



# **Pro-poor Climate Change Adaptation in the Urban Centres of Low- and Middle-Income Countries**

Caroline Moser and David Satterthwaite

With

Sheridan Bartlett, Jorgelina Hardoy, Saleemul Huq,  
Mark Pelling, Hannah Reid and Aromar Revi

This paper has been commissioned by the World Bank Group for the "Social Dimensions of Climate Change" workshop. Views represented are those of the authors, and do not represent an official position of the World Bank Group or those of the Executive Directors of the World Bank or the governments they represent. The World Bank does not guarantee the accuracy of data presented in this paper.

For additional copies of this paper, please contact:

Social Development  
The World Bank  
1818 H Street, NW  
Washington, DC 20433

E-mail: [socialdevelopment@worldbank.org](mailto:socialdevelopment@worldbank.org)



Printed on Recycled Paper

# **Pro-poor Climate Change Adaptation in the Urban Centres of Low- and Middle-Income Countries**

by

**Caroline Moser**

*(Global Urban Research Centre, University of Manchester) and*

**David Satterthwaite**

*(International Institute for Environment and Development)*

With

**Sheridan Bartlett, Jorgelina Hardoy, Saleemul Huq, Mark Pelling,**

**Hannah Reid and Aromar Revi**

**Workshop on  
Social Dimensions of Climate Change  
World Bank  
Washington, DC**

**March 5-6, 2008**



# Contents

|   |            |
|---|------------|
| <b>ABSTRACT .....</b>   | <b>III</b> |
| <b>1. INTRODUCTION .....</b>  | <b>1</b>   |
| 1.1. THE URGENCY OF THE SITUATION .....   | 1          |
| 1.2. OBJECTIVE AND STRUCTURE OF THE PAPER .....   | 2          |
| <b>2. BACKGROUND: WHY IS CLIMATE CHANGE AN IMPORTANT URBAN PROBLEM? .....</b>   | <b>4</b>   |
| 2.1. THE MAIN IMPACTS OF CLIMATE CHANGE IN THE NEXT FEW DECADES .....   | 4          |
| 2.2. THE SCALE OF THE URBAN POPULATION AT RISK .....  | 4          |
| <b>3. A CONCEPTUAL FRAMEWORK: FROM ASSET VULNERABILITY TO ASSET ADAPTATION ..</b>   | <b>7</b>   |
| 3.1. ASSET VULNERABILITY .....  | 7          |
| 3.2. ASSET-BASED ADAPTATION .....   | 8          |
| <b>4. URBAN POVERTY, ASSET VULNERABILITY AND CLIMATE CHANGE .....</b>   | <b>10</b>  |
| 4.1. TYPES OF VULNERABILITY AND GROUPS PARTICULARLY AFFECTED .....  | 10         |
| <b>5. CURRENT GOVERNMENT OPERATIONAL FRAMEWORKS FOR ACTION .....</b>  | <b>14</b>  |
| 5.1. INTRODUCTION .....   | 14         |
| 5.2. LOCAL GOVERNMENT AS THE INSTITUTION DRIVING ADAPTATION .....   | 14         |
| <b>6. COMMUNITY RESPONSES TO CLIMATE CHANGE: A PRO-POOR ASSET-BASED<br/>ADAPTATION FRAMEWORK TO EXTREME WEATHER .....</b> | <b>18</b>  |
| 6.1. ASSET-BASED ADAPTATION FOR LONG-TERM PROTECTION .....  | 18         |
| 6.2. ASSET-BASED ADAPTATION FOR PRE-DISASTER DAMAGE LIMITATION .....  | 23         |
| 6.3. ASSET-BASED ADAPTATION FOR IMMEDIATE POST-DISASTER RESPONSE .....  | 25         |
| 6.4. ASSET-BASED ADAPTATION FOR REBUILDING .....  | 28         |
| <b>7. INSTITUTIONAL IMPLICATIONS AND ASSOCIATED RECOMMENDATIONS .....</b>   | <b>31</b>  |
| 7.1. KEY FINDINGS .....   | 31         |
| 7.2. IMPLICATIONS FOR URBAN GOVERNMENT .....  | 31         |
| 7.3. IMPLICATIONS FOR NATIONAL GOVERNMENT .....   | 32         |
| 7.4. THE ROLE OF INTERNATIONAL DONORS .....   | 32         |
| <b>REFERENCES (DRAFT) .....</b>   | <b>35</b>  |

---

*This paper draws on four commissioned background papers by Aromar Rev, Mark Pelling, Sheridan Bartlett Jorgelina Hardoy and Gustavo Pandiella as well as a report by David Satterthwaite, prepared for the OECD Development Assistance Committee (for full details see bibliography).*

## **Abstract**

This paper describes how urban centers in low- and middle-income countries concentrate a large proportion of those most at risk from the effects of climate change. This will happen as poor people in such centers see their lives, assets, environmental quality and future prosperity threatened by the increasing risk of storms, flooding, landslides, heat waves and drought – as well as by overloading water, drainage and energy supply systems. It starts by identifying the urgency of the situation, and highlights why it is essential to focus on urban climate change because of the scale of the urban population at risk.

To better understand the problem as well as recommend solutions to address it, the paper introduces a pro-poor asset-based framework. As a conceptual approach it helps to identify the asset vulnerability of poor communities, households and individuals within urban areas to climate change. It also considers the role of assets in increasing the adaptive capacity of low-income households and communities. Asset vulnerability and a lack of resilience to risk is then explored in terms of four broad categories, namely: a) those groups who are particularly vulnerable and need long-term protective action; b) those unable to take immediate pre-damage limitation; c) those unable to respond immediately post disaster, and d) those most vulnerable during rebuilding. This highlights the many synergies between poverty reduction and building resilience to climate change, and clarifies how vulnerability and risk are influenced by income-level, age and gender.

The paper then highlights three reasons why strengthening, protecting and adapting the assets and capabilities of individuals, households and communities ('autonomous adaptive capacity') have far more importance than in high-income countries. The first is the limitations in urban governments' adaptive capacity, especially in providing needed protective infrastructure and services to low-income populations. The second is the unwillingness of many city or municipal governments to work with low-income groups, especially those living in informal settlements. The third is the key role of assets in helping households and communities to cope with disasters.

The paper also develops an operational tool - an asset adaptation framework - that serves to highlight the measures and interventions needed to address not only long-term protection from climate change, but also to support low-income households and communities to cope with extreme-weather related disasters during pre-disaster damage limitation, immediate post-disaster responses and rebuilding.

This focus on strengthening of the asset base of households and communities is also a key means to build more competent, accountable local governments. A substantial part of adaptive capacity therefore relates to the capacity of local communities to make demands on local governments and, wherever possible, to work in partnership with them. The paper concludes by discussing the roles for national governments and international agencies in supporting adaptive capacity at all levels.

# 1. Introduction

## 1.1. The urgency of the situation

Urban centres in low- and middle-income countries concentrate a large proportion of those most at risk from the effects of climate change — as lives, assets, environmental quality and future prosperity are threatened by “the increasing risk of storms, flooding, landslides, heat waves and drought and by overloading water, drainage and energy supply systems” (Wilbanks, Romero Lankao et al 2007). In general, cities and smaller urban centres that are already at risk from extreme weather events are the ones most to be impacted by climate change. This will also bring other less dramatic stresses such as heat waves (to which certain inner-city areas which become heat-islands are particularly at risk) and, for many urban areas, reductions in freshwater availability; also sea-level rise for all coastal cities.

The evidence that demonstrates the vulnerability of urban populations to climate change is based on data over the past 30 years. This shows a dramatic growth in the numbers killed or seriously impacted by economic losses associated with an increase in the scale of worldwide devastation by extreme weather events. Most of this increase arises from extreme-weather events whose intensity and frequency is likely to grow, with its impact proportionally experienced most in urban areas in low- and middle-income countries.

Within cities and towns, almost all serious disaster-related injuries and deaths occur among low-income groups. Risks fall disproportionately on this population that tends to live on sites with greatest hazard and least adequate provision for protective infrastructure - for instance a third of the population globally lack roads and drains. Thus the principal driver of increasing loss of life as well as social and economic vulnerability is poverty and exclusion, which forces the majority of the population to live in locations, and inhabit shelter that are exposed to environmental hazard. Climate change not only exacerbates existing risks but also reveals new hidden vulnerability as more locations places are exposed to new hazards such as floods and storms.

Without effective, locally driven adaptation, the future holds very serious consequences for the lives and wellbeing of hundreds of millions of urban dwellers as well as their assets. Equally important is the impact on national economies, given the importance of urban-based production. The fact that there are limits to the damage or devastation that adaptation can prevent, as well as the serious deficiencies in the institutional capacities for urban adaptation in most low- and middle-income countries, makes it all the more urgent that global agreements are reached to achieve the needed cuts in greenhouse gas emissions.

Adaptation is not an alternative to mitigation (greenhouse gas emission reduction). However, adaptation is more pressing because of the time-lags within the global climate system between when greenhouse gas emissions are reduced and when impacts diminish or cease. There is a profound inequality globally between what causes climate change (at root the high consumption lifestyle of higher income groups and the production system that supports them) and those most at risk from its effects. In urban contexts it is mostly urban centres in low-income countries with very low average greenhouse gas emissions per person that need to adapt most, yet have the least adaptive capacity, while facing the largest backlogs in protective infrastructure.

At the same time there are substantial synergies between successful climate change adaptation and successful local development. Indeed, poverty reduction, including the provision of housing upgrading and local infrastructure and services, is central to adaptation. So too are urban poor groups with agency and voice to contest their rights, making city and municipal governments more accountable to their populations. Successful, well-governed cities greatly reduce climate-related risks for low-income populations; unsuccessful, badly governed cities do not and usually greatly increase such risks.

To date, there has been relatively little consideration as to what adaptation will be needed in urban areas in low and middle-income countries. In part, this is because so much of the IPCC's attention has been focused on persuading governments to accept the scientific evidence for human-induced climate change, and the pressing need for mitigation. Currently it is natural scientists that have produced most of the evidence for human-induced climate change, and who are most strongly represented in governments and international agency discussions or actions on climate change. This has also meant a greater scientific knowledge of likely climate-change impacts on agriculture, forestry and eco-systems than on the built environment. The National Adaptation Programmes of Action has been developed primarily by Ministries of the Environment — not Ministries of Housing or Public Works or Local Government (all of whom will have key roles in adaptation). In addition, mitigation is a national agenda driven by international agreement whereas adaptation is intensely local, requiring competent, capable local governments with a commitment to work with low-income groups that live in informal settlements. Finally, there is long-standing antipathy within most bilateral agencies and much of the development community to focus on urban areas.

Despite these constraints there are at least four good reasons for giving more attention to urban areas.

- **The scale of the population at risk within urban centers.**

A large and growing proportion of those most at risk from climate change live in urban areas in low- and middle-income countries that now have most of the world's urban population and most of the largest cities. Since 1950, there has been a sevenfold increase in their urban population. Much of this has been an increased concentration of people and economic activities in low-lying coastal zones or other areas at risk from flooding and extreme weather events. The last 50 years has also brought a very large increase in the number of urban dwellers living in poverty, lacking the basic infrastructure and services that would protect them from environmental health hazards and disasters.

- **The economic costs without adaptation.**

Successful national economies depend on well-functioning and resilient urban centres. This provides an important economic rationale for addressing current urban vulnerabilities to extreme weather and expanding protection from likely future changes. Since most buildings and infrastructure have long shelf-lives, current construction needs to incorporate structures that are able to cope with climate change-induced risks in the future.

- **The vulnerability of urban populations to climate change.**

Too little attention has been given to the vulnerability of urban populations to climate change, especially to their asset vulnerability. For instance, ninety-nine percent of households and businesses in low-income nations have no disaster insurance.

- **The developmental opportunities from a pro-poor adaptation agenda.**

Many of the measures to reduce climate-change risk for urban vulnerable groups also reduces key aspects of urban poverty, particularly the lack of infrastructure and services and poor quality homes on dangerous sites. In addition, the high spatial concentration of poor communities reduces costs for most infrastructure and service provision.

## **1.2. Objective and structure of the paper**

The objective of the paper is to provide an overview of social development dimensions of climate change adaptation in urban areas of low and middle-income countries. It is intended to highlight the extent and ways in which poor populations are particularly vulnerable to climate change both as individuals but also in terms of their assets at household and community level. However a focus on asset vulnerability, while

critically important — and indeed the primary focus of most work to date<sup>1</sup> — is only half the story. To go beyond vulnerability and focus on strategies and solutions, the paper introduces an asset-based climate change adaptation framework that is pro-poor in focus and identifies the role of assets in increasing the adaptive capacity, and associated resilience, to climate change of low-income households and communities.

The focus on strengthening, protecting and adapting the assets and capabilities of individuals, households and communities — the so-called ‘autonomous adaptive capacity’ — has far more importance than in high-income countries mainly because of the limitations in urban government’s adaptive capacity, as well as the unwillingness of many city or municipal governments to work with low-income groups. At the same time this strengthening of the asset base of households and communities is also a key means to build more competent, accountable local governments. A substantial part of adaptive capacity therefore relates to the capacity of local communities to make demands on local governments and, wherever possible, to work in partnership with them.

The paper is divided into seven sections; following this introduction, Part Two, by way of contextual background describes why climate change is such a critically important urban problem. Part Three introduces a conceptual framework for the asset vulnerability experienced by the poor and an associated asset-based adaptation framework that seeks to provide community and household level solutions. Part Four uses empirical evidence to describe vulnerability of the urban poor to climate change, particularly women and children at different stages of climate adaptation. Part Five outlines current local government frameworks for adaptation, highlighting some of their limitations from a social development perspective. Part Six describes the asset-based adaptation framework to extreme weather or disaster associated with climate change, addressing four aspects: long-term protection, pre-disaster damage limitations, immediate post-disaster responses and finally rebuilding. Drawing on empirical examples from commissioned papers as well as the literature, it illustrates the asset-based actions with their associated institutions and social actors. Part Seven concludes by focusing on the institutional implications of this framework in relation to municipal and national government as well as donors.

In a world of increased concern, media hype and donor buy-in to the issue of climate change, the importance of this paper lies in its effort to set out an urban social development agenda — that complements rather than competes with the agendas of other research and policy-focused communities such as natural scientists. For this reason intentionally it sets clear parameters as to what it does, and does not cover. For instance, it does not summarize the scientific evidence for human-induced climate change. It also focuses on those aspects of climate change for which there is high confidence that they are occurring or will occur in the next few decades. It also does not discuss the very serious social, political and environmental issues that are likely to arise further into the future, if no effective international agreement is reached soon on greenhouse gas emission stabilization and reduction.

Finally, and of particular significance it follows the IPCC’s lead in being cautious in ascribing climate change as a significant causal factor in conflicts, whether social, economic or political in nature. In this way it argues that the extent to which climate change will produce or catalyze serious conflict in urban areas in the next few decades depends heavily on the effectiveness of adaptation and mitigation measures. This contrasts with a more certain vision, increasingly popular though as yet unsubstantiated, that links climate change to increased levels of conflict.

---

<sup>1</sup> See for instance DFID’s briefing note on ‘The impact of climate change on the vulnerability of the poor’, 2004

## 2. Background: Why is climate change an important urban problem?

**Table 1: Some likely impacts of climate change**

| <i>Change</i>   | <i>Impact on agriculture &amp; water</i>  | <i>Impact on urban areas</i>   | <i>Impact on health</i>  |
|---|---|--|--|
| <b>Warm spells and heat waves</b> frequency up on most land areas | Reduced crop yields in warmer regions, wildfire risk up                                   | Heat islands with higher temperatures (up to 10°); often large concentrations of vulnerable populations; air pollution worsened.   | Increased risk of heat-related mortality and morbidity; increased respiratory disease if air pollution worsens, new disease ecologies (eg malaria spreading its range) |
| <b>Heavy precipitation events</b> , frequency up over most areas  | Damage to crops, soil erosion, water-logging, water quality problems                      | Disruption to assets, livelihoods and city economies, damage to physical capital such as homes, possessions, financial capital from businesses and to transport and infrastructure; often large displacements of population, with risks to networks and social capital | Flooding & landslide risks up; deaths, injuries, water-borne diseases; dis-locations; risks to mental health, especially associated with displacement                  |
| <b>Intense tropical cyclone</b> activity increases                | Damage to crops, trees and coral reefs, disruption to water supplies                      |  | Risk of deaths, injuries and food and water-borne diseases up  |
| Increased area affected by <b>drought</b>                         | Land degradation, lower crop yields, livestock deaths, wildfire risks and water stress up | Water shortages, distress migration into urban centres, hydro-electric constraints, lower rural demand for goods/services  | Increased food & water shortages, malnutrition and food and water borne diseases up  |
| Increased incidence of <b>extreme high sea level</b>              | Salinization of water sources   | Permanent erosion and submersion of land, Loss of property and livelihoods, damage to tourism, damage to buildings from rising water table   | Coastal flooding, increasing risk of death and injuries  |

### 2.1. The main impacts of climate change in the next few decades

Table 1 summarizes the main manifestations of climate change and their likely impacts. Agriculture is included not only because of its influence on the price and availability of food, fuel and many industrial inputs for urban areas, but also because of the importance of rural-based (producer and consumer) demand for goods and services for many urban economies. In addition, there are important rural-urban linkages for adaptation and mitigation, such as the protection of key natural defenses and water-shed management linked to flood control and water-supply protection.

### 2.2. The scale of the urban population at risk

Many development and disaster specialists do not fully appreciate the size of the urban low-income population, the speed with which it is growing, and its concentration within it of groups that face high risks from climate change. Low- and middle-income countries have more than three quarters of the world's urban population (United Nations, 2006). They also have most of the urban population at greatest risk from the increased intensity and/or frequency of storms, flooding, landslides and heat waves that climate change is bringing or will bring (Wilbanks, Romero-Lankao et al 2007, Satterthwaite et al 2007). A very high concentration of global deaths from extreme-weather related disasters occurs in low-

and middle-income countries; if more precise data were available, it is likely to show that a large and growing proportion of these deaths are in these nations' urban areas (UN Habitat, 2007). The economic prosperity of many cities and towns centres will be at risk from the direct and indirect impacts of climate change. In many countries well established, long-term migration flows exist. Migrants go to cities in coastal areas at risk from sea-level rise and increased extreme weather events. It is also within such countries that here is the greatest deficit in adaptive capacity. Finally, most of the world's total population growth between 2005 and 2025 will occur in urban centres in low- and middle-income countries (United Nations 2006). This will undoubtedly produce tremendous challenges not only in terms of housing and infrastructure but also in terms of urban management, with important implications for climate change risk levels as well as for greenhouse gas emission-levels.

A number of issues make it difficult to generalize about climate-change related risks for urban centers. Not only does the scale and nature of risk vary greatly between urban centers; within cities these vary between different population groups or locations. Nevertheless cities can be grouped according to certain shared physical characteristics that relate to climate-change risk such as the following:

- Already facing serious impacts from heavy rainstorms, cyclones or hurricanes
- Coastal location and so impacted by sea-level rise
- Location by a river that may flood more frequently
- Location dependent on freshwater sources whose supply may diminish or whose quality may be compromised

Box 1 gives brief descriptions of examples of cities from floods or sea level rises.

The extent to which these pose problems also relate to the quality and level of infrastructure and service provision, as well as to settlement location. A high proportion of the deaths, serious injuries and loss of property from storms, floods and landslides are the result of deficiencies in such provision, and because settlements have developed on dangerous land sites. This also means that there are large variations in the relative importance of climate-change related risks compared to other pressing environmental hazards; where a large proportion of the population lacks infrastructure such as water and sanitation it is difficult to claim the problem is simply one of climate-change. However, as discussed in more detail later, in general there are strong synergies between pro-poor urban development and increased resilience to climate-change. Indeed, much of the risk to urban populations from climate change is a result of the lack of urban development or anti-poor attitudes and orientations within urban governments and elites.

Most countries likely to face serious constraints on climate-change related freshwater availability are also low and middle-income ones. China and India together have more than a quarter of the world's urban population as well as the largest urban population living in low-elevation coastal zones affected by sea level rises (McGranahan, Balk and Anderson 2007). Africa has a high concentration of its largest cities in coastal areas. Without adaptation, climate change is likely to bring ever-increasing numbers of accidental deaths and serious injuries and increasingly serious damages to people's livelihoods, property, environmental quality and future prosperity.

**Box 1: Examples of cities at risk from floods and/or sea level rise**

**Alexandria (Egypt):** An assessment of the vulnerability of the most important economic and historic centres along the Mediterranean coast (the cities of Alexandria, Rosetta and Port-Said) suggests that, for a sea-level rise of 50cm, over 2 million people will have to abandon their homes, 214,000 jobs would be lost and the cost in terms of land and property value and tourism income lost would be over \$35 billion. Alexandria alone has more than 3 million inhabitants. But it is not really possible to put a monetary value on the loss of the world-famous historic, cultural and archaeological sites (El-Raey, 1997).

**Dhaka (Bangladesh):** Dhaka has over 10 million inhabitants and is central to Bangladesh's economic success in recent years. Its population has grown more than 20-fold in the last fifty years. This is a city already vulnerable to flooding, especially during the monsoon season – as shown by the major floods in 1954, 1955, 1970, 1980, 1987, 1988, 1998 and 2004; the 1988, 1998 and 2004 floods were particularly severe, with extensive economic losses. These were mainly caused by the spill-over from surrounding rivers. Large sections of the city are only a few metres above sea level. Much of Bangladesh outside Dhaka is also vulnerable to floods — and the combination of sea-level rise and increased frequency and intensity of storms that climate change is likely to bring greatly increases these risks (Alam and Golam Rabbani, 2007)

**Port Harcourt (Nigeria):** The city has more than a million inhabitants. An extreme 10-hour rainfall in July 2006 drove 10,000 residents out of their homes and caused widespread traffic chaos. The Niger delta frequently experiences flood problems that are aggravated by structures such as the Port Harcourt–Patani–Warri highway that cuts across natural drainage lines and acts as a barrier to floodwaters (Abam, Ofoegbu, Osadebe and Gobo, 2000). Blockage of channels by debris and obstruction of floodways by new construction were seen as the main obstacles contributing to Port Harcourt's flooding.

### **3. A conceptual framework: From asset vulnerability to asset adaptation**

A social development perspective on urban climate change adaptation focuses both on the risks and the impacts of such changes on the poor, excluded and marginal populations living in urban areas. Recognition that poor populations are particularly vulnerable to climate change both in terms of individual lives, but also in relation to their household and community assets makes it useful to draw on earlier conceptual and operational frameworks on poverty, vulnerability and assets, and to modify these to address the dramatic and particular problems associated with climate change.

#### **3.1. Asset vulnerability**

Analysis of the risks and impacts of climate change on low-income urban households and communities is grounded in terms of the concept of vulnerability. This draws on an important development literature that captures the multidimensional aspects of changing socioeconomic well-being, in this case associated with climate change-related extreme weather and storms<sup>2</sup>. Moser (1998) in an urban study defines vulnerability as insecurity and sensitivity in the well-being of individuals, households and communities in the face of a changing environment, and, implicit, in this, their responsiveness and resilience, to risks that they face during such negative changes. Changes that threaten welfare can be ecological, economic, social and political, and they can take the form of sudden shocks, long-term trends, or seasonal cycles. Accompanying such changes are increasing risk and uncertainty. Although the concept of vulnerability has focused mainly on its social and economic components, in applying it to climate-change, vulnerability to physical hazards becomes more important.

Also of operational relevance to climate-change related vulnerability is the distinction between vulnerability and capacity/capability which itself is linked to resilience. The emergency relief literature, for instance, has shown that people are not 'helpless victims' but have many resources even at times of emergency, and that these should form the basis of recovery (Longhurst, 1994, 19); there is also widespread recognition of the resources that grassroots organizations can bring to adaptation. When sudden shocks or disasters occur, the capabilities of individuals and households are deeply influenced by factors ranging from damage or destruction of their homes/assets to constraints on prospects of earning a living, to the social and psychological effects of deprivation and exclusion including the socially generated sense of helplessness that often accompanies crisis.

The fact that vulnerability can be applied to a range of hazard stresses and shocks offers a particular advantage to the analysis of climate change-related risks in urban contexts. Urban poor populations have to live with multiple risks and manage the costs and benefits of overlapping hazards from a range of environmental sources but also face economic, political and social constraints. This is also true of rural populations but the intensity of multiple hazards is greater in urban contexts. Climate change, therefore, brings a futures dimension to understanding vulnerability. It highlights the uncertainty of future risk and with this an uncertainty concerning the bundle of assets that will enable greater adaptation and resilience, or lead to increased vulnerability. An asset-based vulnerability approach that incorporates social, economic, political, physical, human and environmental resources allows for flexibility in analysis and in planning interventions that is harder to maintain in a hazard-specific approach. It also highlights how many assets serve to reduce vulnerability to a range of hazards.

---

<sup>2</sup> Sen's (1981) work on famines and entitlements, assets and capabilities, as well as Chambers (1992; 1994) and others on risk and vulnerability influenced an extensive debate that defined concepts such as capabilities and endowments, and distinguished between poverty as a static concept, and vulnerability as a dynamic one that better captures change processes as 'people move in and out of poverty' (Lipton and Maxwell 1992, 10).

## **Box 2. Definition of the Most Important Capital Assets**

**Physical capital:** the stock of plant, equipment, infrastructure and other productive resources owned by individuals, the business sector or the country itself.

**Financial capital:** the financial resources available to people (savings, supplies of credit).

**Human capital:** investments in education, health, and the nutrition of individuals. Labour is linked to investments in human capital; health status determines people's capacity to work, and skill and education determine the returns from their labour.

**Social capital:** an intangible asset, defined as the rules, norms, obligations, reciprocity, and trust embedded in social relations, social structures, and societies' institutional arrangements. It is embedded at the micro-institutional level (communities and households) as well as in the rules and regulations governing formalized institutions in the marketplace, political system, and civil society.

**Natural capital:** the stock of environmentally provided assets such as soil, atmosphere, forests, minerals, water and wetlands. In rural communities land is a critical productive asset for the poor; while in urban areas, land for shelter is also a critical productive asset.

Sources: Bebbington 1999; Carney, 1998; Moser 1998; Narayan 1997; Portes 1998; Putnam 1993.

Vulnerability is closely linked to a lack of assets. The more assets people have, the less vulnerable they are, and the greater the erosion of people's assets, the greater their insecurity. As a starting point, it is useful to identify how assets are defined, as well as those of particular importance in the context of climate change. Generally, an asset is identified as a "stock of financial, human, natural or social resources that can be acquired, developed, improved and transferred across generations. It generates flows or consumption, as well as additional stock." (Ford 2004). In the current poverty-related development debates, the concept of assets or capital endowments includes both tangible and intangible assets, with the capital assets of the poor commonly identified as natural, physical, social, financial and human capital (see Box 2)<sup>3</sup>. The trauma of climate change-associated disaster events is seldom included in impact assessments. Where this has been done, assets are shown to be both a significant factor in self-recovery and to be influenced by the response and reconstruction process. Where survivors participate in decision-making, psychological recovery strengthens the recovery of livelihoods and well-being. Reconstruction is a period where entitlements can be re-negotiated to improve the capacity and well-being of the poor, or to entrench poverty and inequality reconstructing vulnerability through reconstruction.

### **3.2. Asset-based adaptation**

Asset-based approaches to development are not new and as with poverty definitions are rooted in the 1990s international poverty debates. Assets are closely linked to the concept of capabilities. Thus assets "are not simply resources that people use to build livelihoods: they give them the capability to be and act" (Bebbington 1999). As such, assets are identified as the basis of agents' power to act to reproduce, challenge or change the rules that govern the control, use and transformation of resources (Sen 1997). In recent work on asset-based approaches Moser (2007) distinguishes between an asset index conceptual framework as a diagnostic tool for understanding asset dynamics and mobility, and an asset accumulation

---

<sup>3</sup> In addition to these five assets, which are already grounded in empirically measured research (see Grootaert et al 2001), more "nuanced" asset categories have been identified. These include the aspirational (Appadurai 2004), psychological (Alsop et al 2006), productive and political assets, increasingly associated with human rights (Ferguson et al 2006, Moser et al 2007). These examples illustrate the growing importance of thinking "outside the box" and moving beyond well-established categories of capital assets.

policy as an operational approach for designing and implementing sustainable asset accumulation interventions.

To get beyond vulnerability and focus on strategies and solutions, the paper introduces an asset-based climate change adaptation framework that is pro-poor in focus and identifies the role of assets in increasing the adaptive capacity of low-income households and communities to climate change. Asset-based frameworks are concerned specifically with assets and their associated long-term accumulation strategies (see Moser 2007; Carter 2007). Assets are closely linked to growth and risk management. For asset accumulation, risk is generally seen as an opportunity, although in the context of physical hazard it may be difficult to identify this. Yet, long-term protection against such hazards may in themselves provide incentives and create opportunities for the provision of critically important improvements to mechanisms of resilience and investing in opportunities. Clearly the asset-portfolios of individuals, households and communities are a key determinant of their adaptive capacity both to reduce risk and to cope with and adapt to increased risk levels. As discussed below, they also influence capacity to make demands on, and work with, local governments.

An asset-based adaptation strategy in the context of climate change includes a number of basic principles. These include the following:

- First, the process by which the assets held by individuals and households are protected or adapted does not take place in a vacuum. External factors such as government policy, political institutions, and nongovernmental organizations all play important roles, further discussed in Section Five. However institutions can also include the laws, norms and regulatory and legal frameworks that either block or provide access, or indeed positively facilitate asset adaptation, in a variety of ways.
- Second, the formal and informal context within which actors operate can provide an enabling environment for protecting or adapting assets. Entry points to strengthen strategies for asset adaptation are contextually specific but may be institutional or opportunity-related in focus. The adaptation of one asset often impacts on other assets that are highly interrelated; similarly insecurity and erosion in one can also affect other assets.
- Third, household asset portfolios change over time, sometimes rapidly, for example following marriage or the death or incapacity of an income earner. Thus households can quickly move into security/vulnerability through internal changes linked to life cycle as well as in response to external economic, political and institutional variability.

The key to the development of an asset-based adaptation framework therefore, is, first and foremost, the identification and analysis of the connection between vulnerability and the erosion of assets which is discussed in Section Four. Section Six then goes further and introduces an asset-based adaptation framework that seeks to identify asset adaptation or protection strategies as households and communities exploit opportunities to develop resilience and resist, or recover from, the negative effects of climate change<sup>4</sup>.

---

<sup>4</sup> Research results on longitudinal asset accumulation in Guayaquil, Ecuador, showed that asset accumulation policies were not static but changes over time, with a useful distinction made between first and second generation policies (Moser 2007).. While first generation asset accumulation policy generally provides social and economic infrastructure essential for assets such as human, physical capital and financial capital, second generation asset accumulation policy in contrast is designed to strengthen accumulated assets, to ensure their further consolidation and to prevent erosion. Such strategies go beyond issues of welfare and poverty reduction to address a range of concerns relating to citizen rights and security, governance and the accountability of institutions. While this distinction may also be relevant for an adaptation framework it will require further redefinition – a policy issue that goes beyond this paper.

## 4. Urban poverty, asset vulnerability and climate change

### 4.1. Types of vulnerability and groups particularly affected

Hazards from extreme weather combine with vulnerabilities to produce impacts on the urban poor's human (health) and physical capital (housing) and their capacity to generate financial and productive assets. Some impacts are direct, such as more frequent and more intense floods. Those that are less direct include reduced availability of freshwater supplies. Finally, others that are indirect include constraints on food supplies and increased prices.

There is also considerable variation in levels of vulnerability to climate change within low-income populations, in terms of both the hazards to which they are exposed and their capacity to cope and adapt. Variations exist among settlements in terms of the quality of physical capital and homes, the provision for infrastructure, and the risks from flooding or landslides. In addition, concern with risk-reduction through building improvements will vary depending on ownership status, with tenants often less interested, especially if their stay is temporary, such as seasonal migrants (Andreasen 1990).

Residents often have short-term outlooks which make it difficult to engage them in to address longer-term concerns. For instance, a recent review of flooding in urban areas in sub-Saharan Africa documented how changing rainfall patterns and increasing storm frequency is aggravating the problem of flooding. In most cities settlement layout restricts where floodwaters can go, with large parts of the ground covered with roofs, and roads, pavements and natural channels obstructed. This results in increased local runoff and higher flood frequency, magnitude and duration, aggravated by the occupation of floodplains, usually by informal settlements, as well as the lack of attention to household waste collection and the construction and maintenance of drainage channels. Now, even quite modest storms produce high flows in rivers or drains, and floods (Douglas et al 2007, 2008).

In identifying the vulnerability of poor urban populations to extreme-weather events, there are also differences in people's knowledge and capacity to act. These include issues such as gender with differences in women and men's exposure to hazards, capacities to avoid them, to cope with them and adapt to them. Age is also important with children facing greater risks and less coping capacities to some impacts, and very young children and older groups facing particular risks to some impacts, as is an individual's health status regardless of age and gender.

It is useful to identify different aspects, or types of vulnerability to climate change in terms of four broad questions, each of which is particularly, though not entirely, associated with an aspect (or stage) of asset adaptation:

1. **Long-term protection:** Who lives or works in the locations most at risk from the direct or indirect impacts of climate change, including the infrastructure necessary to reduce risk?
2. **Pre-disaster damage limitation:** Who lacks knowledge and capacity to take immediate short-term measures to limit impact?
3. **Immediate post-disaster responses:** Who and whose homes/neighbourhoods face greatest risks when impact occurs and are least able to cope with impacts?
4. **Rebuilding:** Who is least able to adapt to avoid impacts?

At the outset it is important to note that many components of poverty reduction strategies also build resilience against a range of hazards, and thus compliment actions targeted at particular group's exposure to specific hazards. For instance, better quality housing and infrastructure and services greatly reduce a

range of hazards — including biological pathogens (disease causing agents), while an effective health care system reduces the impact of illnesses and injuries.

**1. Long-term protection: *Groups living or working in locations most at risk, or who lack protective infrastructure***

Most at risk in cities are lower-income groups living in environmentally hazardous areas. For instance, large concentrations of illegal settlements can be seen on hills prone to landslides (Rio de Janeiro, La Paz, Caracas and Bamenda), in deep ravines (Guatemala City) or on land prone to flooding (Guayaquil, Recife, Monrovia, Lagos, Port Harcourt, Port Moresby, Delhi, Bangkok, Jakarta, Buenos Aires, Resistencia, Santa Fe, Mumbai, Accra, Kumasi, Mombasa) (Hardoy, Mitlin and Satterthwaite 2001). In fact most major cities were founded on ‘safe’ sites, but have grown to sizes never envisaged by their founders. Increased exposure to extreme-weather hazards is partly related to expansion onto hazardous sites, such as Caracas and Rio de Janeiro’s settlement expansion onto steep, unstable slopes, or Guayaquil’s expansion onto the low-land mangrove swamps of the suburbios. Risks faced in such sites have been exacerbated by damage to natural systems including the loss of mangrove stands, or hillside vegetation and deforestation yet areas constantly exposed to flooding increasingly attract low-income groups because of cheaper land and housing prices.

Aside from sea-level rises, extreme weather impacts frequently relate more to the lack of protective infrastructure and services than to the hazards inherent to urban sites. For instance, it is generally cities with greatest protective infrastructure inadequacies that have experienced the highest number of flood-related deaths and injuries over the last 25 years. The lack of protective infrastructure is partly linked to the constrained investment capacity of city and municipal governments. But in some cities, it is associated more with the problematic relationships between local governments and urban poor groups living in high-risk informal settlements. These populations often occupy illegal land and work in the informal economy outside official rules and regulations. Infrastructure and service provision agencies at times do not work in such informal settlements because of the “anti-poor” attitudes of government officials and politicians<sup>5</sup>. Within such settlements most loss or damage to buildings in extreme weather is the result of poor building quality and the lack of application for effective, locally relevant building codes. The greater intensity and shifting geography of windstorms that climate change is likely to bring will also mean that existing infrastructure is not prepared for hazard exposure.

As is the case in any forced relocation conflicts can develop when governments bulldoze settlements to clear poor groups off land-sites deemed to be vulnerable to (for instance) floods. This can result in standoffs, physical resistance and even personal injury to those trying to defend informal property and associated livelihoods (an issue widely documented during the apartheid period in South Africa). This is exacerbated when alternative sites are inadequate or not provided at all. Even accountable urban governments face difficulties in addressing this issue, because low-income groups need locations that provide income-earning opportunities.

**2. Pre-disaster damage limitation: *Groups with less capacity to take action to avoid impact***

Generally high-income groups and formal businesses with protected buildings and sites do not require ‘emergency preparedness’ measures in response to forecasts such as for storms and high tides. For groups living in less resilient buildings, and more dangerous sites, potential wellbeing and asset impacts can be reduced by appropriate actions. However, to be effective, advanced reliable information needs to reach those most at risk, to be considered credible, and to contain supportive measures that allow them to

---

<sup>5</sup> Misconceptions include the assumption that informal settlements population are unemployed (when in reality they work long hours), that they are recent migrants (rather than city-born or long-term residents), or that migrants would have been better off if they had not migrated (despite the fact that migration studies show that this is a logical responses to changing economic opportunity).

take risk-reducing actions. This includes the identification of known safer locations, and provision of transport to assist them move. An example from Santa Fe (Argentina), for instance, showed that although flood risk information was widely available, many people failed to move because they were not convinced of the reliability of the official information, because of a lack of knowledge as to what to do, their concern about post-flooding looting, and the worry that the government would not allow them to return to their settlement. Risks faced by low-income households can be exacerbated by economic concerns. For instance in San Salvador, many roofs were blown off during storms because households had not fastened them securely — because they wanted to keep the roofs intact and unmarked so they could be sold in a crisis (Wamsler 2007).

Climate-change makes extreme events less predictable – which in turn makes long-established coping mechanisms less effective. The experience of the INGO, ActionAid illustrates this. The agency held discussions on flooding problems with residents of poor communities in such cities as Accra, Kampala, Lagos, Maputo and Nairobi. Residents in each city identified that flooding had become more frequent and less predictable. In all cases resident responses were ad-hoc, individual, short-term survival efforts. These included sleeping on furniture, moving families to safer sites; measures to protect property ranged from barriers to water entry at the door, trenches to steer water away, and outlets at the house rear so water could quickly flow out. Organized community action to limit impacts, such as clearing drainage channels in anticipation of flooding, was found to be relatively rare, while there was also no evidence of coordinated action to develop emergency shelter in any of these cities. Examples such as this show that even pre-disaster it cannot be assumed that poor communities have high levels of trust and cohesion, community social capital. This depends on a complex set of factors including length of settlements, pattern of occupation and state infrastructure delivery mechanisms (see Moser and Felton 2007).

Important differences in knowledge and the capacity to act to limit risk exist based on age, gender and health status. This includes an action as simple as differentials in the capacity to run or to swim, with speed variations relating to different groups; infants, younger children, adults caring for them, the disabled and older people all move more slowly when responding to impending risks. In societies where women are constrained by social norms from leaving the home they may move less rapidly to avoid floodwater, as is also the case with women who take responsibility for young children as is frequently the situation. Although the Indian Ocean Tsunami was not related to climate change, its impacts illustrate differentials in vulnerability; in India, Indonesia and Sri Lanka, Oxfam America found mortality in women was between three and four times that of men (Oxfam America 2005).

### **3. Immediate post-disaster responses: *Groups less able to cope with impacts***

Disasters have differential impacts on the poorest, often separating communities and households. Again particular groups, differentiated by age, gender, health status, and other forms of exclusion such as ethnicity or religion, are least able to cope with the immediate affects of climate change related disasters. Infants, young children and older age groups are at greater risk of heat stress from heat waves while children face higher risks of injury or death from the direct impact of most extreme weather events and from the disruption they bring to, for instance, safe water and food supplies. Children face a range of increased risks after a disaster, such as the increased likelihood of being removed from school/put into work as income is lost. Disaster events often endanger the personal safety of girls and women, with higher risk of gender-based violence, abuse and maltreatment associated with household stress and/or displacement (Bartlett 2008). However, there has been little attention to date focused on protection against sexual and domestic violence (Enarson and Meyreles, no date). While little is known on the psychological impact of urban disasters, it is clear that different forms of trauma unfold over time from acute shock lasting a few days, to longer-term impacts such as recurrent stress related illnesses and reduced quality of life (Bartlett 2008).

#### **4. Rebuilding: *Groups less able to adapt after impact***

Poorer groups not only get hit hardest by the combination of greater exposure to hazards and a lack of hazard-removing infrastructure, but also have less capacity to adapt after disaster — with less state support and insurance protection. Post-disaster reconstruction process often offers opportunities for private gain (it has been argued that this is one reason why disasters are managed through post-disaster reconstruction rather than pre-disaster risk management) with associated inequitable resource allocations again a cause of conflict between different groups within communities affected by disaster, such as landlord and tenants, looting of the asset-rich by the asset poor.

Within poorer groups, again some have particular problems. When populations are forced to move, gender inequalities that exist prior to a disaster can manifest themselves in many ways afterwards — not only in differential impacts but also in the resources and services available to support recovery and reconstruction. Women’s needs and priorities are rarely addressed in resettlement accommodation, with particular problems faced by women-headed households and widows (Enarson, 2004). Women generally assume most child-rearing and domestic responsibilities, even when often more onerous and time consuming, with greater difficulties getting food, fuel and water, among other domestic responsibilities. At the same time they “struggle in the fast-closing post-disaster ‘window of opportunity’ for personal security, land rights, secure housing, employment, job training, decision-making power, mobility, autonomy, and a voice in the reconstruction process” (ibid). Equally problematic is the failure to recognize women’s individual and collective capacities for recovery and reconstruction as community leaders, neighbourhood networkers, producers, gardeners, rainwater harvesters, and monitors of flood prone rivers. This means that their resources, capacities, assets and hard-won knowledge about how to make life safer and live with risk are all ignored. Examples show that supporting women’s involvement in reconstruction and in rebuilding their livelihoods not only benefits women but also their communities (Enarson 2004).

Children are also generally affected in more extreme ways than the population as a whole, both by extreme events and by longer term climate-change.<sup>6</sup> This relates to their greater physiological and psychosocial vulnerability to a range of associated stresses, as well as the long-term developmental implications of these vulnerabilities. Disruptions to water supplies and sanitation systems for instance, are far more likely to result in diarrhoeal illness for infants and young children than for other age groups, and repeated episodes can have long-term implications for physical growth and even cognitive functioning. Almost all of the disproportionate implications for children are exacerbated by poverty and by the difficult choices that must be made by low-income households as they adapt to more challenging conditions. Thus, many of the well-documented pathways between poverty and poor developmental outcomes for children are intensified by the added pressures of climate change.

---

<sup>6</sup> This text draws direct from a background paper prepared by Sheridan Bartlett; see Bartlett 2007 and Bartlett 2008.

## 5. Current government operational frameworks for action

### 5.1. Introduction

The quality of government, both at national level and, as crucially, at local (district or municipal) level, influences the levels of risk from climate change facing those with limited incomes and assets. This will determine the following:

- *The quality of provision for infrastructure for all areas* (that limit risks of flooding for the whole city area, not just for the wealthier areas) and land-use management (to limit or make more resilient settlements in high-risk areas);
- *Good disaster-preparedness* (including warnings, measures taken to limit damage and, if needed, provision to help people move to safer areas quickly);
- *Quality of planning for and coordinating disaster-response* (for instance rescue services and appropriate emergency and health care services) and reconstruction (to help those who have lost their homes and livelihoods) which should aim to improve resilience, but seldom achieves this;
- *Extent to which poorer groups can buy, build or rent “safe” housing in “safe” sites;*
- *Degree to which local government creates an enabling environment for households and local civil-society action* to contribute towards addressing the practical aims identified above.

### 5.2. Local government as the institution driving adaptation

The first task for city governments is to take the lead in climate change risk assessments — to ensure both areas and population groups that are particularly vulnerable are identified. For cities with effective city development plans or strategies, it is then easy to formulate and implement climate adaptation plans, or strategies, identifying key intervention points. Although most plans prioritize economic growth and the necessary associated infrastructure, their development constitutes a process engaging powerful stakeholders, into which adaptation issues can be introduced. This is simplest in cities that already prioritize environmental issues and/or disaster preparedness. In most instances the key is competent, accountable urban governments that understand how to incorporate, or mainstream, adaptation measures into their work and departments. For other cities and the smaller urban centers that dominate low- and middle-income countries, the long-term goal is to support local capacity to develop adaptation strategies.

Important intervention points include, first, adjusting local planning, regulatory and financial frameworks to encourage and support adaptation by households, community organizations, NGOs and the private sector; and second, local government responses to bottom-up pressures for risk-reduction. Many needed measures may seem to be quite minor adjustments to current practices, such as adjusting building codes, land sub-division regulations, land-use management and infrastructure standards, that in sum over time can build greater resilience without high costs. However, this requires cross-departmental collaboration and agreement on responsibility for the different measures undertaken individually or jointly — which in turn means careful locally rooted risk assessments and widespread consultation.

At first sight such adaptation framework would appear to have a limited role for households, community organizations and other civil society organizations. Theoretically city and municipal governments are in charge of planning, implementing and managing most measures that can diminish climate-change risks, including those that address the high vulnerability of particular groups to known hazards, such as floods, heat waves or increased constraints on freshwater supplies. Their responsibilities also include factoring climate-change related risks into new development plans and investment programs, adapting infrastructure standards and building codes as appropriate. If this were the case, there would be limited relevance for adaptation strategies focusing on the assets and capabilities of low-income households and

their grassroots organizations, except to ensure that local government is responsive to their protection-priorities.

However, to date, there is little evidence of state institutions in low- and middle-income countries acting on adaptation in urban areas. For instance, in India, Chile, Argentina and Mexico, central government is starting to be concerned about adaptation but this has yet to engage the interest of the larger, more powerful national ministries or agencies or city and municipal governments.<sup>7</sup> Local government politicians and civil servants are often confused as to how to respond to climate change.<sup>8</sup> This is not surprising. Even in the cities of high-income countries where there is the greatest awareness of climate change — that have made substantial efforts to reduce emissions — there has been no move on adaptation (Ligeti, Penney and Wieditz 2007). This is not helped by the lack of locally relevant data on the likely direct and indirect impacts of climate change in each urban area.

### **5.3. Comparing local government roles in high-income nations and low- and middle-income countries**

Is the lack of government responsibility only a problem in low and middle income countries? High-income countries experience shows that local government is the key locus for action on adaptation. Households in London or Washington DC, for instance, do not expect to have to make major investments in adaptation, or to work with community-based organizations to do so. If there is serious flooding, this is seen as the responsibility of government, even where households chose to live in new developments in floodplains. Urban populations now take for granted that a web of institutions, infrastructure, services and regulations protect them from extreme weather/floods, and keep adapting so as to continue protecting them. Many of the measures to protect against extreme weather supply everyday needs; health care services integrated with emergency services and sewer and drainage systems serve both daily requirements but also can cope with storms. The police, armed services, health services and fire services, if or when needed, provide early warning systems to ensure rapid emergency responses. Consequently extreme weather events rarely cause a large loss of life or to seriously injury. Although occasionally such events cause serious property damage, the economic cost is reduced for most property owners by property and possessions insurance.

This adaptive capacity is also underpinned by most buildings conforming to building regulations and health and safety regulations and served by piped water, sewers, all-weather roads, electricity and drains 24 hours a day. The institutions responsible for such services are expected to make these resilient to extreme-weather events. Consequently infrastructure and services, paid direct as service charges or taxes, represent a small proportion of citizen income. While private companies or non-profit institutions may provide some of the key services, the framework for provision and quality control is supplied by local government or local offices of provincial or national government. In addition, it is assumed that city planning and land-use regulation will be adjusted to any new or heightened risk that climate change may bring, encouraged and supported by changes in private sector investments (over time shifting from high-risk areas) and changes in insurance premiums and coverage. At least for the next few decades, as the

---

<sup>7</sup> Satterthwaite, Huq, Pelling et al 2007; this paper drew on unpublished background papers by Jorgelina Hardoy and Gustavo Pandiella (Argentina), Karina Martínez, E. Claro and Hernando Blanco (Chile), Aromar Revi (India) and Patricia Romero Lankao (Latin America).

<sup>8</sup> The authors have participated in many climate change conferences with mayors or technical staff from urban governments in low- and middle-income countries; their presentations suggested considerable confusion between adaptation and mitigation, and between conventional urban environmental policies and climate change (for instance an assumption that controlling air pollution necessarily lowers greenhouse gas emissions). There may also be more knowledge of mitigation than adaptation.

IPCC’s Fourth Assessment stressed, this ‘adaptive capacity’ can deal with most likely impacts from climate change in the majority of urban centers in high-income countries.<sup>9</sup>

**Table 2: Different local contexts through which national governments and international agencies can pursue “good governance” for adaptation**

| Resources available to local government  | The quality of local government/governance   |   |
|--|--|---|
|  | From democratic and accountable local government structures...   | ...to undemocratic, unaccountable and often clientelist local government  |
| From relatively well-resourced, local government institutions with the needed technical competence...        | Local government can be well served by external funding to support adaptation by households and private enterprises as well as for infrastructure and support services (provided by community organizations, NGOs, private enterprises or government agencies) | Long-term support needed for governance reforms at all levels of government; support needed for local private and community provision, to improve conditions and build local capacity to pressure on government for better governance |
| ...to poorly resourced local governments lacking funding, a strong local revenue base and technical capacity | Support to building local government adaptive capacity; support for its partnerships with civil society, with local private-sector infrastructure and with service providers (including informal providers) and for disaster preparedness                      | As above but with strong support for local private providers and community provision within a long-term goal of supporting more competent, accountable and transparent local government   |

For the most part, households and community organizations in high-income countries engage very little with the institutions that ensure their protection other than through complaint channels such as local politicians, lawyers, ombudsmen, consumer groups and watchdogs. While some groups are ill-served or excluded, a high proportion of the urban population is well served and protected. In contrast to this situation in high-income countries, it is difficult to generalize about the competence and capacity of local governments in low- and middle-income nations, given the level of variation relating to the extent to which they work, with and are accountable to, lower-income groups. Table 2 contrasts the resources available to local governments, and the quality of local governance and level of citizen accountability. In the thousands of cities and smaller urban centres where most of the population live in illegal and informal settlements not only is the public provision of infrastructure and services inadequate; in addition there are few mechanisms of accountability to local governments that lack resources to meet their responsibilities. At the same time such local governments are often unrepresentative, and anti-poor, regarding informal settlement populations as ‘the problem’ rather than as key parts of the urban economy.

At the other extreme are cities and towns where infrastructure and services provision deficiencies affect a much smaller proportion of the population. This often reflects local governments that are more accountable to the citizens in their jurisdiction, with national government structures that have strengthened and supported this level of government. This often associated with stronger local democracies. For instance, in many urban centres in Latin America, the quality and coverage of provision

---

<sup>9</sup> Some locations cannot be defended, while the potential for adaptation to keep down risks depends on effective mitigation. The weakest governance point in richer societies is reconstruction, where the investment potential both to enhance the life chances and well-being of the urban poor and to lead in local economic regeneration is consistently missed. Government responses to recent flooding in Hull, UK and New Orleans, USA have shown little sign of catalysing progressive reconstruction and have been undermined by slow administrative systems compounded by insurance services in the case of Hull, and competition for reconstruction funds between business interests and survivors in the case of New Orleans; (Independent review body (2007) final report of the June 2007 floods in Hull, see <http://www.coulthard.org.uk/downloads/floodsinhull3.pdf>; Koepp (2007).

for water, sanitation and drainage has improved very considerably over the last two decades, while others already have close to 100 percent coverage (UN Habitat 2006; Heller 2006). Several countries have implemented constitutional or legal changes to increase city and municipal government revenues and to strengthen local democracies (Campbell 2003; Fernandes 2007; Cabannes 2004). There are also an increasing number of local governments that have developed successful partnerships with low-income groups and their community organizations that demonstrate cheaper, more effective ways in which they can meet their responsibilities for infrastructure and services (D'Cruz and Satterthwaite 2005; Hasan 2006).

## 6. Community responses to climate change: A pro-poor asset-based adaptation framework to extreme weather

Given the limited commitment and effectiveness of many city or municipal governments to address the impacts of climate change, discussed above, it is clear that a framework needs to be developed that focuses both on local and household responses, as well as their capacity to negotiate and contest government. This section describes such an operational framework that seeks to provide a more systematic operational approach to adaptation to urban climate change.

The conceptual framework, briefly described in Section Two, introduced a crucially important time dimension that distinguished between four closely related stages of intervention: long-term protection; pre-disaster damage limitation; immediate post-disaster response; and rebuilding. For each of these, asset-based actions and associated institutions/social actors at household, community and government level need to be identified (see Table 3). Obviously, the greater the success in the first stage, the less the need for intervention in the second, third and fourth stages; similarly good pre-disaster damage limitation can greatly reduce the impacts and thus the need for post-disaster response and rebuilding. This is a critical point and has implications for human well-being as well as the economic costs of disaster. The economic savings to be made by investing in disaster prevention compared to the costs of reconstruction are contingent on place<sup>10</sup>.

**Table 3: Synthesis of asset-based adaptation framework to extreme weather/disasters**

| Areas for intervention          | Long –term protection: floods/storms          | Pre-disaster damage limitation | Immediate post disaster response | Rebuilding |
|---------------------------------|---|--------------------------------|----------------------------------|------------|
| <b>Actions and institutions</b> | Asset-based actions and institutions / actors |                                |                                  |            |
| <b>Levels</b>                   | Household and neighbourhood                   |                                |                                  |            |
|                                 | Municipal or city                             |                                |                                  |            |
|                                 | Regional and national                         |                                |                                  |            |

This section describes each stage for intervention in turn illustrated with examples from the literature and commissioned studies. Ideally it would have been preferable to have provided examples of asset-based actions implemented. However, the dearth of such examples means that it has been necessary to cite prescriptive recommendations as much as descriptive concrete experience.

### 6.1. Asset-based adaptation for long-term protection

This is undoubtedly the most important stage of intervention since getting in place long term adaptation precludes, or greatly reduces, the need for interventions in the other three stages. But the first stage is also the most difficult to implement for a range of reasons that are not only economic and social but also political in nature. At the outset it is important to recognize that most low-income groups in urban areas already have a range of adaptive measures. Such groups spend their lives adapting to change whether it is in economic opportunities, political circumstances or housing risks. At the same time their survival needs and economic priorities often conflict with risk reduction. A case study in Indore, for instance, showed

<sup>10</sup> The World Bank and US Geological Survey calculated that economic losses worldwide from disasters during the 1990s could have been reduced by US\$280 billion if US\$40 billion had been invested in risk reduction. In China, US\$3.15 billion flood control investments over 40 years are thought to have averted losses of US\$12 billion. Studies in Jamaica and Dominica have put the ratio of costs for reconstruction against prevention at between 2:1 and 4:1 (DFID 2005), although some sources suggest that it can be up to 10:1 (IIED 2007).

how the inhabitants of a low-income settlement at high risk of flooding had developed their own local temporary and permanent adaptations measures; they were unwilling to move to safer sites because that were not well located in terms of income-earning opportunities (Stephens, Patnaik and Lewin 1996).

**Table 4: Asset-based adaptation framework for long-term protection from floods and storms**

| <b>Asset based actions</b>   | <b>Institutions/actors</b>                                 |
|--|--|
| <b><i>Household and neighbourhood level</i></b>  |  |
| Households relocate to safer sites (perhaps resulting in erosion of financial and social capital and loss of the physical asset, housing itself)   | Households, housing finance agencies                       |
| Households improve housing and physical assets (providing better protection against hazards); risk reduction through community space management to reduce local hazards  | H/h, CBOs, NGOs  |
| Households protect productive assets   |  |
| Households get insurance (property and possessions) with implications for financial capital  | Insurance companies, NGOs, community based micro-insurance |
| Community-based disaster-response and preparedness training including early warning systems, safe sites and routes to them identified as preventative measure for human capital and family first aid   | NGOs; CBOs   |
| <b><i>Municipal or city level</i></b>  |  |
| Local government provide or upgrade protective infrastructure and adjust official standards  | In partnership with CBOs and NGOs                          |
| Local/city government support for household and neighbourhood action to improve dwellings and infrastructure   | Government agencies and households, CBOs, NGOs...          |
| City/municipal hazard mapping and vulnerability analysis as basis for identifying adaptation strategy. Also land use planning so slums don't end up in the most risky sites and wetlands and floodplains are retained and can fulfil their natural functions | Government agencies working with NGOs and CBOs             |
| <b><i>At regional and national level</i></b>   |  |
| 7. Risk reduction investments and actions that are needed beyond city boundaries (eg upstream or within watershed)   | Local and extra-local government                           |
| 8. State framework to support the above  | Regional and national government                           |

A pro-poor adaptation policy starts by identifying the measures to be introduced for long-term protection for those identified as vulnerable, as described in Section Two. Risk can be reduced both through improving existing conditions of vulnerability (i.e., existing slums), and by planning to prevent new conditions of vulnerability from emerging in the city (i.e., planning for future urban expansion). Given that the majority of urbanites live in towns of less than 500,000, the latter is particularly relevant in rapidly expanding towns where this provides opportunities for urban development to be a force for adaptation.

Reducing exposure and increasing the resilience of physical capital that has already accumulated in cities can be done in three ways:

- Reducing hazards in sites they already occupy through installing protective infrastructure and complementary risk-reduction measures (which may need modifications outside the area at risk — for instance watershed management upstream);
- Supporting better quality buildings — for instance through technical support and where needed appropriate finance systems;
- Assisting those who live in the most dangerous sites to move to safer sites; as well as taking measures to increase the supply and reduce the cost of land-for-housing on safe, serviced

sites. Theoretically land use planning should plan hazard exposure out of a city's expansion although this is rarely done.

Examples of success for all three ways exist; for the first and second, 'slum' and squatter upgrading is important, although to be effective in climate-change contexts, requires modifications to address impacts. Thus, buildings constructed without attention to health and safety standards, can be retrofitted, although this may be more expensive than building safe dwellings. Artisan construction often has little experience of building hazard-proof buildings. For the third, few examples of success can be identified; largely because the alternatives offered to those who move from dangerous sites brings economic and social disadvantages.

The relocation of existing houses and settlements away from areas at high risk from extreme weather, coupled with land-use management strategies to prevent new settlements in such areas is probably the most important asset-based strategy. Although homeowners and renters alike often resist relocation, because it can result in a decline in financial capital and social networks, as well as the loss of the physical asset itself, the housing. For poor urban households housing is the first and most important asset they seek to acquire (see Moser and Felton 2007). Addressing city and municipal government's incapacity or unwillingness to ensure land-for-housing available on safe sites problem is not simply a technical problem. Regardless of climate change, it is highly political, relating to land interests and elite resource allocation. Climate change therefore simply increases the exposure to the risk of subsidence, mud-slides, wind-damage or flooding and to the political economy of related policy (ODI, 2007). As discussed in the section on relocation above, this is an entry point for conflict and violence between those seeking to use the opportunity to gain land, as against those being ejected.

In Mombasa, for instance, Awuor, Orindi and Adwerai (2008) note that along with ecological and climatic factors relating to low altitude, high average temperatures and humidity, *socio-economic factors*, particularly unplanned settlements contribute to the increased vulnerability of the city population's to climate change impacts. High population density, and large number of unplanned settlements that have encroached into areas demarcated for infrastructure, (such as roads, drainage and sewerage lines) not only increase the risk of flooding whenever it rains but also make rescue operations difficult once disasters strike. The Mombasa District Commissioner, while inspecting the extent of damage caused by floods in April/May 2006, attributed the poor drainage to Mombassa's mushrooming of slums and land-grabbing.<sup>11</sup> He noted that building perimeter walls and unplanned structures along water ways interfered with drainage of water, and led to flooding in most parts of the city. This assessment however, was not followed up by any action.

Households are more likely to opt for housing improvements and risk reduction rather than relocation. As Hardoy and Pandiella (2008) identify in the case of Latin American cities, when legal land for housing is scarce and/or unaffordable for low-income groups, households face choices between different types of vacancy and ownership (private or state owned), accessibility (especially to income-earning opportunities), and possibilities of service provision and regularization.. Where dwellers' organizations pre-exist, they may select a piece of land and prepare an urban plan with plots and streets. Once settled, they struggle for services, regularization, and in cases where the natural and environmental conditions generate risks; they also start demanding government for solutions (Moser 1998). But many of the sites on which they have developed their homes face risks. For instance, around 1.1 million people live in the favelas of Rio de Janeiro that sprawl over the slopes of the Tijuca mountain range. Over time, the inhabitants have improved their housing, incorporating more permanent materials, and obtained services such as electricity, water and sewerage. Though favelas have always suffered during the rainy season, the paving of sidewalks has increased water runoff to the point that it is ankle or knee deep between houses.

---

<sup>11</sup> [The Daily Nation](#) Newspaper (May 8, 2006) Kenya: Climate Change Fuelling Conflicts, Nairobi, Kenya

Water runs down from the mountain through cemented or quasi-natural watercourses flooding low lands below. The accumulation of uncollected wastes poses serious problems. Extreme rains only increase the risks in the area (De Sherbinin, Schiller and Pulsipher, 2007).

Although there is often scope for community-level action to build more resilience to extreme-weather, this is often difficult to manage. In Buenos Aires, for example, Hardoy et al (2008) describe how in some predominantly low-income peripheral districts, each neighbour contracts trucks to bring debris to elevate their plot of land and later compact it as best as they can. There is no agreement or coordination between neighbours so each plot ends up at different levels. When it rains, some plots get more flood waters than others. Thus the site's natural drainage has been modified without incorporating the necessary drainage infrastructure. This individualistic rather than collective response again belies the idealized picture of harmonious community social capital, pervasive in the development literature on participation.

A case study of 15 disaster-prone 'slum' communities in El Salvador also shows the difficulties of getting appropriate risk-reduction action at neighbourhood level for lower-income groups. Households recognized that flooding and landslides were the most serious risks, although earthquakes and windstorms, lack of job opportunities and water provision and insecurity due to violent juvenile crimes were also highlighted. Households on average spent 9 per cent of their incomes investing in risk reduction. Measures taken to lower risk included diversifying livelihoods or investing in assets that were easily sold if disaster occurred. Remittances from family members working abroad were important for many families, especially as support for post-disaster recovery (Wamsler 2007)...

However, the El Salvador case study also identified a complex range of issues that limited the effectiveness of household risk-reduction measures. These included the individualistic nature of households' investments, the lack of representative community organizations through which to design and implement settlement-wide measures and the lack of support from government agencies, with most residents viewing local and national governments as unhelpful or even as a hindrance to their efforts. Meanwhile, most of the institutions that supported social housing and housing finance initiatives, such as local and international NGOs, and government agencies, did not consider risk-reduction. Although their programmes usually supported safer houses, they took no actions to support insurance, or to enhance family or community capacity for recovery. Wamsler (2007) therefore identified the need for initiatives to strengthen community capacity to work collectively, so individual household efforts could better contribute to community-wide risk reduction.

Examples of city governments working with low-income groups living on high-risk sites to develop settlements in safer locations include the following:

- A relocation programme in Mumbai that was not in response to climate-hazards but to transport hazards — the tens of thousands of households living each side of the railway track — demonstrated methods for designing and implementing relocations in which those moved had far more control (Burra et al 2003).
- The large scale upgrading and secure tenure programme of the Community Organizations Development Institute in Thailand has included city-wide strategies in which poorer groups were fully involved in finding safe sites when they had to move (Boonyabantha 2005).
- The municipality of the city of Ilo in Peru coped with rapid population growth by developing a large well-located land site that made land-for-housing available at a very low-cost (Follageti 1998, Diaz and Miranda 2005).
- The city of Windhoek worked with the Namibian Homeless People's Federation to reduce minimum lot sizes and allow incremental development of infrastructure which made official legal housing plots with basic infrastructure affordable for a larger section of low-income households.

The need for partnerships is a common finding in research on the institutional architecture that best supports local adaptation. Pelling (2003) shows successful partnerships between community actors, local NGOs, international donors and municipal government that have reduced vulnerability to flood and hurricane risk in Santo Domingo, the Dominican Republic. Partnership works best when municipal agencies are responsive and accountable to local actors. Achieving this is one of the biggest challenges facing not just adaptation, but also progressive, pro-poor urban development more generally.

Most notable in the examples in India, Thailand and Namibia, mentioned above, is the active engagement of networks or federations of ‘slum’ or shack dwellers, those most at risk, in developing these solutions. Other examples, such as from South Africa, Malawi and Kenya, describe such federations negotiating official, legal, land-sites for their members, primarily women organized in savings groups. While it is important to emphasize that these examples were not driven by climate-change adaptation, and contrast to the Latin American examples above, they nevertheless demonstrate how relocation agreements were reached between very low-income households and governments, in a relocation methodology that involved poorer groups, thus avoiding the impoverishment that often accompanies such processes. When urban poor groups are engaged in the design and management of relocation, measures are taken to retain or strengthen the social networks of organizations involved in the allocation of plots and relocation move. In the Mumbai case study, it was savings groups formed by those living each side of the railways that participated in the design and management of the relocation program, both during and after the move (Burra et al. 2003). National federations of slum/shack dwellers function in fifteen countries all endeavoring to work with local governments in improving housing, infrastructure and services. Such federations also have exchange programs through which they learn from one another, as well as from local governments that work with them.<sup>12</sup> These are obviously important examples of representative organizations formed by the urban poor (in which women have central roles) that potentially offer government agencies partnerships in developing risk reduction measures central to adaptation.

For urban governments, perhaps the most critical first step in understanding adaptation needs, and their mainstreaming into conventional development programs, is to develop an information base. The data should cover the current provision for infrastructure and services, details of environmental hazards, and the identification of those most vulnerable. An important component is an impact assessment of past extreme weather and other disasters, with the level of detail including ‘small disasters’ (that do not get included in international disaster databases).<sup>13</sup> This can draw on the *DesInventar* methodology, developed in Latin America and now widely applied elsewhere. It provides intensive information on disasters in a wide range of localities, including “small disasters.” that can inform a risk/vulnerability assessment map at city and district level. Hazard maps detail what is located within hazardous zones, identify settlements, populations, or even gender or aged differentiated groups, most at risk as well as activities that may pose particular risks (such as water treatment plants vulnerable to flooding). From this, choices can be made relating to investments and support programmes for households and communities in high-risk sites.

At present climate-change models can only predict likely changes at a continental or regional level but not for particular localities. While satellite imagery has been used to map urban expansion, and can also identify environmental hazards, it is costly. Alternative approaches based on the upscaling of local and participatory vulnerability assessments are in their infancy. These are embedded within local

---

<sup>12</sup> see [www.sdinnet.org](http://www.sdinnet.org); also d’Cruz and Satterthwaite 2005.

<sup>13</sup> The Centre for Research on the Epidemiology of Disasters (CRED), which holds the only publicly accessible global disaster database, defines disaster as “a situation or event, which overwhelms local capacity, necessitating a request to national or international level for external assistance”. To be entered into the EM-DAT database, at least one of the following criteria has to be fulfilled: 10 or more people reported killed; 100 people reported affected; a call for international assistance; and/or declaration of a state of emergency; CRED EM-DAT; see <http://www.em-dat.net/>. See also International Federation of Red Cross and Red Crescent Societies 2002.

organizations and offer opportunities for raising local awareness on climate change risk, as well as providing low-cost planning data, albeit of a lower quality than that derived from city-wide sample surveys. There are also examples of detailed maps and enumerations of informal settlements undertaken by local civil society organizations, including slum and shack-dweller federations that provide examples of new approaches to address data shortfall (Hasan 2006, Weru 2004).

The ability to protect productive assets and accumulated wealth is a key indicator of adaptive capacity for poor households. Pre-disaster efforts to strengthen and secure assets and savings can help prevent post-disaster dependency and provide a basis for re-energising the local economy. In rural development, micro-credit and micro-insurance have become commonplace but both are rare in urban contexts. The NGO Development for Humane Action (DHA) combines micro-banking with skills training and social networking to build social capital and generate business opportunities for poor women. In 2006 it worked in 5,604 slum and village communities across six states in India including those affected by the Tsunami. This funding supported diversification away from fishing-based livelihoods and provided an economic boost even after disaster (Chakrabarti and Bhatt 2006). However, any financial service for low-income groups, such as micro-insurance or micro-credit for businesses or house improvement can only be effective if low-income group risks are reduced, and repayments do not draw from needed consumption (see ProVention 2007).

## 6.2. Asset-based adaptation for pre-disaster damage limitation

**Table 5: Asset-based framework for pre-disaster damage limitation**

| <b>Asset based actions</b>   | <b>Institutions/actors</b>   |
|--|--|
| <i>At household and neighbourhood level</i>  |  |
| Social assets in place to facilitate the dissemination of early warning and knowledge of how to respond                  | CBOs, NGOs, coordination with state agencies for early warning and responses, including where needed identification of safe sites and routes to it   |
| Households temporary move away from dangerous site (perhaps resulting in likely erosion of financial and social capital) | State provides transport to safe sites to those without access to private transport. Police and civil defence prepare to protect of assets left behind after the disaster has passed (eg from looting) |
| Households prepare property to withstand event (protecting physical capital)   | H/h, CBOs, NGOs  |
| Households protect or move productive assets   | H/h, CBOs  |
| <i>At municipal or city level</i>  |  |
| Preparation of safe spaces with services to which people can move temporarily  | Government, NGOs, CBOs. Oversight in early warning to ensure communication between state agencies and local focal points.  |
| Organising corridors for mass evacuation   | Police and civil defence clear main route ways to enable fast evacuation and also to prepare for the distribution of relief aid.   |
| <i>At regional and national level</i>  |  |
| Flood management upstream  | Private and state owned flood management infrastructure  |
| Disaster early warning system  | State at national and regional level   |

Most urban centers in low- and middle-income countries at high risk from extreme weather events lack the capacity to invest in measures that provide complete protection. In such circumstances, well-conceived interventions taken in the period just prior to the extreme event can greatly reduce loss of life and serious injury and loss of possessions, while also having the potential to moderate damage to homes.

Obviously, one of the foundations for this is an early warning system that not only identifies the risk but also communicates the information to all neighborhoods at risk. Many low-income countries do not have an adequate weather monitoring system although its importance is now more widely recognized. Awuor, Orindi and Adweral (2008) describe the efforts of the Kenyan government, through the local administration and Kenya Meteorological Department, to gather climate information and send it to residents and businesses in the expected impact areas, especially strategic holiday and business areas. This includes a radio-based information system for vulnerable coastal communities that will monitor sea-level rises and help detect extreme events such as Tsunamis, storm surges, coastal flooding and tropical cyclones.

However, a warning system does not in itself necessarily generate the needed actions. For instance, in El Zanjón, Buenos Aires, a low-income community at risk of flooding, the lack of timely information hindered households from taking appropriate actions prior to the arrival of floods. In 2004, a few days after the neighborhood was flooded, film makers produced a video showing the situation and linked this to climate variability and change. Local inhabitants explained how they never knew when the floods were coming, despite government having the information regarding precipitation, tides and water levels. The video was used to generate community awareness, with a community early warning system developed. A telephone line was installed so Port authorities could call one household, with a system of whistles set up to alert neighbours (Simms and Reid 2006).

Latin America provides numerous examples of the provision of early warning and immediate pre-disaster action. Cuba, for instance, is well known for its speed and efficiency. In 2004, 2 million people were evacuated as Hurricane Charley approached and although 70,000 houses were damaged, only four people died. One key driver of change in the region is the redefinition of the causes of disasters with extreme weather disasters now identified as a failure of development, rather than simply a natural event, with associated policy shifts in avoidance and reduction impact measures.<sup>14</sup> Even though this redefinition was not actually climate-change driven, it has significant relevance for adaptation. This requires a change in focus from hazard-prone areas and associated engineering solutions, to better identifying and changing the complex urban processes that increase risks.

### **Box 3: Examples of Latin American early warning systems**

- El Salvador has developed an early warning system and emergency preparation plans for communities;
- In 1993 Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua and Panama created the Centro de Coordinación para la Prevención de los Desastres en America Latina - CEPREDENAC. The center coordinates cooperation, information exchange and expert advice to improve regional decision making on risk prevention and mitigation. In each country a Commission or national risk management and disaster prevention system was set up.
- In 2000 the Government of Nicaragua created the *Sistema Nacional para la prevención, mitigación y atención de desastres* (SNPMAD) that integrates different government levels, social actors and municipal and regional committees for risk prevention and mitigation, with a clear focus on risk management. The system aims to work with municipal committees at the local level, strengthening networks and horizontal

---

<sup>14</sup> See, for instance, the work of La Red in Latin America, and Peri-Peri and AURAN in Africa (Bull-Kamanga et al. 2003;) and the work of Allan Lavell, Ben Wisner, Terry Cannon, and Mark Pelling (Pelling 2003).

- relations. A national fund has also been created to accompany the work (Soto Linda 2001).
- Andean capital cities, La Paz, Lima, Quito, Caracas and Bogotá, have initiated a regional project to strengthen local risk management capacities. This aims to establish alliances between local mayors, produce information exchange, tools, and local norms and regulations to include risk management within local development plans.

Various measures have been taken in Central America, in part in response to the devastation caused by Hurricane Mitch in 1998 which affected over 1.2 million people. Different programs and networks have been set up in the region to better prepare for disasters and these have great relevance for climate change adaptation, even if they were not motivated by it (see Box 3).

### 6.3. Asset-based adaptation for immediate post-disaster response

After any disaster-event, two separate intervention points are the immediate response and then the longer term follow-up. The two are separated, in large part because responsibility for them is generally divided between different institutions both within low- and middle-income countries and international agencies.

**Table 6. Climate-Related Disasters typology, trends and impacts in Mombasa**

| Disaster type | When it was or is experienced | Established incidence rate or return period | Impact profile (who, what was affected most and quantity/extent of damage)  | Impact on assets   | Remarks   |
|---------------|-------------------------------|---|---|--|---|
| El-Nino       | 1947, 1961 and 1997           | Approximately 5 years                       | -Houses destroyed<br>-Property lost<br>-Livestock and crops lost<br>-Human lives lost<br>-Increased disease incidents (cholera, typhoid cases)  | Physical capital eroded<br>Productive assets eroded<br>Human capital killed or eroded through ill-health | Most affected areas are estates located near the ocean and lacking or with poor drainage structures or systems. |
| Floods        | Frequently (almost annually)  | Unpredictable                               | Houses destroyed<br>-Property lost<br>-Livestock (all types lost)<br>-Human lives lost<br>-Increased disease incidents (cholera, typhoid cases) | Physical capital eroded<br>Productive assets eroded<br>Human capital killed or eroded through ill-health | Most affected areas are estates lacking or with poor drainage structures or systems.                            |
| Tsunami       | 2006                          | Unpredictable                               | -several fishing boats reported destroyed   | Productive capital eroded  | 1 human life reported lost  |
| Drought       | 2005/6                        | Every 4-5 years                             | -All agricultural activities are affected.<br>-Women spend more time looking for water.   | Productive capital eroded<br>Women's productive capital eroded   | As time is spent in looking for water, other activities suffer time allocation.<br>- Droughts also cause famine |

Source: Adapted from Awuor Orindi and Adweal 2008; Column on 'Impacts on Assets' added by Moser

As noted earlier, a careful city impact analysis of past extreme weather events or other disasters provides a valuable base from which to identify disaster avoidance and response interventions. Table 6

summarizes recent disasters experienced in Mombasa, Kenya and shows the erosion of multiple assets that predictably has included physical, productive and human capital. It also highlights the relationship between the collapse of physical capital associated with infrastructure, and its health impacts on human capital. During the flooding in Mombasa in 2006, the Ministry of Health issued a cholera alert, 94 suspected cases of cholera were reported, 13 cases were found to be positive and at least 2 deaths were reported. In addition, water sources got contaminated, several drainage systems collapsed, and water pipes washed away. The Kenya Red Cross estimated that some 60,000 people were affected by the floods in on the coast, a high proportion of who were in Mombasa (the coast's main population concentration (Awuor, Orindi and Adweal, 2008)).<sup>15</sup>

**Table 7: Asset-adaptation framework for immediate post-disaster response**

| <b>Asset based actions</b>  | <b>Institutions/actors</b>  |
|---|---|
| <b><i>At household and neighbourhood level</i></b>  |   |
| Reducing risks in affected areas (eg draining flooded areas, clearing roads); recovering assets | Government (mainly agencies responsible for disaster response) perhaps international agencies |
| Adopt cash-based social protection measures   | Donors, NGOs  |
| Restoring infrastructure and services   | Utilities, disaster response agencies   |
| Support for households to restore livelihoods with gender disaggregated analysis                | Local governments? NGOs?  |
| Planning and implementing repairs   | Households, insurance companies, local contractors  |
| <b><i>At municipal or city level</i></b>  |   |
| Rapid repairs to key infrastructure and services such as healthcare, safe water provision       | Government and utilities  |
| Human capital social protection of displaced especially for elderly and children                | Government: Ministries of Health /Education/ Welfare<br>NGOs                                  |
| Protection of physical capital to prevent looting and further erosion of assets                 | Police and security services  |
| Support for community-action  | Local government, NGOs  |
| <b><i>At regional and national level</i></b>  | Funding and institutional support for the above   |

The scale of the impact on livelihoods and incomes, especially for those the informal economy, and on school days lost, both often go unrecorded. For instance, the city of Sante Fe, Argentina, suffered serious floods in 2003, displacing a third of the city's population, causing large damages to production and infrastructure. But more floods in 2006-2007 caught the government unprepared; there were several deaths, tens of thousands of people had to evacuate, highways and roads flooded, and bridges came down. Again a third of the city was turned into shallow lake in the same area hit by the 2003 flood. City authorities recognized that in the last 50 years there has been no official urban land policy and people settled in areas near to work or social networks. But as some NGOs have commented, the lack of policies is also a way of doing politics.<sup>16</sup>

The tsunami that struck several Asian-Pacific countries in 2004 provided important lessons about relative merits of an asset-based approach. Because of the sheer volume of money donated by governments and individuals and the pressure on International NGOs (INGOs) to distribute funds quickly, direct cash transfers, cash-based social protection, to individuals and families were used in preference to gifts of food

<sup>15</sup> United Nations Office for the Coordination of Humanitarian Affairs (OCHA), 17 November 2006.

<sup>16</sup> Asociación Civil Canoa. <http://www.canoa.org.ar/PrPe-Recons.html>

or other commodities. People quickly used the cash to acquire assets they wanted and needed, which allowed them to rebuild their livelihoods faster than traditional disaster relief methods would have done. Staff also reported that cash transfers appeared to enable people to retain their dignity and take control over their own lives and communities faster (Moser et al 2007).

An awareness of the assets and capabilities of women, men, youth and children affected by a disaster and their importance in immediate post-disaster response, brings changing approaches. Maternal and child health care and nutritional supplementation are among the first supports set up in the immediate aftermath of disaster. To address the needs of human capital health interventions beyond the availability of health services and provision for personal safety and environmental health in post disaster situations is often very inadequate, especially for children and girls/women. Awareness of the heightened potential for injury is also critical after an extreme event, especially where children are concerned. A careful assessment of the post-disaster area can result in the avoidance of cuts, falls, electric shocks and other injuries from unfamiliar hazards (Bartlett 2008).

Among the key guidelines for responses are:

- People have access to an ongoing, reliable flow of credible information on disaster and associated relief efforts.
- Keep the emergency response short, and shift to cash transfers and microfinance projects rather than direct supply of goods and services as soon as possible. Principles related to community involvement and integrating a gender analysis and women in all “solutions” need to be operational immediately after disasters.
- Normal cultural and religious events are maintained or re-established (including grieving rituals conducted by relevant religious practitioners, and people able to conduct funeral ceremonies).
- As soon as resources permit, children and adolescents have access to formal or informal schooling and to normal recreational activities
- Adults and adolescents are able to participate in concrete, purposeful, common interest activities, such as emergency relief activities
- Isolated persons, such as separated or orphaned children, child combatants, widows and widowers, older people or others without their families, have access to activities that facilitate inclusion in social networks
- When necessary, a tracing service is established to reunite people and families
- Where people are displaced, shelter is organised with the aim of keeping family members and communities together
- The community is consulted regarding decisions on where to locate religious places, schools, water points, and sanitation facilities. The design of settlements for displaced people includes recreational and cultural space.
- Where ethnic or other excluded groups are affected by disaster, ensure they are included in all post-disaster responses.

Many of the problems experienced after disasters are related to the way emergency and transitional assistance is delivered, with people frequently feeling little or no control over their lives. Not only do survivors generally have no role in decisions that affect them; much of the time they do not even know what decisions have been made. The resources, skills and social capital within local communities are often overlooked in the rush to assess risks and needs. An example of an alternative approach comes from an emergency camp in Thailand, set up by the Community Organizations Development Institute (CODI). From the day after the disaster, when the camp was opened, residents were encouraged to organize themselves by alley, with each alley providing a representative to a resident committee that served as the gatekeeper for all NGOs coming to provide services. Camp residents negotiated with them to determine how best to use the assistance available. Although residents waited many months for final

relocation, the mood was very different from conventional ‘post-disaster’ settlements, and people had taken a constructive role in improving and maintaining the camp (Bartlett 2008).

Despite the rhetoric that exists on the value of genuine involvement of adults or children affected in the aftermath of a disaster, this is surprisingly rare. In part this relates to the push to accomplish a great deal in a short time, and the sense that involving people will undermine efficiency. But as the CODI example illustrates, efficiency can be enhanced when people are engaged in practical ways. But participation is too often perceived by organizations as an additional project to burden staff in an already overwhelming situation, rather than a means of getting things done. When superficial consultation occurs it usually has more to do with donor requirements for participation, than with actually sharing control with the community, drawing on their knowledge and strengths. In defense of over-burdened organizations, it must also be acknowledged that facilitating and supporting truly constructive community engagement, especially with communities that may have little practice with joint decision making, can take skill and experience, as well as genuine commitment. In many cases, those working in the field in this setting, hired suddenly in the aftermath of disaster, may have little or no understanding of this approach, let alone experience (ibid).

Approaches that encourage active engagement, community control and rebuilding social capital in the aftermath of disaster have huge implications for children. Psychosocial support sessions, however effective, cannot replace functioning families and communities. The Thailand example, described above, showed the differences for children not only in terms of their health and safety, but also in terms of the level of reassurance and stability provided by the presence of adults who were engaged and in charge. In the aftermath disasters, an important response is to get schools and early childhood centres up and running as soon as possible. The benefits of community level supportive institutions for children have been well documented. Early childhood programs, for instance, can help to reduce parental stress as well as providing young children with a safe, structured daily routine and valuable contact with other children (Williams, Hyder and Nicolai 2005). Schools provide the same routine, sanctuary and interest for older children (Nicolai and Triplehorn 2003).

#### **6.4. Asset-based adaptation for rebuilding**

Although the reconstruction process should be an opportunity to address both short term and longer-term development issues, it often just replaces old problems with new ones. There tends to be very little understanding of how reconstruction can be turned to better advantage to rebuild social as well as physical assets and thereby also contribute to poverty reduction. Table 8 outlines the key asset-based actions for rebuilding after a disaster. Obviously, one of the most pressing issues for many low-income households is whether they can get back their previous home or its site on which to rebuild — and this is often prevented by a lack of land title or by government decisions that prevent rebuilding in the affected areas.

Where reconstruction includes new housing prepared by governments or international agencies, although these may be an improvement over conditions in emergency camps and transitional shelter, it often fails to meet family members’ needs some ways. Problems relating to upgrading undertaken to reduce risks from potential climate-related extremes can occur not only for reconstructed settlements following major disasters, but also for smaller scale reconstruction.

**Table 8: Asset-adaptation framework for rebuilding after a disaster**

| <b>Asset based actions</b>  | <b>Institutions/actors</b>               |
|---|--|
| <i>At household and neighbourhood level</i>   |  |
| Displaced households seeking land rights and titles associated with political capital; rebuilding physical capital              | Households and government agencies; NGOs |
| Building/rebuilding homes and physical capital undertaken with community involvement that also rebuilds trust and collaboration | Households, NGOs, CBOs government        |

|  |   |
|--|---|
| relating to social capital   |   |
| Households rebuild productive capital relating to income generating activities   | Relatives sending remittances<br>Financial service institutions |
| Building/rebuilding houses and neighbourhood infrastructure such as transport links, and water and sanitation infrastructure     | Households, CBOs and government                                 |
| Securing provision of infrastructure to enhance well-being for affected and host populations where relocation has been necessary | Affected and host hh, local government, NGOs                    |
| Recovering the household and local economy   | Households, CBOs, NGOs, municipal and national governments      |
| <b><i>At municipal or city level</i></b>   |   |
| Building/rebuilding infrastructure (to more resilient standards)   | Government agencies working with CBOs, NGOs                     |
| Rebuilding of systems of safety and security in communities to ensure accumulation of assets                                     | Police and security systems                                     |
| Building/rebuilding livelihoods and productive capital   | Government working with households                              |
| <b><i>At regional or national level</i></b>  |   |
| Rebuilding productive capital of region  | Financial services and banks                                    |
| Regional reconstruction of natural and physical capital – such as water systems  |   |

The tsunami experience also showed why solid gender analysis should be included in rebuilding. After the tsunami, many women joined self-help groups to obtain microcredit, which they used to boost their assets and increase their productive activities. This reliance on self-help groups was caused partly by the gender-blind nature of disaster relief that focused on men's lost fishing boats, not on the assets managed or controlled by women. Another tsunami lesson underscored the need to focus on rebuilding communal assets rather than individual ones. Often individual reconstruction did not work well, while community-led development worked better. Some communities had enough power to throw out corrupt engineers or suspend them. The collective focus broke the "beneficiary" mentality with leaders emerging who took on public roles. This also showed how community-led reconstruction can save on costs. Money is not wasted on unneeded infrastructure and outside professionals when the community has the skills to perform the tasks themselves (Moser et al 2007).

The location of rebuilt settlements has obvious implications for livelihoods as well as for access to such amenities as schools, markets and health facilities. In Tamil Nadu after the tsunami, many large resettlement areas remained empty after they were completed, in part because there were too far from jobs and other supports, even though this meant staying in hot, crowded, run down emergency barracks. Genuine consultation in advance of such major decisions, and throughout the rebuilding process, far from being a factor that slows down the process, is the only approach likely to ensure its practicality and efficiency.

Often housing in new settlements is placed in a grid pattern on land that has been leveled and stripped of vegetation — an arrangement that is efficient for engineers, but that fails to make optimal use of space from a social perspective. It means, for one thing, that through-streets occupy most of the open space, with implications for social interaction and children's play and safety. Housing that is clustered in ways that reflect and support social ties is, at the same time, more likely to result in local interaction. (Bartlett 2008).

Recovering the household and local economy is also a cornerstone of progressive adaptation post-disaster. Without this, recovery and reconstruction can easily reproduce or even exaggerate the social inequality and asset poverty that led to disaster in the first place (UNDP 2004). Two core principles are required for pro-poor recovery:

1. Where possible promote local sourcing of materials and skills, to prevent monetary resources aimed at reconstruction from leaking, rapidly leaving the local economy;
2. Use emergency response and reconstruction interventions as a vehicle for enhancing local skills and empowerment, by transferring or sharing decision-making power with survivors. This moves beyond the simple employment of survivors to provide income or reduce reconstruction costs.

The recovery of the local economy and local land ownership is interdependent. Loss of rights over land and forced resettlement during reconstruction, often under the guise of 'adaptation' or 'risk reduction', serves to transfer land rights from the poor to the rich while at the same time dislocating survivors from the identity of place and informal safety nets offered by social support networks.

## 7. Institutional implications and associated recommendations

### 7.1. Key findings

Section Five discussed the lack of adaptive capacity within most urban governments and the underlying reasons for this. Section Six highlighted the critical importance of household and community level asset-based adaptation strategies during the four different stages associated with extreme weather. The reasons for providing support to household and community-based initiatives and actions include the following:

- Local government lacks the knowledge and capacity to act
- Local government will not act in informal settlements and with those working in the informal economy because of ‘anti-poor orientations’ (Satterthwaite)
- Household and community action brings immediate benefits. It reduces some risks and increases coping capacities, with many synergies between household and community-led poverty reduction and adaptive capacity to protect and rebuild assets.
- Supporting household and community adaptation also helps build competence and accountability within local governments. The key is not to support autonomous household adaptation (which cannot provide much needed ‘big infrastructure’ and emergency services) but to recognize the competence, capacity and resources that low-income organizations can bring to adaptation. If local governments work with, and support them, vulnerabilities can be reduced. This has been widely recognized in ‘slum’ and squatter upgrading and to provision for infrastructure and services (see for instance Boonyabanha 2005, Hasan 2006). It now needs to be applied to climate-change adaptation.

There are critical interventions at all stages in climate change adaptation that go beyond the scope, capability and financial budgets of local households and communities. Such institutions are not the panacea for climate change adaptation but one of a number of partners to address this critical global problem. This makes it important to conclude by highlighting the implications for local and national governments as well as the role of donors.

### 7.2. Implications for urban government<sup>17</sup>

Section 5 discussed the key role city and municipal governments play in adaptation, and highlighted examples of the kinds of local governance reforms that allow this government level to be effective. Section 6 included several examples of city governments that have worked closely with low-income groups and their organizations in reducing environmental risks; it also noted the extent to which the effectiveness of these partnerships was increased by working with community groups, such as federations of slum/shack dwellers. Obviously, effective and pro-poor adaptation strategies for urban areas will depend on more competent, better resourced, accountable urban governments that are willing and able to work with poorer groups. This also raises issues of whether they receive the needed support from national governments and international agencies — as discussed below.

One key issue in relation to local governments adaptive capacity to support household and community initiatives is whether capable, committed individuals are attracted to work in them – as civil servants and politicians. Although this is difficult to measure, in many South American countries, clearly this has changed in the last two to three decades due to a number of reasons which include the following:

- A return to democratic governments,
- Reforms that made them more democratic,

---

<sup>17</sup> Sections 7.1. and 7.2 draw on Satterthwaite 2008, prepared with support from OECD Development Assistance Committee.

- Key institutional changes that gave more power and resources to urban governments while also increasing their accountability,
- Most of the population now lives in urban areas.
- Particular mayors or municipal governments that tried new approaches
- The introduction of elected mayors encouraged new people to enter local politics.<sup>18</sup>

It has also been driven by national networks that have encouraged and supported inter-municipal learning — for instance through national associations of local authorities or national associations of particular professionals (architects, sanitary engineers). Thirty years ago, it was difficult to find evidence of socially or environmentally progressive urban governments in Latin America; today this is not the case. Thus, one key issue for national governments and international agencies is to support those local governments that are doing innovative work to do it better, as well as designing initiatives to learn from them.

### **7.3. Implications for national government**

The potential for urban (metropolitan, city, municipal) governments to be good ‘climate-change adaptors’ depends heavily on the extent to which higher government levels provide the legislative, financial and institutional basis to allow them to do so, while not pushing adaptation responsibilities on local governments that cannot be fulfilled. Also important are the conditions set for urban governments applying for funding from higher levels, such as requirements for local development plans to involve all key interest groups and incorporate risk and vulnerability assessments. National funds, on which innovative urban governments can draw, are important. These need to support locally-developed responses that will vary depending on the range and relative importance of climate-change related hazards in different urban centres.

Central government institutions generally have important roles in helping local governments develop climate change disaster-risk reduction and asset-based adaptation strategies. Countries that already have such strategies in place need to review these in light of the increased or new risks that climate change is likely to bring. For countries where extreme weather events are already causing disasters, there is need for a national fund that supports locally developed disaster-risk reduction but also supports rapid responses when disasters occur, as well as helping households, civil society and local governments in rebuilding processes.

Some obvious tasks and responsibilities for urban adaptation fall to higher government levels, such as weather information systems that support local assessments. A clear articulation of the planning and implementation roles, pre and post extreme weather events, is also needed. This concerns local governments, higher government levels (including provincial/state and national), government agencies that have key roles in disaster response (such as the army and the police) and civil society organizations (including NGOs and grassroots organizations). Higher government levels also have responsibility to identify which urban areas need priority action, and the forms of external support required.

### **7.4. The role of international donors**

The role of international donors in supporting governments in the development of adaptive capacity within urban areas can be usefully identified in terms of three entry points. The first is an examination of funding flows to identify whether sectoral priorities are appropriate, with sufficient allocated to urban infrastructure that enhances climate-resilience. The second is identification of the role of international donors in increasing national adaptive capacity for urban areas, such as supporting the development of national or state/provincial level financial and regulatory capacity that assist urban governments developing adaptive capacity. The third is direct support to local adaptive capacity, working with city and

---

<sup>18</sup> Long-term success often depended on these innovators instituting changes in local government processes so their innovations continued to work when they were no longer in office.

municipal governments keen to innovate, committed to reducing risks to other climate-related hazards, and in agreement to work with lower income groups. Here, the focus is on linking local asset-based adaptation with good local development and environmental governance, with support for local adaptive capacity not simply following national policies but helping to lead and inform such national policies.

The bottom-line for donors is the urgent need for a large increase in international funding to address the backlog in urban infrastructure, as part funding for climate-change adaptation. For it is obvious that programs to make infrastructure more resilient to climate change cannot be implemented if there is none. At the same time increased adaptation funding flows will not achieve much unless local government's have the necessary capacity to use the resources appropriately, and to work with the groups most at risk. For the majority of low-income countries, and many middle-income ones, this may present significant more difficulties for official development assistance agencies than the actual funding itself. Such agencies are not set up to support long-term local engagement necessary to ensure the development of local adaptive capacity — especially the local engagement that supports the asset-based adaptation frameworks that are so important for low-income groups and their own organizations.

Development assistance agencies therefore need to recognize the importance of long-term commitment to national (and provincial) systems that builds adaptive capacity by local governments. This assumes that budgets associated with disaster reconstruction include works that strengthen long term local capital assets. This may require restructuring loan conditions that are often constrained by tight spending deadlines, making participatory approaches difficult to achieve. Disaster reconstruction budgets are often funded by moving funds from development pools, which makes such reconstruction funds more responsible to link these to developmental outcomes. Certainly for most low- and middle-income countries, building resilience to climate change requires substantial increases in funding for 'risk-reducing' infrastructure, as well as support for the needed (national and local) governance processes to ensure it is used well.

To date development assistance has failed to support cities that have already faced serious climate-related disasters, to invest in the necessary infrastructure required to reduce future risks. The most appropriate funding channel may be a substantial municipal infrastructure fund to which local governments and civil society groups can apply. To make this only fund 'adaptation to climate change' would be a mistake; but it should have a climate-change adaptation lens to ensure that all infrastructure funded takes account of climate change. Such a fund should also be pro-active in helping identify cities or smaller urban centres most at risk and helping develop appropriate local responses. The extent to which this type of financial support for local development+adaptation requires external funding and the terms under which this should be provided will obviously vary a lot. As table 2 emphasized, what is possible and what should be prioritised in any country depends on the competence, capacity and accountability of local governments.

An important part of building local adaptive capacity is supporting adaptation that serves low-income groups. Here there are good 'slum and squatter upgrading' experiences on which to draw, in which as described above, local governments have worked with informal settlements inhabitants to provide infrastructure and services and improve housing quality. Equally useful are the many examples of 'upgrading' and new housing developments, such as those undertaken by federations formed by 'slum' or 'shack' dwellers themselves. Often these have proved to be more effective and less costly than those supported by international agencies, and where local government support has been received, it has demonstrated a considerable capacity to 'go to scale' (as in India, South Africa, Thailand and Malawi). Such do so, requires donor support, and some bilateral agencies including DFID and Sida (and international foundations) have recognized this, (Mitlin and Satterthwaite 2007). Thus assistance for adaptation to climate change needs to think through the financial systems and mechanisms that will allow

support for a multiplicity of city or municipal innovations by local governments and by grassroots organizations, that reinforces and works with ‘good local development’ and ‘good local governance’<sup>19</sup>.

In addition, international donors are concerned to see how urban adaptation can also contribute to mitigation, and here there are some complementarities between the two. But care needs to be taken, especially in assuming that measures to reduce greenhouse gas emissions necessarily serve adaptation or development. Because mitigation in high-income countries focuses so strongly on increasing energy efficiency, there is an assumption that the measures used to achieve this should be transferred to low and middle-income countries even those countries that have 1/50<sup>th</sup> or even 1/100<sup>th</sup> of the carbon emissions per person of high-income countries. In most urban centres in low- and middle-income countries, asset-based adaptation priorities of the poor need to focus on the expansion and improvement of protective infrastructure and services, not on energy efficiency. At the same time this is important for large infrastructure or relocation projects, and in-situ disaster reconstruction that can make contributions to mitigation through material recycling, careful resource sourcing and integrated transport planning to minimize carbon costs in construction and use.

Finally, there is also a critical need to draw on the ‘disaster-preparedness’ community of scholars and activists who have transformed our understanding of what causes disasters and the extent to which ‘natural’ disasters are preventable. It is surprising that to date they have not had a more central role in asset-based adaptation, given how much they can contribute to understanding the possibilities and constraints of adaptation that reduces risks from disasters and allows for progressive reconstruction.

---

<sup>19</sup> The current focus on National Adaptation Programmes of Action (NAPAs) and on community-based adaptation leaves out the key role of local government (although some community-based adaptation has involved local governments). There need to be local Adaptation Programmes of Action (LAPAs) and City Adaptation Programmes of Action (CAPAs) to underpin and drive innovations in NAPAs. It is also important to stress that in almost all instances, there needs to be **development+adaptation**. Even competent and accountable national and local (city and municipal) governments will not engage with adaptation to climate change unless it is seen as supporting and enhancing the achievement of development goals.

## References (draft)

- Abam, T.K.S., C.O. Ofoegbu, C.C. Osadebe and A.E. Gobo (2000), "Impact of hydrology on the Port-Harcourt-Patani-Warri Road ", *Environmental Geology*, Vol. 40, Nos 1 and 2, pages 153-162.
- ActionAid International (2006), *Climate change, urban flooding and the rights of the urban poor in Africa: Key findings from six African cities*, ActionAid International, London.
- Adger, Neil, Pramod Aggarwal, Shardul Agrawala et al. (2007), *Climate Change 2007: Impacts, Adaptation and Vulnerability: Summary for Policy Makers*, Working Group II Contribution to the Intergovernmental Panel on Climate Change; Fourth Assessment Report, IPCC Secretariat, WHO AND UNEP, Geneva subsequently published in Parry, Martin, Osvaldo Canziani, Jean Palutikof, Paul van der Linden and Clair Hanson (editors) *Climate Change 2007: Impacts, Adaptation and Vulnerability*, Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, Cambridge University Press, Cambridge and New York, pages 7-22.
- Alam, Mozaharul and M.D. Golam Rabbani (2007), "Vulnerabilities and responses to climate change for Dhaka", *Environment and Urbanization*, Vol. 19, No. 1, pages 81–97.
- Alsop, Ruth, M. Bertelsen and Jeremy Holland. 2006. *Empowerment in Practice: From Analysis to Implementation*, Washington DC, World Bank.
- Appadurai, Anad. 2004. 'The capacity to aspire: Culture and the terms of recognition', in Rao, V. and M. Walton (Eds). *Culture and Public Action*, Stanford: Stanford University Press.
- Awuor, Cynthia B., Victor A. Orindi and Andrew Adwerah (2008), Climate Change and Coastal Cities: The Case of Mombasa, Kenya, *Environment and Urbanization*, Vol. 20, No. 1.
- Bartlett, Sheridan (2008), *Climate Change and Urban Children: Implications for Adaptation in Low and Middle Income Countries*, IIED Working Paper, IIED, London.
- Bebbington, Anthony. (1999) Capitals and capabilities: a framework for analysing peasant viability, rural livelihoods and poverty. *World Development* 27: 2021-44.
- Boonyabancha, Somsook (2005), "Baan Mankong; going to scale with 'slum' and squatter upgrading in Thailand", *Environment and Urbanization*, Vol. 17, No. 1, pages 21–46.
- Bull-Kamanga, Liseli, Kade Diagne, Allan Lavell, Fred Lerise, Helen MacGregor, Andrew Maskrey, Manoris Meshack, Mark Pelling, Hannah Reid, David Satterthwaite, Jacob Songsore, Ken Westgate and Andre Yitambe (2003), "Urban development and the accumulation of disaster risk and other life-threatening risks in Africa", *Environment and Urbanization*, Vol. 15, No. 1, pages 193–204.
- Cabannes, Yves (2004), "Participatory budgeting: a significant contribution to participatory democracy", *Environment and Urbanization*, Vol. 16, No. 1, pages 27–46.
- Campbell, Tim (2003), *The Quiet Revolution: Decentralization and the Rise of Political Participation in Latin American Cities*, University of Pittsburgh Press, Pittsburgh, 208 pages

- Carney, Diana. (ed.) (1998), *Sustainable Rural Livelihoods: What Contribution Can We Make?*, London: Department for International Development (DFID)
- Carter, Michael (2007), 'Social Protection Policy to Overcome Poverty and Aid Traps: Insights from Research' in C. Moser (ed.) *Reducing Global Poverty: the Case for Asset Accumulation*, Washington DC Brookings Press
- Chakrabarti, P and Bhatt M (2006) (Eds.) *Micro-Finance and Disaster Risk Reduction*, Knowledge World, New Delhi.
- Chambers, Robert. (1992.) 'Poverty and livelihoods: whose reality counts?' *Discussion Paper No. 347*. Institute of Development Studies: Brighton.
- Chambers, Robert. (1994.) 'The origins and practice of participatory rural appraisal'. *World Development* 22: 953-969.
- Confalonieri, U. Menne, B. Akhtar R., Ebi, K., Hauengue, M., Kovats, R.S. Revich, B. and Woodward, A. (2007), Chapter 8: *Human Health*, in Parry, Martin, Osvaldo Canziani, Jean Palutikof, Paul van der Linden and Clair Hanson (editors) *Climate Change 2007: Impacts, Adaptation and Vulnerability*, Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, Cambridge University Press, Cambridge and New York, pages 391-431.
- D'Cruz, Celine and David Satterthwaite (2005), *Building Homes, Changing Official Approaches: The Work of Urban Poor Federations and their Contributions to Meeting the Millennium Development Goals in Urban Areas*, Poverty Reduction in Urban Areas Series, Working Paper 16, IIED, London, 80 pages.
- de Sherbinin, Alex, Andrew Schiller and Alex Pulsipher (2007), "The vulnerability of global cities to climate hazards", *Environment and Urbanization*, Vol. 19, No. 1, pages 39-64.
- DFID (2004) *Disaster Risk Reduction: A Development Concern*, DFID, London, 74 pages.
- Díaz Palacios, Julio and Liliana Miranda (2005), "Concertación (reaching agreement) and planning for sustainable development in Ilo, Peru", in Bass, Steve, Hannah Reid, David Satterthwaite and Paul Steele (editors), *Reducing Poverty and Sustaining the Environment*, Earthscan, London, pages 254–278.
- Douglas, I. and K. Alam (2006) *Climate Change, Urban Flooding and the Rights of the Urban Poor in Africa: Key Findings from Six African Cities*, ActionAid International, London.
- Douglas, Ian, Kurshid Alam, MaryAnne Maghenda, Yasmin McDonnell, Louise McLean and Jack Campbell (2008), "Unjust waters: climate change, flooding and the urban poor in Africa", *Environment and Urbanization*, Vol. 20, No 1.
- El-Raey, M. (1997), "Vulnerability assessment of the coastal zone of the Nile Delta of Egypt to the impact of sea level rise", *Ocean and Coastal Management*, Vol. 37, No. 1, pages 29–40.
- Enarson, Elaine (2004), *Gender Matters: Talking Points on Gender Equality and Disaster Risk Reduction*, 22 pages.

- Enarson, Elaine and Lourdes Meyreles (no date), *International Perspectives on Gender and Disaster: Differences and Possibilities*, mimeo, 26 pages; available from [http://www.erc.gr/English/d&scrn/murcia-papers/session2/Enarson\\_Meyreles\\_II\\_Original.pdf](http://www.erc.gr/English/d&scrn/murcia-papers/session2/Enarson_Meyreles_II_Original.pdf)
- Enarson, Elaine, Lourdes Meyreles, Marta González, Betty Hearn Morrow, Audrey Mullings and Judith Soares (2003), *Working with Women at Risk: Practical Guidelines for Assessing Local Disaster Risk*, International Hurricane Center, Florida International University, Miami, 95 pages.
- Ferguson, Claire, Caroline Moser and Andy Norton (2007) 'Contesting Rights: Citizenship, Power and Assets', in C. Moser (ed) *Reducing Global Poverty: the Case for Asset Accumulation*, Washington DC Brookings Press
- Fernandes, Edesio (2007), "Implementing the urban reform agenda in Brazil", *Environment and Urbanization*, Vol. 19, No. 1, pages 177–189.
- Ford Foundation. 2004. *Building Assets to Reduce Poverty and Injustice*. New York: Ford Foundation.
- Grootaert, Christiaan and Terry van Bastelaer (Eds). 2002. *Understanding and Measuring Social Capital: A Multidisciplinary Tool for Practitioners*. Washington, DC: World Bank
- Hardoy, Jorge E., Diana Mitlin and David Satterthwaite (2001), *Environmental Problems in an Urbanizing World: Finding Solutions for Cities in Africa, Asia and Latin America*, Earthscan, London, 448 pages.
- Hardoy, Jorgelina and Gustavo Pandiella (2008)
- Hardoy, Jorgelina and Gustavo Pandiella (2008), "Urban poverty and vulnerability to climate change in Latin America", Background paper, prepared for the World Bank, IIED, London.
- Hasan, Arif (2006), "Orangi Pilot Project; the expansion of work beyond Orangi and the mapping of informal settlements and infrastructure", *Environment and Urbanization*, Vol. 18, No. 2, pages 451–480.
- Heller, Léo (2006), Access to Water Supply and Sanitation in Brazil: Historical and Current Reflections; Future Perspectives, background paper for the 2006 edition of the Human Development Report, 51 pages.
- IIED (2007), *Up in smoke? Latin America and the Caribbean; The threat from climate change to the environment and human development*, The third report from the Working Group on Climate Change and Development, IIED, page 10.
- Interagency Network for Education in Emergencies (2004) *Minimum Standards for Education in Emergencies, Chronic Crises and Early Reconstruction*, [www.ineesite.org/standards/MSEE\\_report.pdf](http://www.ineesite.org/standards/MSEE_report.pdf)
- International Federation of Red Cross and Red Crescent Societies (2002), *World Disasters Report: Focus on Reducing Risk*, Oxford University Press, Oxford and New York, 239 pages.
- Koepp, S (2007) "It's been 2 years since Katrina, what's delaying reconstruction", *Fortune* 156 (4), 67

- Levina, Ellina, John S. Jacob, Luis E. Ramos and Ivonne Ortiz (2007), *Policy frameworks for Adaptation to Climate Change in Coastal Zones: The Case of the Gulf of Mexico*, Paper prepared for the OECD and International Energy Agency, 68 pages.
- Ligeti, Eva, Jennifer Penney and Ireen Wieditz (2007), *Cities Preparing for Climate Change: A Study of Six Urban Regions*, Clean Air Partnerships, Toronto, 74 pages.
- Lipton, Michael and Maxwell, Simon (1992) "The new poverty agenda: An overview", *Discussion Paper 306*, Brighton: Institute of Development Studies
- Longhurst, Richard., "Conceptual frameworks for linking relief and development", *Institute of Development Studies Bulletin*, Vol. 25. No 4 (1994), pp. 21-23.
- López Follegatti, Jose Luis (1999), "Ilo: a city in transformation", *Environment and Urbanization*, Vol.11, No.2, October, pages 181-202.
- McGranahan, Gordon, Deborah Balk and Bridget Anderson (2007), "The rising tide: assessing the risks of climate change and human settlements in low-elevation coastal zones", *Environment and Urbanization*, Vol. 19, No. 1, pages 17–37.
- Mitlin, Diana and Anna Mueller (2004), "Windhoek, Namibia: towards progressive urban land policies in Southern Africa", *International Development Planning Review*, Vol. 26, No. 2, pages 167-186.
- Mitlin, Diana and David Satterthwaite (2007), "Strategies for grassroots control of international aid", *Environment and Urbanization*, Vol. 19, No. 2, pages 483-500
- Moser, Caroline. (1998).The Asset Vulnerability Framework: Reassessing Urban Poverty Reduction Strategies. *World Development*, 26(1):1-19
- Moser , Caroline (2007) 'Asset accumulation policy and poverty reduction' in C. Moser (ed.) *Reducing Global Poverty: the Case for Asset Accumulation*, Washington DC Brookings Press
- Moser, Caroline and Andrew Felton (2007) 'Intergenerational asset accumulation and poverty reduction in Guayaquil Ecuador (1978-2004)' in C. Moser (ed.) *Reducing Global Poverty: the Case for Asset Accumulation*, Washington DC Brookings Press
- Moser, Caroline, Pamela Sparr and JamesPickett (2007) Cutting-Edge Development Issues for INGOs" Applications of an Asset Accumulation Approach, *Asset Debate Paper No. 1*, Washington D.C. Brookings Institution
- Narayan, Deepa 1997. Voices of the poor: poverty and social capital in Tanzania. Environmentally and Socially Sustainable Development Studies and Monograph Series No. 20. Washington, D.C.: World Bank.
- Nicolai, S and C Triplehorn (2003 ) *The Role of Education in Protecting Children in Conflict*, HPN Network Paper #42, ODI, London

ODI 2007

Oxfam America 2005

- Patel, Sheela, Celine d’Cruz and Sundar Burra (2002), "Beyond evictions in a global city; people-managed resettlement in Mumbai", *Environment and Urbanization*, Vol. 14, No. 1, pages 159-172.
- Pelling, Mark (2003), *The Vulnerability of Cities: Natural Disasters and Social Resilience*, Earthscan, London, 212 pages.
- Pelling M. (2005), "Disaster data: building a foundation for disaster risk reduction", International Federation of the Red Cross and Red Crescent Societies, *World Disasters Report 2005*, pages 173–180.
- Pelling, M. (2006), "Measuring vulnerability to urban natural disaster risk: benchmarks for sustainability", *Open House International*, special edition on managing urban disasters, Vol. 31, No. 1, pages 125–132.
- Pelling, M. (2007), *Making Disaster Risk Reduction Work*, ProVention Forum 2007, ProVention Consortium
- Pelling, M. and A. Holloway (2007), *Legislation for Mainstreaming Disaster Risk Reduction*, Tearfund (<http://www.tearfund.org/webdocs/website/Campaigning/Policy%20and%20research/DRR%20legislation.pdf>).
- Pelling, Mark (2008), "Adapting urban centers to climate change in low and middle income countries", Background paper, prepared for the World Bank, IIED, London.
- Portes, Alejandro (1998). Social capital: Its origins and applications in modern sociology. *Annual Review of Sociology*, 24, 1-24.
- Putnam, Robert (1993) *Making Democracy Work: Civic Traditions in Modern Italy*. Princeton, N.J.: Princeton University Press.
- ProVention Consortium (2007) *Making Disaster Risk Reduction Work* The 2007 ProVention Forum, Dar es Salaam, Tanzania. Accessed from [http://www.proventionconsortium.org/themes/default/pdfs/Forum\\_2007\\_report.pdf](http://www.proventionconsortium.org/themes/default/pdfs/Forum_2007_report.pdf)
- Revi, Aromar (2008), "Furthering pro-poor urban climate change adaptation in low & middle-income countries", Background paper, prepared for the World Bank, IIED, London.
- Satterthwaite, David (2001), "Reducing urban poverty: constraints on the effectiveness of aid agencies and development banks and some suggestions for change", *Environment and Urbanization*, Vol. 13, No. 1, pages 137–157.
- Satterthwaite, David (2005), "Meeting the MDGs in urban areas; the forgotten role of local organizations", *Journal of International Affairs*, Vol. 58, No. 2, pages 87–112.
- Satterthwaite, David (2008), *Integrating Adaptation to Climate Change in Decision-making at the Urban/Municipal Level in Low- and Middle-income Nations*, Paper prepared for the OECD Development Assistance Committee, IIED, London.
- Satterthwaite, David, Saleemul Huq, Mark Pelling, Hannah Reid and Patricia Lankao-Romero (2007), *Adapting to Climate Change in Urban Areas; The possibilities and constraints in low- and middle-income nations*, IIED Working Paper, IIED, London, 107 pages.

- Sen, Amartya (1981) *Poverty and Famines: An Essay on Entitlement and Deprivation*, Oxford: Clarendon Press
- Sen, Amartya. (1985) *Commodities and Capabilities*, Amsterdam: North-Holland.
- Sen, Amartya 1997. 'Editorial: human capital and human capability'. *World Development* 25(12).
- Soto Linda 2001
- Stephens, Carolyn, Rajesh Patnaik and Simon Lewin (1996) *This is My Beautiful Home: Risk Perceptions towards Flooding and Environment in Low-income Urban Communities: A Case Study in Indore, India*, London School of Hygiene and Tropical Medicine, London, 51 pages.
- UNCHS (1996), *An Urbanizing World: Global Report on Human Settlements, 1996*, Oxford University Press, Oxford and New York.
- UNDP (2004) *Reducing Disaster Risk: A Challenge For Development*, accessed from <http://www.undp.org/cpr/disred/rdr.htm>.
- UN-Habitat (2003), *The Challenge of Slums: Global Report on Human Settlements 2003*, Earthscan, London.
- UN-Habitat (2006), *Meeting Development Goals in Small Urban Centers; Water and Sanitation in the World's Cities 2006*, Earthscan, London.
- UN-Habitat (2007), *Enhancing Urban Safety and Security; Global Report on Human Settlements 2007*, Earthscan Publications, London, 480 pages.
- United Nations (2006), *World Urbanization Prospects: the 2005 Revision*, United Nations Population Division, Department of Economic and Social Affairs, CD-ROM Edition – Data in digital form (POP/DB/WUP/Rev.2005), United Nations, New York.
- Velasquez, Luz Stella (1998), "Agenda 21; a form of joint environmental management in Manizales, Colombia", *Environment and Urbanization*, Vol. 10, No. 2, pages 9–36.
- Wamsler, Christine (2007), "Bridging the gaps: stakeholder-based strategies for risk reduction and financing for the urban poor", *Environment and Urbanization*, Vol. 19, No. 1, pages 115–142.
- Weru, Jane (2004), "Community federations and city upgrading: the work of Pamoja Trust and Muungano in Kenya", *Environment and Urbanization*, Vol. 16, No. 1, pages 47–62.
- WHO (1992), *Our Planet, Our Health*, World Health Organization, Geneva.
- Wilbanks, Tom and Patricia Romero Lankao with Manzhou Bao, Frans Berkhout, Sandy Cairncross, Jean-Paul Ceron, Manmohan Kapshe, Robert Muir-Wood and Ricardo Zapata-Marti (2007), Chapter 7: *Industry, Settlement and Society*, in Parry, Martin, Osvaldo Canziani, Jean Palutikof, Paul van der Linden and Clair Hanson (editors) *Climate Change 2007: Impacts, Adaptation and Vulnerability*, Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, Cambridge University Press, Cambridge and New York, pages 357-390.

Williams, JRA, Tina Hyder and Susan Nicolai (2005) "Save the Children's experience: ECD in emergencies", *Responses to Young Children in Post-Emergency Situations, Early Childhood Matters*, Number 104, 16-21, Bernard van Leer Foundation