level rise, greater monsoon precipitation and increased glacial melt;
- Increased vulnerability to cyclone and storm surges;
- Increased moisture stress during dry periods, leading to increased drought;
- Increased salinity intrusion; and
- Greater temperature extremes.

What is less clear, in analytical terms, is how these impacts relate to the urban poor. All too often this relationship is misunderstood as being little different from, or indeed merely a variety of, natural disasters (Simon, 2008). This is reflected in the way the disasters management community, political leaders, civil servants, charities and other actors respond to extreme weather events such as cyclones. Following rescue operations of perhaps a week's duration, the response shifts to reconstruction – with an emphasis on mitigation to reduce vulnerability to future occurrences – and, perhaps, special assistance to the most vulnerable affectees.

A disaster risk management approach ignores two important dimensions of climate change impacts. First, it ignores the gradual changes in climate variability and the consequent 'piggy-backing' effect on patterns of extreme and severe weather events. Second, it also ignores many unexpected, hard-to-notice subtle changes in the affected systems as a consequence of both weather events and gradual changes in climate variability. The second forms of impacts are particularly important for poor urban communities. For example, poor urban people usually work as day labourers and lack productive capital, which makes them least able to distribute risk across asset classes and across time. We therefore posit that the

impacts of climate change on poor urban households and communities need to be divided into three forms (IoM, 2010):

- I. **Sudden-onset events**, such as floods, cyclones and catastrophic river erosion. Large areas of Bangladesh, including numerous cities and towns, are and will be highly vulnerable to the threat of sudden-onset events for the foreseeable future, and climate change may well aggravate the situation. The most recent examples of such events include cyclones *Sydr* and *Aila*, which have driven tens of thousands of people into urban areas.
- II. **Slow-onset processes**, such as coastal erosion, sea-level rise, salt water intrusion, rising temperature, changing rainfall patterns and drought. Many cities and towns of Bangladesh are exposed to slow-onset processes. For example, according to IPCC (2007) a one-metre rise in sea level will inundate 20 percent of Bangladesh land mass, which includes urban areas of various sizes.
- III. **Cascade effect** (a chain of events due to an act affecting a system), such as environmental degradation, increased urbanisation, reduced human security and international migration. For example, as noted above, climate change will displace an estimated 12 to 15 million people in Bangladesh by the turn of this century. Most of them will be poor people from rural areas heading for urban areas, putting additional stress on the low levels of facilities in existing low-income settlements and on the capacity of their providers.

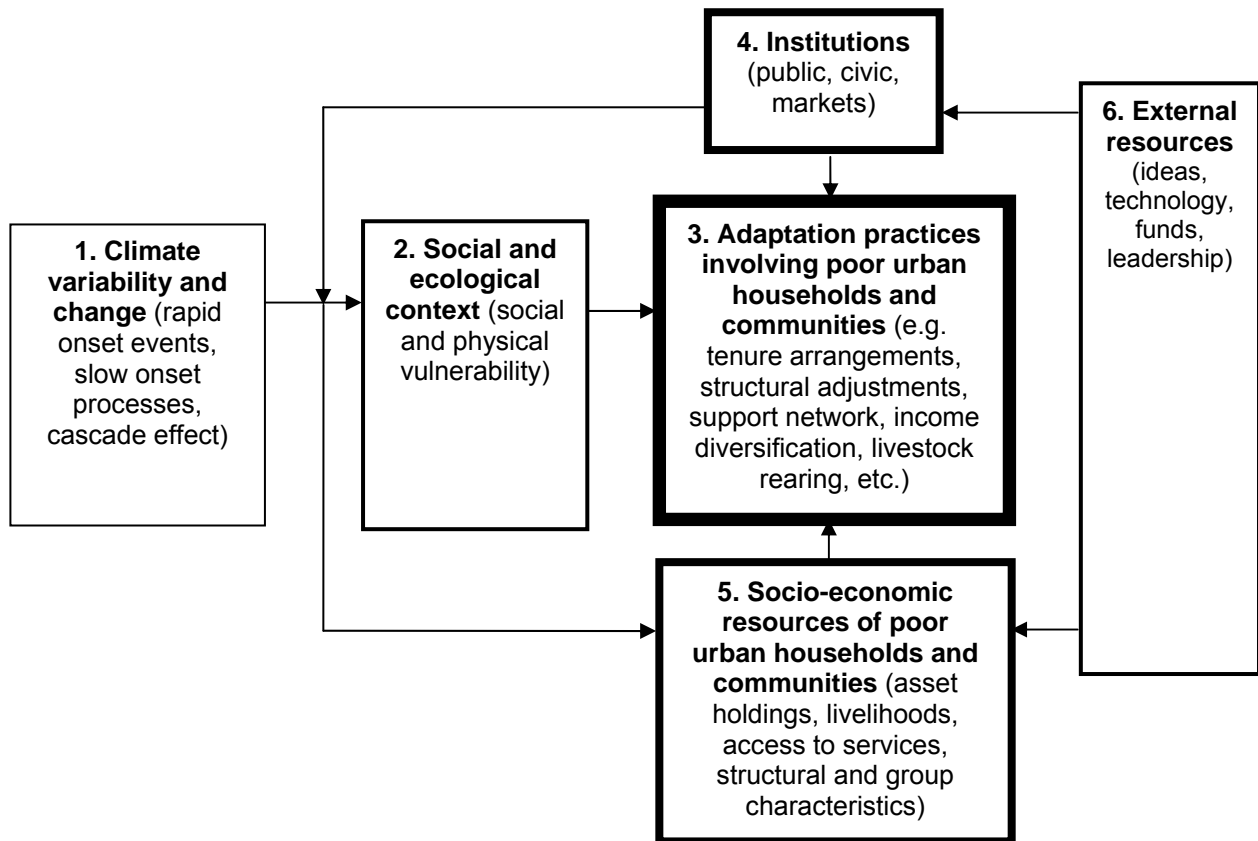
It is important to recognise that sudden-onset events may cause affected populations to leave their homes (at least temporarily), often leading to sudden, large-scale movements of people into urban areas. Poor urban people find it harder to manage these sudden impacts, as this puts serious pressure on their livelihood practices. Relocation is often associated with additional costs, as well as loss of assets. At the same time, they are forced to put their earnings on hold and may find it difficult to return to the same employment. In the case of gradual-onset processes and cascade effects, a larger number of people are expected to migrate to urban areas, creating additional pressure on existing settlements. Some poor urban communities that are impacted directly by these processes may face permanent displacement due to the long-lasting – and in some cases irreversible – effects of the processes.

3. Analytical framework

Our framework incorporates a number of key elements that facilitate and/or hinder access to, and influence over, resources, decision-making and actions on climate change adaptation of the urban poor (Figure 2). A strong emphasis is placed on the existing adaptation practices of poor urban households and communities, to examine how these practices have been shaped. This reflects our positioning of poor urban people as innovative individuals, whose abilities, preferences, aspirations and struggles are reflected in the practices that they develop. We acknowledge the importance of the broader process of climate variability and change and the specific social and ecological context to understand why certain practices emerge (Boxes 1 and 2, Figure 2). But we are more concerned with how the practices (Box 3) have taken hold, so we prioritise three contributing elements, namely: socio-economic

resources of poor urban households and communities; institutions; and external resources (Boxes 4, 5 and 6).

Figure 2: Dimensions of adaptation practices



Source: Authors' adaptation of Agrawal (2010). Note: more box thickness means higher research priority.

3.1 Adaptation practice

Poor people have to try to adapt to existing environmental problems. There is growing recognition that poor people are already, consciously and/or unconsciously, adapting to climate change impacts, both in physical and behavioural terms. For instance, Chatterjee (2010) documented how low-income households in Mumbai have made both temporary and permanent adaptations to flooding. Some of these practices relate to built environment adjustments; Lehmann (2008) describes these as passive and basic building design practices. Others, such as seasonal/ permanent migration, relate to adjustments in lifestyle as an act of adaptation practice (McLeman and Smith, 2008; IOM, 2010).

Because the adaptation practices of poor urban people are (i) rarely reflected in the formal mechanisms for poverty reduction and climate adaptation, and (ii) context specific, it is often difficult for policy makers, professionals and practitioners to understand or prescribe what works for the poor. As Scott (1998) argues in *Seeing like a State*, most formal state-

sponsored urban development is unable to resist the temptation to regard the apparent unplanned nature of poor communities as in need of re-organisation, leading to policy attempts to regularise design and planning processes. But, as Scott argues, the successful social organisation of community design depends upon the recognition that local, practical knowledge is as important as formal, epistemic knowledge.

Following this view, the alternative perspective taken here is that it is precisely the pragmatism (Guy, 2010a) and fluidity (Guy, 2010b) of the adaptation practices of poor people that deserves close attention and appreciative analysis. This approach resonates with the work of Agrawal (2010), which advocates governments and other actors to understand, take advantage of, and strengthen already existing practices that poor households and groups use individually or collectively (Agrawal, 2010). The construction of specific adaptation practices, however, is dependent on the social and economic resources of households and communities, as well as their ecological location, networks of social and institutional relationships, and institutional access. Understanding these practices thus requires examination of more than just poor peoples' individual and collective characteristics, resources and strategies. It also requires examination of the broader aspects of the political economy, including urban governance structures, the socio-ecological settings and sources of external supports.

Recent studies of adaptation have classified adaptation practices into a variety of categories (Table 1). Although these classifications are useful, they are not readily applicable to all forms of adaptation practices of poor urban communities. For example, the classifications of Smithers and Smit (1997) and Pelling and High (2005) are not directly related to the basic types of risks that climate hazards pose for poor communities (Section 2.3). Agrawal's (2010) approach is relevant for examining how climate-related risks affect livelihood capabilities over time, across space, across asset classes and across households. But the approach is developed with reference to rural contexts only. Chatterjee's (2010) classification has emerged from the example of slums in Mumbai – highly relevant for our research. But the study focuses only on one type of shock: slum-dwellers' response to flooding events. Finally, Moser et al. (2010) focus exclusively on asset-based adaptation at three levels: households; small business; and collectives. Critics have pointed out that the different asset effects are overlapping, that welfare relates to asset returns, rather than to the assets themselves, and that the approach cannot rank situations where some assets improve while others deteriorate (Grieg-Gran et al., 2005).

Thus, the significance of adaptation practice as the starting point to examine how weather events and climate variability impact on poor urban communities is well established. But it is not yet clear how best to undertake such an examination. Building on the aforementioned approaches, our analytical framework attempts to offer some important contributions to this emerging field of study (Section 3.5).

Table 1: Selected examples of adaptation practice categorisation

Source	Category of adaptation practices
Smithers and Smit (1997)	<p><i>Timing</i> – incidental versus purposeful adaptation practices.</p> <p><i>Duration</i> – short-term adjustments versus permanent adaptation; tactical versus strategic adjustments.</p> <p><i>Form</i> – technological, behavioural and/or institutional.</p> <p><i>Effect</i> – buffering a system from climate perturbation (enhancing stability) versus attempting to facilitate a shift or evolution to a new state (enhancing resilience or flexibility).</p>
Pelling and High (2005)	<p><i>Learning to learn (deutero-learning)</i> – learning to operate with ongoing adaptation.</p> <p><i>Learning from experience (single/double/triple loop learning)</i> – reflecting on the merits of improving what is being done or doing something new.</p> <p><i>Managing resources</i> – to improve adaptive capacity.</p> <p><i>Institutional modification</i> – attempts to change the social context, for example by realigning their connections of social capital or by challenging or supporting particular institutions. This can also include lobbying on behalf of a policy coalition.</p> <p><i>Individual action on the environment</i> – material adaptations.</p> <p><i>Collective action on the environment</i> – group reappraisal of past actions, reflection on the use of resources, and changing institutions (but these are not expanded on in this figure, where the focus is on the experience of an individual acting within an organisation).</p>
Agrawal (2010)	<p><i>Mobility</i> – the distribution of risk across space.</p> <p><i>Storage</i> – the distribution of risk across time.</p> <p><i>Diversification</i> – the distribution of risk across asset classes.</p> <p><i>Communal pooling</i> – the distribution of risk across households.</p> <p><i>Market exchange</i> – the purchase and sale of risk via contracts, which may substitute for any of the other four categories when households have access to markets.</p>
Chatterjee (2010)	<p><i>Structural adjustments</i> – these include physical structural mechanisms to raise the building to stabilise the process of sinking, to live with this risk and minimise losses.</p> <p><i>Support network after the event</i> – refers to a household’s ability to access resources from multiple sources (e.g. government, non-government, private and local agencies) simultaneously during relief and recovery phase.</p> <p><i>Long-term recovery and network of loss redistribution</i> – how slum dwellers diversify loss redistribution system to recover and reconstruct after flood loss.</p> <p><i>Network for diverse slum communities</i> – socio-cultural characteristics that render households more or less vulnerable during, immediately after and at recovery stages.</p>

Source	Category of adaptation practices
	<p><i>Variety in support network</i> – support network needs to be of different kinds (not limited to distribution of relief material and economic assistance. Such networks could also be designed to provide physical, informational, and legal assistance to slum households to reduce risks and overcome losses).</p> <p><i>Consolidation of existing networks</i> – how poor urban people secure networks that are already informally in place and operating successfully.</p>
Moser et al. (2010)	<p><i>Household level adaptation</i> – adapting household to the most important asset, protecting human capital, and mobilisation of urban and rural networks.</p> <p><i>Adaptation by small business</i> – maintaining stock, protecting produce by covering it with plastic, or storing it in containers; reduction of range of perishable goods on offer; buying extra stock to profit from scarcity (if having greater liquidity) or reducing stock (if limited liquidity).</p> <p><i>Collective adaptation</i> – maintenance of wells; house sharing; structural adjustments to houses; taking children to safer places (as a form of rescue); strengthening civic buildings, such as schools.</p>

3.2 Institutions

Institutions are broadly defined here; encompassing both formal institutions (e.g. municipal authorities and NGOs) and informal institutions (e.g. community-based organisations and cultural norms and values). We will look at how different forms of institution interact and influence each other within a political economy. The political economy approach enables us to view the vulnerability of any group in terms of the availability of resources and, crucially, by the entitlement and reactive claims of individuals and groups to access and use these resources (Reilly, 1996). For example, the government and the affluent elite usually deny poor urban people access to resources by constructing them as ‘liminal citizens’,¹ or a transitional group. This is particularly important in urban areas in Bangladesh, where a small but powerful elite group controls and competes for urban land (driving poor people off their settlements) and the government ignores low-income and poor people in cities and towns. In reaction, poor urban people redefine their identities and incorporate strategies of survival, constructing a ‘shadow hegemony’² that defies the state (McKean, 2009). Here vulnerability is seen as a socially-constructed phenomenon influenced by institutional structures and economic dynamics. The socio-economic processes that determine vulnerability are manifest at the local, national, regional and global level. But the state of vulnerability itself is associated with specific populations in specific contexts (Adger and Kelly, 1999).

¹ Liminal citizenship is essentially non-citizenship. Poor urban people are believed to be dangerous criminals, who steal land and precious resources within the city; yet their cheap labour sustains the economy. These and other negative perceptions construct them outside the social order, placing them in an isolated liminal space (McKean, 2009).

² Shadow hegemony is a process of innovation – of reconfiguring poor urban people’s identity, maximising their resources and designing strategies of survival – in which the cultural productions and informal economic systems designed by poor people dominate. Often unintentionally or indirectly, these acts defy the state’s construction of the liminal citizenship. However, the shadow hegemony is not all-encompassing. Some state services cannot be reproduced by poor urban people, preventing them from fulfilling all of their needs (McKean, 2009).

3.3 Socio-economic resources

Our definition of the socio-economic resources of poor urban people and communities includes their assets and capabilities, knowledge and innovations, and leadership. A number of studies have highlighted the association of lack of capital (or assets) and capabilities with poverty in general (Bebbington 1999; Rakodi, 1999) and climate change adaptation of poor urban communities in particular (Moser et al., 2010; Moser and Satterthwaite, 2008). This builds on the argument that assets are closely linked to the concept of capabilities and the basis of agents' power to act to reproduce, challenge or change the rules that govern the control, use and transformation of resources. This approach follows the emergency relief literature in acknowledging that people are not just 'helpless victims', but have many resources, even at times of emergency, and that these should form the basis for responses. It highlights the uncertainty of future risk and with this an uncertainty concerning the bundle of assets that will promote effective adaptation and greater resilience. It also reveals how many assets and types of asset are needed to reduce vulnerability to a range of hazards.

Many writers have also pointed to the fact that poor urban people are innovators in their own right, which is evident in their application of knowledge and demonstration of leadership. Innovations refer to the adoption of an idea or behaviour (whether a system, policy, programme, device, process), or product or service, that is new to the adopting organisation (Damanpour, 1991). Historically the application of the theory of innovation has focused on the fields of agriculture and organisational change (Hernández-Mogollon, et al., 2010). But recently there has been a growing recognition of the importance of the concept in the adaptation literature. This is evident in the conceptualisation that the lives of poor urban people are purely determined by the natural environment or the powerful; within their communities, they have their own space to innovate (McKean, 2009). Chatterjee (2010) documents how low-income households in Mumbai have made both temporary and permanent adaptations to flooding. Similarly, Boonyabanha (2005) shows how local government worked innovatively with informal settlements in slums of Thailand to provide infrastructure and services and improve the quality of housing. In this context, Agrawal (2010), Watson (2009) and Tibaijuka (2004) have outlined several modes of institutional innovation in the fields of collaborative institutional arrangements for environmental action in the context of climate change, physical planning and security of tenure for poor urban people. At a more conceptual level, Shove (2010) argues that transition towards sustainability depends on societal innovation in which the status quo is called into question and in which less resource-intensive regimes, routines, forms of know-how, conventions, markets and expectations take root.

3.4 External resources

In contrast to the socio-economic resources which are internal to individual and networks of poor urban communities, external resources represent a range of national and/or international bodies and organisations which promote new ideas, funds and leaderships for the benefit of poor urban households and communities. These resources can be linked to both institutions and poor urban communities (Figure 2).

Internationally, climate change initiatives in developing countries such as Bangladesh are increasingly becoming attractive to donors. There is promise of adaptation funds being available for developing countries, although it is not yet clear how the process will work. Development assistance is also flowing into renewable energy projects and the Clean Development Mechanisms (CDM), which allows projects in developing countries to generate greenhouse gas reduction certificates, with over 1,500 projects submitted in only two years (Michaelowa and Michaelowa, 2007). At the organisational level, the activities of Slum/Shack Dwellers International (SDI) offer poor urban communities benefits from new ideas on how to secure tenure rights and basic services.

External resources can also derive from national level institutions and organisations. National governments may promote measures to provide support to poor urban communities through municipal governments. Local NGOs can access international funds in order to support grassroots level activities and organisations. Local research organisations can undertake research, thus generating new ideas to benefit both institutions and poor urban people. Popular local campaigns and support groups can emerge to promote awareness and disseminate new ideas.

Thus there is a real possibility for poor urban people and communities to benefit from external resources. In practice, however, these resources rarely reach the target beneficiaries, i.e. poor urban people. In our six case studies, we aim to explore which of these growing sources of external support reach poor urban people, and examine the prospects for programming external support so that it becomes more effective.

3.5 Framing analysis

The above aspects enable us to focus on four important aspects of adaptation:

- *First*, adaptation practices reflect poor people's individual and collective characteristics, resources and strategies. They offer a platform for external actors to understand what works for poor urban people and in poor urban communities.
- *Second*, the institutional and political economy concept addresses poor people's entitlement to call on resources and negotiate changes in access and use of resources. In urban areas this is commonly about access to land, housing provision and tenure security (Revi, 2008).
- *Thirdly*, the socio-economic resource dimension focuses on people's assets and capabilities as the basis for response, understanding assets as a complex and dynamic bundle of material, financial, human, natural and social assets. It also relates to people's knowledge-base, local knowhow and capacity for individual and social learning.
- *Fourthly*, external resources can help address new ideas, funds and leadership at the international and national levels and help them take root in individual communities and, perhaps, households.

Individually, these components are inadequate to present a holistic framework for understanding how climate change is impacting on the lives of poor urban people, the ways in which they are adapting and the actions they might take to reduce vulnerability and improve their prospects. Indeed, urban adaptation to climate change is the sum of all physical and organisational adjustments to urban life that is required to cope with changes in climate patterns (Bigio, 2003). A holistic framework needs to include an inadequate, unstable, or risky asset base; limited or no safety net; inadequate protection of poorer groups' rights through the operation of the law; and poorer groups' voicelessness and powerlessness within political systems and bureaucratic structures (Satterthwaite, 2004).

It is also important to recognise that with the threat of possible weather shock, poor people try to protect their limited assets by avoiding taking too much additional risk (Rosenzweig and Wolpin, 1993). If they have any doubt about the effectiveness of potential solutions in terms of their living conditions and livelihood choices, they would 'wait and see' (Ensor and Berger, 2009). This has led us to position existing adaptation practices that people and their organisations have already developed at the centre of our analytical framework. We examine these practices through the concepts discussed in earlier sections, in an effort to identify more effective policy to build on and enhance existing practices and introduce new practices.

As we have noted above, the existing literature does not offer a comprehensive categorisation of adaptation practices. We have therefore developed our own categorisation, building on the existing literature presented above (Table 2). This identifies five thematic areas – livelihoods, built environment, network, institutions and external support. Under each theme are a number of adaptation practices. We have also identified as many as ten criteria to evaluate the usefulness of the identified practices (see Annex A). We aim to develop a 'wagon wheel' for each adaptation practice, based on the ten criteria. In doing so, we will be able to identify areas of improvements for individual practice.

4. Methodology

4.1 Overall approach

This research focuses on selected low-income urban communities located in the three leading metropolitan cities of Bangladesh in terms of the size of poor urban population: Dhaka, Chittagong and Khulna (Table 3). Two low-income urban settlements from each city will be studied to contrast how different communities are adapting to the different risks that they face. This selection will be based on a set of criteria agreed by the research team following reconnaissance surveys of a number of candidate case study settlements. Selection is based on diversities in: socio-demographic profiles; presence of adaptive practices; levels of institutional co-operation; tenure and land ownership; and entrepreneurship. Such contrasts allow a comparative analysis in cross-vulnerability contexts of: livelihood challenges facing the urban poor (*Objective 1*); range of current adaptation practices (*Objective 2*); patterns of mediating institutional structures (*Objective 3*); and likelihood of influence of potential solutions (*Objective 4*). Ultimately this will allow us to produce policy-relevant knowledge (*overall aim*).

During fieldwork, the team will secure a representation of people from all levels of poverty and socio-demographic profiles within the case study settlements. We will meet with members of the local academic communities, policy makers and civil society representatives. Three main data collection techniques will be employed:

- I. Rapid survey and qualitative appraisal (mapping, problem listing and ranking, and adaptation practices identification) with the residents of selected zones within low-income settlements;
- II. Interviews with key informants and actors from residents of case study settlements, and relevant institutions, individuals and activists; and
- III. Dialogues with members of local academic communities, policy makers and civil society.

The residents of the selected low-income settlements will be stratified according to poverty level (Laderchi, et al., 2003), gender, age and socio-cultural groups. This will provide the basis for cluster sampling of residents during participatory and qualitative appraisals. The key informants are people who have been affected by the problems we explore, are willing to speak about their practice, willing to discuss what they have tried, how they had adapted, what they plan to do in future, and so on. The dialogues will focus on local- and subnational-level representation, so as to capture local concerns, practices and strategies. It aims at consensus building and diversity mapping, and involves dissemination and awareness raising as well as conventional data collection. During dialogue sessions we shall present our initial findings to communities and to key informants and receive feedback and additional evidence that will allow us to strengthen or revise our analysis.

Table 2: ClimUrb adaptation practice categorisation

Broad theme	Category of adaptation practices	Relevant level
Livelihoods	<p><i>Diversification</i> – e.g. multiple/seasonal employment and new activities.</p> <p><i>Mobility</i> – e.g. short-/long-term migration (with/without family).</p> <p><i>Skill building</i> – e.g. undertaking on-the-job training.</p> <p><i>Savings and investment</i> – e.g. in financial savings; human development.</p> <p><i>Access to basic services</i> – e.g. water; sanitation; health; shelter.</p> <p><i>Consumption smoothing</i> – e.g. variations in food intake during difficult periods.</p>	<p>Households</p> <p>Households</p> <p>Households/ community</p> <p>Households/ community</p> <p>Households/ community</p> <p>Households</p>
Built environment	<p><i>Design innovations</i> – e.g. new low-tech approaches to cooling and flood protection.</p> <p><i>Structural adjustments</i> – e.g. structural mechanisms to protect shacks/huts.</p> <p><i>Space utilisation</i> – e.g. patterns of utilisation of domestic/ common space.</p> <p><i>Communal pooling</i> – e.g. house sharing.</p> <p><i>Public spaces</i> – e.g. use of ‘green infrastructure’ for communal shade.</p>	<p>Households/ community</p> <p>Households/ community</p> <p>Households/ community</p> <p>Households/ community</p> <p>Households/ community</p>
Networks	<p><i>Relief and rescue</i> – e.g. access to multiple and diverse sources of relief and rescue efforts.</p> <p><i>Long-term recovery and loss redistribution</i> – e.g. loss redistribution systems (multiple and diverse) to recover and reconstruct.</p>	<p>Households/ community/ institutions</p> <p>Households/ community/ institutions</p>
Institutions	<p><i>Governance structure for access and management of civic facilities and basic services</i> – e.g. water and sanitation facilities.</p> <p><i>Governance structure for access to intelligence</i> – e.g. early warning systems.</p> <p><i>Market structure</i> – e.g. informal land and rental markets; tied employment.</p>	<p>Households/ community/ institutions</p> <p>Households/ community/ institutions</p> <p>Households/ community/ institutions</p>
External support	<p><i>Research and development</i> – e.g. participation in action research.</p> <p><i>National/ international civil society activists/ pressure groups</i> – e.g. Shack/Slum Dwellers International (SDI).</p>	<p>Community/ institutions</p> <p>Community/ institutions</p>

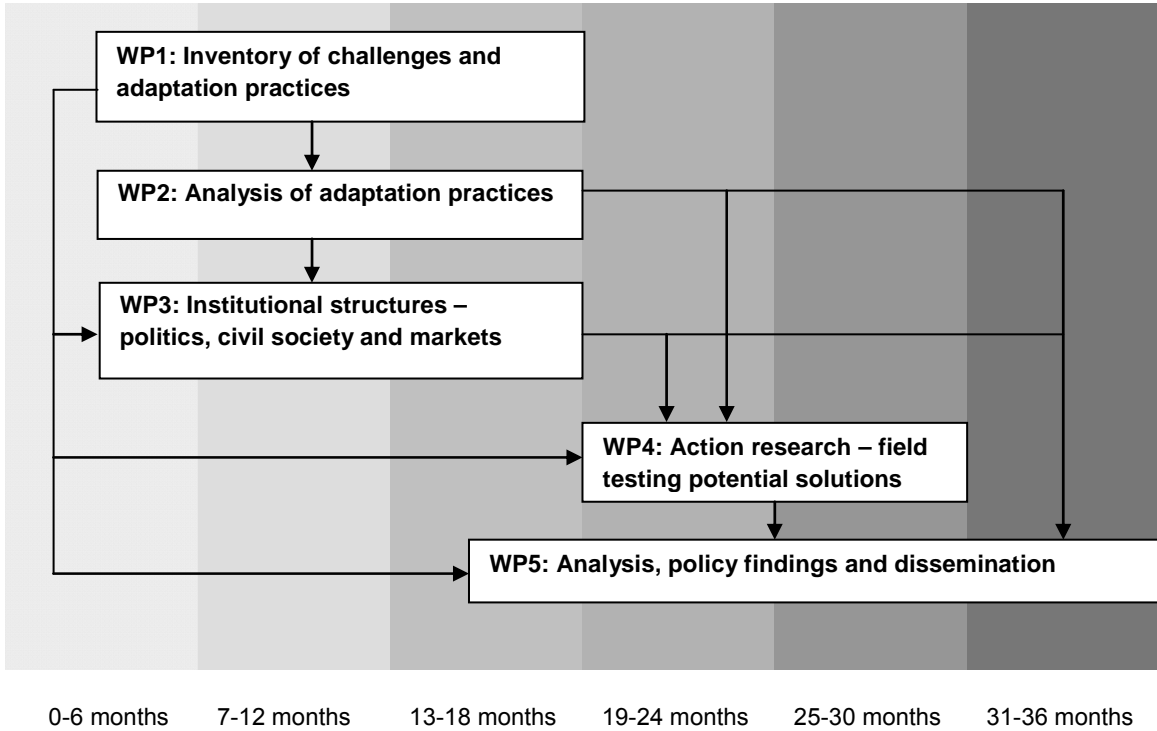
Table 3: Population profile of six metropolitan cities of Bangladesh in 2005

Metropolitan area	Total population 2005	Poor urban population 2005	Total no. of poor urban clusters 2005
Dhaka	9,136,182	3,420,521	4,966
Chittagong	4,133,014	1,465,028	1,814
Khulna	966,837	188,442	520
Rajshahi	489,514	156,793	641
Barisal	365,059	109,705	351
Sylhet	356,440	97,676	756

Source: Angeles et al., (2009). Do note that these are estimates and not census results.

In taking a cross-disciplinary approach, the research has been structured into five work packages (WPs), one for each objective and a comparative analysis and policy findings. While the WPs will focus on specific aspects of the research, the data generated and the analytical findings will feed into one another (Figure 3). Each WP will be jointly headed by a pair of leading Bangladeshi and UK researchers, who will also contribute to other WPs. Data will be collected and analysed by a small team of experienced Bangladeshi researchers over a period of 15 months. By drawing on the experience of domestic researchers with an intimate knowledge of the local societies, we will be able to overcome a common criticism of comparative studies, namely that they often draw on a collection of separately conceived and conducted projects in isolated communities (e.g. Hantrais, 1999).

Figure 3: Schedule of CLIMURB work packages (WPs)



We will commence by undertaking WPs 1, 2 and 3 simultaneously in Khulna and then move to Dhaka and Chittagong. Successful implementation of the data collection and analytical protocols in one city will enhance the research team's ability to undertake these activities in other cities. It will also enable us to address any pitfalls in one city and apply this knowledge to subsequent cities. Interviews, group discussions and dialogues will be the main form of data collection. WP4, led by BRAC Development Institute (BDI), will then field test potential solutions to enhance the adaptive capacity of poor urban people and assess levels of acceptance by the poor people and support from local institutions. We will reapply the participatory appraisal methodology, undertake further interviews and hold dialogues. Finally, WP5 will synthesise data analysis and policy findings, combining both qualitative and quantitative materials and methods. We will also analyse how the research findings address the policy gaps identified above, and assess the potential policy gains if the research findings are incorporated in the policy-making process. We now briefly discuss the activities for each WP below.

4.2 Work packages (WPs)

WP1. Inventory of adaptation practices: The first work package will involve conducting a participatory appraisal of poor urban livelihoods and how weather events and climate variability impacts influence these dynamics in each of the selected case study settlements. There are two critical steps here:

- First, creating socio-economic profiles of the case study settlements. We will conduct a mini-survey involving all households in the case study sites. This will help us to identify household characteristics, including: household types; occupation and livelihoods; tenancy structure; asset holdings and places of origins. We will draw up a map of the settlement and link the individual shacks with their characteristics. We will use this information to group households into stratified categories. A sample questionnaire is presented in Annex B.
- Second, systematic qualitative appraisal to identify major problems and adaptation practices. We will follow the 'sensitively facilitated' participatory methodologies of Daze et al. (2009) and Moser and Satterthwaite (2008), involving participatory mapping, group discussions and key informant interviews. We aim to conduct at least one group discussion with each stratified household category and one interview with each livelihood categories. A sample schedule is presented in Annex C.

WP2. Analysis of adaptation practices: This will build on the baseline information generated in WP1 to investigate the current adaptation practices to corresponding problems, as identified above, within a sociotechnical framework that seeks to understand the co-evolution of technical, design and socio-economic innovations (Guy and Karvonen 2010). The examination of these practices will be conducted in two steps:

- Categorisation of adaptation practices: Following Agrawal (2010) and Chatterjee (2010) we will distinguish practices which are significant across spaces, over time, across asset classes, across household types. We will also analyse the nature of institutional involvement and sources and development and evolution of ideas and leadership corresponding to each practice (see Table 1 and Annex H). We anticipate

that a series of informal visits to previously selected households will be required during this process.

- Assessment of usefulness of adaptation practices: Following Engle and Lemos (2010) and Debels et al. (2009), we will define a set of variables and indicators to measure the usefulness of adaptation practices (a list of variables and indicators is presented in Annex A). We will also evaluate the statistical significance of the difference amongst the adaptation practices, both between, and within, case study sites. Data will come from the socio-economic profiles created and the participatory appraisals undertaken in WP1.

WP3. Analysis of institutional structures: Data will mainly be collected through WPs 1 and 2. We will also undertake fresh interviews, and hold a dialogue. Our initial thoughts are to conduct at least five new interviews with local politicians, activists and NGOs for each case study settlement. To structure the interview questions and set the context for dialogue, we will focus on three key institutional dimensions:

- Governance: For each of the identified adaptive practices, we will assess existing institutional structures against characteristics of: bureaucracy; clientelism; authoritarianism; participatory democracy; and co-production (Agrawal, 2010). We will also assess the method of learning cycle that corresponds to individual practices, i.e. simply refine action (single-loop), and question the guiding assumption (double-loop), and allow transformation of the structure (triple-loop). Double- and triple-loop learning cycles are better in terms of climate change adaptation (Pahl-Wostl, 2009). We will find out if this holds true for Bangladesh. A list of relevant objectives and methods is presented in Annex D.
- Markets: Following Christoplos et al. (2009), we will study (i) existing levels of access to markets for the urban poor. In this context, following Guy and Henneberry (2008) and CPD (2003), we will examine how the elements of urban land, rental and construction material markets function in poor urban contexts in Bangladesh; and (ii) whether these markets can be structured and operate in a hybrid for-profit/non-profit way and with incentives for providing access to the poor. Further details on this are presented in Annexes E, F and G.
- Networks: We will explore the levels of support from families, communities and local reciprocal relationships by reapplying the method of learning cycle to understand the formation of networks in Bangladesh. We will also adapt Chatterjee (2010) to examine how the networks are consolidated and enhanced (see Table 1). This will mainly be based on information collected in WPs 1 and 2.

WP4. Action research: Led by BDI, we will field test potential solutions and evaluate their effectiveness and acceptability for one solution per settlement. Activities will be structured into the following three phases:

- In the first phase, we will identify three alternative solutions (based on findings of WP2 and 3) for the most important livelihood challenge (as identified by members of the recipient settlement in WP1). We will then repeat the participatory appraisal technique (of WP1), but this time only to ask members of the recipient settlement to

identify which of the proposed alternatives they would prefer to be implemented, and whether they want any modification to the preferred solution.

- In the second phase, the preferred solutions (with suggested modification, if any, incorporated) will be implemented in the recipient settlements. We acknowledge three implementation modes: (i) community-led; (ii) community-sponsor (e.g. local government, NGOs or business organisations) partnership; and (iii) sponsor-led. We will aim for mode (i), but acknowledge that this may not be always possible, in which case we will seek local sponsorships. We acknowledge that various forms of campaign (such as rickshaw painting, drama, essay competitions by children and road shows) may accompany the implementation phase to maximise awareness (Ensor and Berger, 2009). We aim to implement the concept of ‘*storyline*’, which is a means of bringing the complex, futuristic and uncertain dimensions of climate change impacts to poor, illiterate people in a way that they can understand and relate to (e.g. drama, folk song and visual arts). We will construct storylines reflecting the vulnerability of individual settlements to climate change, and publicise these (with volunteers from respective settlements) simultaneously with the implementation exercise.
- In the third step, the selected members of the recipient settlements will be interviewed to collect their viewpoints about the effectiveness of the initiatives. In parallel, the research team will also compile their own monitoring and observation, using both qualitative and quantitative formats.

WP5. Analysis and policy findings: The collected data and initial findings will be analysed and policy relevant findings generated and disseminated. Data will be collected in both qualitative and quantitative formats, but the former will dominate. Our preferred methods of analysis are:

- Qualitative data will be analysed using the grounded theory, and coded using the ATLAS coding software. This will enable us to generate theory from identification and groupings of concepts from coding of unstructured data. Grounded theory is particularly helpful in analysing unstructured data, such as those expressed by the dwellers and other informants.
- The quantitative analysis will be limited to the prioritisation of livelihood challenges facing individuals and communities and measurement of adaptive capacity using indicators. Apart from usual statistical analyses, we will conduct analysis of variance (ANOVA) to study the level of variations both between and within the selected low income settlements in the issues discussed above.
- Policy findings will start by setting the research findings against existing policies. Special attention will be given to dominant narratives and to critically evaluating the extent to which the research findings address policy gaps. We also aim to demonstrate the potential policy gains that can result from incorporating research findings into the policy-making process.

5. Conclusion

The frequency, intensity and uncertainty of extreme and severe weather events and climate variability are on the rise in Bangladesh as a consequence of climate change (Huq and Ayers, 2008; Khatun and Islam, 2010). Nearly 40 per cent of the country's population are poor people, for whom a variable and unpredictable climate presents a risk that can critically restrict options and so limit development. This is true in rural and urban areas alike, but this paper has focused specifically on urban poverty. This is because poverty in urban areas is rising faster than rural areas in the country – the total number of urban poor people will exceed the total number of rural poor people within this generation. Yet, urban poverty has so far received very little attention in policy, research and actions for climate change adaptation in Bangladesh (Banks et al., 2011).

Acknowledging this gap in research and policy, this paper has presented an analytical framework to examine how climate change impacts on the livelihoods and living conditions of poor urban people and communities. At the conceptual level the framework is built on a livelihood-based understanding of urban poverty that recognises multiple sources of deprivation. At the same time, it is recognised that poor urban people are innovative, diverse individuals with their own cultural resources and economic strategies. Such an actor-oriented approach enables the framework to be optimistic about the possibility of effective policy options. Poor people in Bangladesh's low-income settlements are already adapting to environmental and climatic change.

The framework also acknowledges the coincidence of the dual vulnerability of poor urban people, exposing them to the triple forms of impacts of weather events and climate variability: rapid-onset events; gradual-onset processes; and cascade effects. Poor urban settlements are frequently located on particularly vulnerable locations, such as floodplains or steep slopes. This physical vulnerability coincides with poor urban people's social vulnerability, caused by their poverty. In terms of impacts, poor urban people are subject to: sudden-onset events; slow-onset processes; and cascade effects. Sudden-onset events may cause affected populations to leave their homes, often leading to sudden, large-scale movements. However, impacts of gradual-onset processes and cascade effect may be more subtle and deeper, owing to their long-lasting, and sometimes irreversible, nature.

For a holistic understanding of such complex constructions of vulnerability, events and processes, the analytical framework proposes to examine a range of adaptation practices that individuals, communities and institutions have already developed. Existing adaptation practices reveal the abilities, preferences, aspirations and struggles of the households and communities in question. They are examples of ex-post (reactive) adaptation, which reflects the social determinants of vulnerability and are built on existing risk-coping strategies of individuals and communities. In recognition of this, the framework places a central focus on existing and emergent practices, and attempts to examine the three structural components that shape them, namely socio-economic endowments, institutions and external resources.

The implementation of the framework takes place through five work packages in six case study sites in three urban agglomerations: Dhaka, Chittagong and Khulna. The first three work packages deal with empirical aspects of the study, undertaken simultaneously in the

three cities taken sequentially. In the fourth work package, action research is undertaken in selected urban contexts to field test potential solutions. The final work package is dedicated for analysis and dissemination of findings.

The research methodology includes a number of features designed particularly to ensure policy relevant findings. These include: inclusion in the team of experienced domestic experts and researchers; holding dialogues with members of the local academic community, municipal officials, civil society members and community representatives; sponsoring a student project as a vehicle to raise awareness amongst the next generation of practitioners; undertaking actions research; mounting regional (in Bangladesh) and international (in UK, Europe and USA) dissemination conferences; and formal and informal policy engagement processes.

Finally, the study is expected to raise political and institutional awareness of the problems facing poor urban communities in Bangladesh and of the innovations and practices that urban poor people are pursuing to maintain and improve their lives. Hopefully, this increased awareness will be transformed into better policies and more effective institutions.

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Annex A: Variables and indicators for assessing the usefulness of adaptation practice

Variable	Indicator definition	Measurement scale	Relevant interview question
1. Incorporation of local/traditional knowledge	The extent and the way in which the practice has incorporated the local knowledge in the design and implementation of the practice.	High Moderate Low	Where did the idea from? How was the idea implemented? Was the practice involved just doing things right, or doing the right thing, or the right thing is done in more innovative ways?
2. Cost involvement	Direct and indirect cost (time spent; opportunity cost) involved in the design and implementation of the practice.	Low Medium High	During design, implementation and running: <ul style="list-style-type: none"> • How much money (labour, fees, material cost, bribes, interests, etc)? • How much free time, how many people (unpaid), how many visits, commitment, assurance, etc? • What could they do with the non-paid time spent/activities undertaken?
3. Robustness and flexibility	The degree to which the practice is insensitive to uncertainty in climate change, and the ability of the practice to change in response to altered circumstances.	High Moderate Low	What do they do with this (the practice) when it rains, during flooding, cyclones, summer/winter, etc? We need to identify if the practice continues as it is, or in modified ways during weather events.
4. Repeatability and transferability	Degree of freedom and capacity of poor urban people/group in implementing the practice (e.g. absence of limitations or restrictions of, e.g., spatial, economic, political and technical origin). This also covers autonomy	Can be easily (minimum change) repeated or transferred. Can be adapted (moderate additional efforts) to repeat and transfer.	How context-specific is the material used, technique applied, the structure of market, skills required etc? Is there a need for institutional approval attached to the practice? Does the practice give rise to speculation or political interest?

Variable	Indicator definition	Measurement scale	Relevant interview question
	of those who are linked with the practice.	Too context-specific, therefore intransferable or unique.	Does the target community have full autonomy in implementing the practice?
5. Attention to the most vulnerable groups	Attention received by the most vulnerable population group within the target population (the poorest, children, elderly, disabled).	Primary attention. Egalitarian attention. No or little attention.	Who are main beneficiary groups? Is the practice accessible to the most vulnerable group? What evidence is there to show that the practice can benefit the most vulnerable group?
6. Contribution to social learning	Level of environmental and/or social benefits visible to general people, both within and beyond the specific community.	The practice and its benefits are easily visible and well publicised (e.g. used as a success story). The practice is attractive to selected groups (e.g. better off). The practice fails to draw any public attention.	How easy is it to learn the art of the practice? Does the benefit relate to major concerns of poor urban people in general, or to specific groups? Is it cited as an example of good practice in training, local schools and gatherings, both within and outside of the specific community?
7. Governance	The degree to which the practice involves the local institutional structures (e.g. bureaucracy, clientelism, authoritarian, co-production, and co-management).	The practice involves co-production/ co-management/ public-private partnerships. The practice represents bureaucracy, clientelism and authoritarian approaches.	How has the practice involved the local institutions (formal and informal) in the design and implementation? What financial and organisational mechanism has been put in place for the operation and maintenance of the practice? How does it involve local institutions and people?

Variable	Indicator definition	Measurement scale	Relevant interview question
		The practice lacks institutional linkages.	What are their roles?
8. Diversity of climate change impacts addressed	The way the practice addresses the three forms of climate change impacts: rapid-onset events; gradual-onset processes; and cascade impacts. This includes the 'continuity in time' dimension.	The practice relates to all three forms of impacts. The practice related to all but cascade impacts. The practice only related to rapid-onset events.	What is (are) the primary climate change impact-related objective(s) of the practice? Why was it developed in the first place? Has it been modified to include other forms of impacts? How long does the practice keep on being effective, after having been implemented?
9. Contribution to livelihoods security and diversification	The degree to which the practice has secured existing livelihoods or has created other livelihood options and economic linkages.	High Medium Low	Has the practice led to diversification of source of food, support network, product, and livelihood opportunities? Has the practice led to prevention of loss of asset?
10. Bio-physical risk reduction/ environmental protection	Level to which the adaptation practice conserves, restores and/or contributes to the protection and sustainable use of natural resources.	High Medium Low or null	Has the practice led to protection or conservation of natural resources? Has the practice contributed to improvement of the local environment? Does the practice involve sustainable use of natural resources?

Annex B: Census questionnaire

Household ID No:

Interview starting time : Hour Minute
 Name of Interviewer : _____
 Date of interview : day Month Year

Consent statement:

1. Identification:

1.1 Name of the Household head (HHH) _____

1.2 Respondent's Name _____

1.3 Name of the settlement _____ Code

1.4 Type of Housing: 1=Tenant; 2= Proxy landlord; 3=Genuine landlord

2. Primary information regarding the HH:

SI No.	Question	Code	Code list
2.1	How long you have been living in this settlement? (HH Head)		Write in year. If more than six months put 01 if less than six months then put 00. (If staying from birth/all time put 95. If the code is 95 than no need to ask question number 4 and 5.)
2.2	Where did you live before you came to this settlement?		1= Another settlement in this city 2= In this city but in this settlement 3= In a low income settlement in another city 4= In another big city but not in a low income settlement 5= District town 6= Upazilla town 7= Village Other places (Please mention)
2.3	Did you migrate due to any of these causes? (if the answer is 'none' only, then ask next question)		00= None 08= Earthquake 01= Flood 09=Landslide/flash flood 02= Cyclone/Tornado 10= Sand storm 03= River erosion 11= Fire accident 04= Excessive rain 12= Drought 05=Excessive heat 13= Water shortage in dry season 06= Excessive cold (due to low water level) 07= Water logging
2.4	What was the reason of your migration to this settlement?		1= Better livelihood 2= Conflict or clash with others 3= Education 4= Evicted 5= Committed crime and left 6= Conflict with parents

3. Household roster

Who are the household members living in this address? [Please check all that apply and list the numbers.]

Line No	Name	2a. Age (in whole years)	2b. Sex (M=1, F=2)	2c. Relationship with HHH	2d. Highest level of education (in cases of individuals who are more than 5 years old)	2e. Marital status (in cases of individuals who are more than 10 years old)	2f. Primary occupation (in cases of individuals who are more than 8 years old)	2g. Does s/he earn income? 1=yes, 2=no
1		<input type="checkbox"/> <input type="checkbox"/>	1 2	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>		<input type="checkbox"/> <input type="checkbox"/>	1 2
2		<input type="checkbox"/> <input type="checkbox"/>	1 2	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>		<input type="checkbox"/> <input type="checkbox"/>	1 2
3		<input type="checkbox"/> <input type="checkbox"/>	1 2	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>		<input type="checkbox"/> <input type="checkbox"/>	1 2
4		<input type="checkbox"/> <input type="checkbox"/>	1 2	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>		<input type="checkbox"/> <input type="checkbox"/>	1 2
5		<input type="checkbox"/> <input type="checkbox"/>	1 2	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>		<input type="checkbox"/> <input type="checkbox"/>	1 2
6		<input type="checkbox"/> <input type="checkbox"/>	1 2	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>		<input type="checkbox"/> <input type="checkbox"/>	1 2
7		<input type="checkbox"/> <input type="checkbox"/>	1 2	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>		<input type="checkbox"/> <input type="checkbox"/>	1 2
8		<input type="checkbox"/> <input type="checkbox"/>	1 2	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>		<input type="checkbox"/> <input type="checkbox"/>	1 2
9		<input type="checkbox"/> <input type="checkbox"/>	1 2	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>		<input type="checkbox"/> <input type="checkbox"/>	1 2
10		<input type="checkbox"/> <input type="checkbox"/>	1 2	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>		<input type="checkbox"/> <input type="checkbox"/>	1 2
Relationship with the HH head:		Education:			Marital status:		Occupation:	
01 = HH head		00 = No education			1=Never married,		8=Self-employed in business/service provision;	
02 = Spouse		01 = Education up to class 1			2=Married (living with spouse),		9 = Business owner using hired labour;	
03 = Son/daughter		02 = Education up to class 2			3=Separ-ated/deserted,		10=Rickshaw/rickshaw van puller; 11=Boatman;	
04 = Son/daughter-in-law		03 = Education up to class 3			4=Widow/widower		12=Unpaid household work (e.g., housewife);	
05 = Parents		04 = Education up to class 4				6=Regular salaried employment in government, NGO or other institutions;		
06 = Parents-in-law		05 = Education up to class 5				7=Regular salaried employment in some fixed business establishment (shop, factory, hotel, etc.) or in transport sector (bus, truck, etc.)		
07 = Brother/sister		06 = Education up to class 6				8=Self-employed in business/service provision;		
08 = Brother/sister-in-law		07 = Education up to class 7				9 = Business owner using hired labour;		
09 = Other relatives		08 = Education up to class 8				10=Rickshaw/rickshaw van puller; 11=Boatman;		
10 = Grandchildren		09 = Education up to class 9				12=Unpaid household work (e.g., housewife);		
11 = Non-relative		10 = SSC or equivalent				13=Servant/ maid;		
12 = Others		11 = HSC or equivalent				14=Student;		
		12 = University/college graduate (BA/Bcom/BSc)				15=Beggar;		
		13 = MA/Mcom/MSc/				16=Old/disabled;		
		14 = Phd				17=Unemployed;		
						18=Driver (taxi cab, tempo, CNG etc)		
						96=Other (specify)		

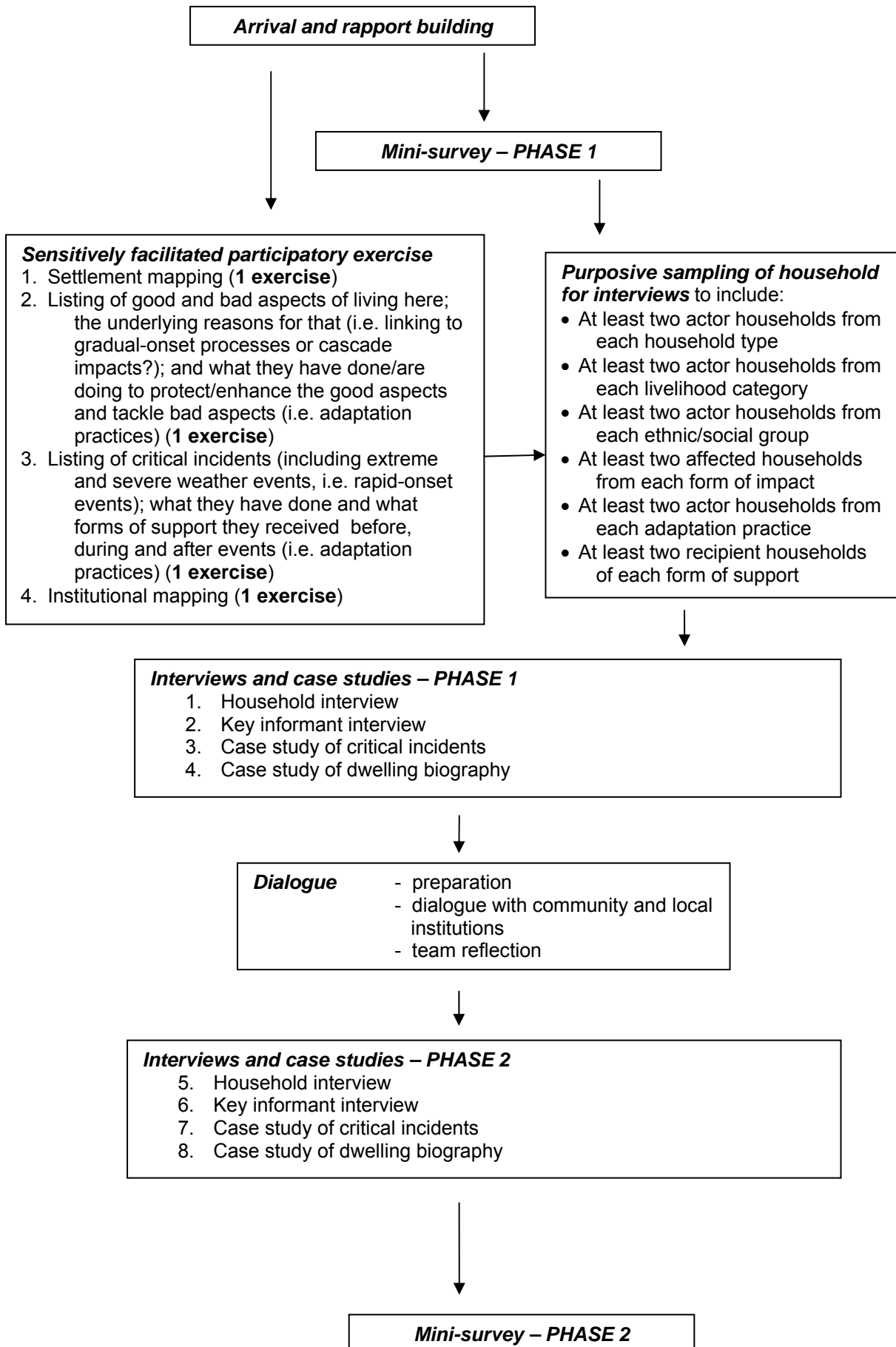
4. Land ownership, wellbeing indicators and social network

4.1	How much land does your household own?	Type of land	Amount in percentage/decimal
		Homestead	
		Farmland	
4.2	What type of latrine does this household use?	1=Open field, 2= <i>Kacha</i> , 3=Sanitary	
4.3	Does any household member work for a daily wage?	1=yes,	
4.4	Do all children ages 6 to 17 go to school?	1=yes,	
4.5	Does the household own a television set?	1=yes,	
4.6	What is the main construction material of the walls of the house?	1=Hemp/hay/bamboo/mud, 2=Cl sheet/wood, 3=Brick/cement	
4.7	Does this household have electricity connection?	1=yes,	
4.8	Does the household own any cattle?	1=yes,	
4.9	Does the house have a separate kitchen?	1=yes,	
4.10	How many rooms does the house have (excluding the ones used for business)?		
4.11	Based on your income and food consumption, how would you rank your household ?	1=Chronic deficiency, 2=Occasional deficiency, 3=Break-even, 4=Surplus	

5. Quick assessment of HH assets:

SI Number	Type of asset		
	Name	Quantity (if none then put code 0)	Value (BDT)
01	Radio		
02	Television		
03	VCD		
04	Freezer		
05	Mobile/telephone		
06	Rickshaw		
07	Rickshaw van		
08	Bicycle		
09	Motorcycle		
10	Auto-CNG		
11	Pet animals		
12	Tube well		
13	Land (cultivable or others)		

Annex C: Fieldwork schedule



Annex D: Institutional politics and governance

Objectives:

1. To examine the formation of various community-level associations and the nature of their links with national/municipal government level (e.g. bureaucracy, clientelism, authoritarian or co-production).
2. To explore how slow-onset processes (e.g. environmental pollution) and cascade effects of climate change (e.g. rural to urban migration) have influenced local institutional politics and governance structure.
3. To explore institutional responses before, during and after any critical incident, including rapid-onset events such as extreme and severe weather events.
4. To examine impacts of existing institutional process and outputs on different types of households and livelihood groups, thus identifying the institutional dimension of their vulnerability to climate change impacts.

Method:

- Interview of representatives of different institutions (asking about the background of the organisation, and their activities and relationship with the community in question).
- Case study of community-level associations (asking about background of the association, activities, links to formal institutions, and how these have evolved over time).
- Case study of critical incidents, in particular severe/ extreme weather events (asking about the nature, extent and duration of shock on households and groups, and nature of institutional support).

Annex E: Structure of financial flows

Objectives:

1. To identify structures of financial flows involving poor urban households and groups in the selected community. This involves examining the sources, recipients and conditionality of financing circuits. The sources include both economic activities, as well as financing institutes (including more powerful groups).
2. To examine how the structures have evolved (i.e. started, expanded, changed) over time and the extent to which this process has been driven by slow-onset processes and cascade effects of climate change impacts.
3. To explore changes in financial circuits before, during and after any critical incident, including rapid-onset events such as extreme and severe weather events (e.g. allowing late payment of micro-credit instalments or any such act of support to specific groups such as female-headed households).
4. To examine the impacts of changes in financial structures on different types of households and livelihood groups, thus identifying the vulnerability of specific groups to changes in financial processes as a result of climate change impacts.

Method:

- Household interview (asking about borrowing and repayment histories, earnings and investments, and any incident of changes in these activities – **not mentioning climate change impacts**). Case study of critical incidents, in particular severe/extreme weather events (nature, extent and duration of shock on financing circuits, **involving both sources and recipients**). This involves interviewing both affected households, and other actors of the financing circuit, e.g. micro-credit institutes.

Annex F: Structure of local economy

Objectives:

1. To identify patterns of various economic activities (small businesses, service activities, small manufacturing and fabricating activities) within the selected community. This involves examining the network of local economy coalitions, both within and beyond the community.
2. To examine how various activities have taken hold (i.e. start-up and upward spiralling) and whether these have been influenced (e.g. by creating markets for specific products) by slow-onset processes and cascade effects of climate change.
3. To explore changes in economic activities before, during and after any critical incident, including rapid-onset events such as extreme and severe weather events, e.g. stockpiling of products for more profit, suspending production, etc.
4. To examine the impacts of changes in economic activities on different types of households and livelihood groups, thus identifying the vulnerability of specific groups to changes in the local economy as a result of climate change impacts.

Method:

- Case study of economic activities (asking about background of the owner, product range, market network, capitals and turnover, and how these have changed over time – **not mentioning climate change impacts**).
- Case study of critical incidents, in particular severe/extreme weather events (asking about the nature, extent and duration of shock on the product, market and the network of coalitions).

Annex G: Land market and tenure structure

Objectives:

1. To examine the types of land tenure in the selected community.
2. To explore the functioning of the land market in the study community, and its links with the municipal land market.
3. To examine how the local land market responds to three forms of climate change impacts in the study community.
4. To examine impacts of the existing land market on different types of households and livelihood groups, thus identifying the institutional dimension of their vulnerability to climate change impacts.

Method:

- Interview of land market operators, both within and beyond the selected community (asking about tenure arrangements, buying and selling processes, pricing, rental market, role of networks and power structures).

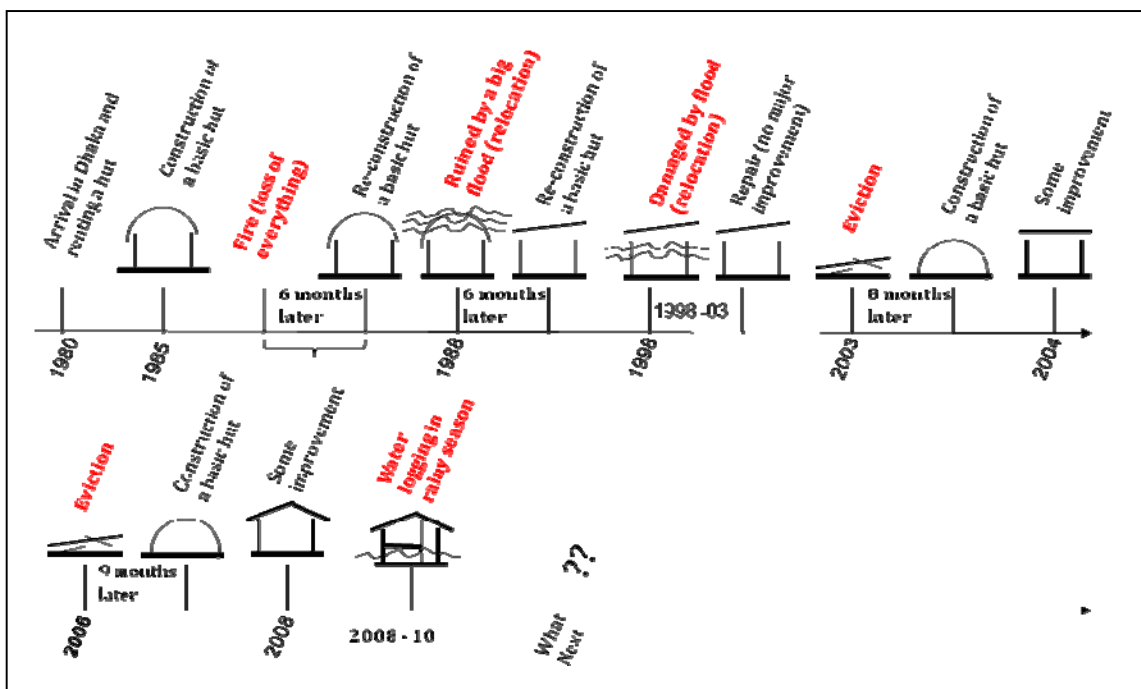
Annex H: Biography of dwellings

Objectives:

1. To understand the struggles, resilience and priorities of poor urban people, through examining the process of erosion, rebuilding and improvement of their most important asset – the dwelling.
2. To explore design innovations that help poor urban people’s dwellings to survive the most adverse of conditions, including various forms of climate change impacts.
3. To understand how these people acquire, adapt and transfer knowledge in a highly climate-sensitive way, by taking the process of construction, reconstruction and provision of basic services in a poor urban dwelling as an example.

Method: Case study of dwellings – drawing the timeline (on the basis of interview with the owner) of damage-inflicting incidents, structural changes to the dwelling (including damage, demolition, reconstruction, improvement) and provision of basic facilities and improvements (see below).

Sample illustration (based on our Beltola case study):



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