



People going through the debris of a home destroyed by an earthquake in Istanbul, Turkey © Mark Edwards/Peter Arnold Inc.

## Can adapting to climate change also meet development goals in cities in developing countries?

Prepared for Cities Alliance by the Human Settlements Group at the International Institute for Environment and Development (IIED)

### Overview

**W**ell-governed cities have the capacity to adapt to the changes that global warming will bring in the next few decades. Much of what makes for a healthy successful city also helps protect its inhabitants and businesses from climate change. Most climate change risks for cities are from deficiencies in housing, infrastructure, and services. In the next few decades most of the increased risks will be from hazards already present – floods, storms, heat waves, and constraints on fresh water supplies. There are multiple links between “good development”, adaptation, and most disaster risk reduction. But realising

these requires competent city governments being able to work with low-income groups and their organisations. A city with its citizens in good quality housing, served by piped water, sewers, drains, all-weather roads, and emergency services is inherently resilient to most climate change impacts.

This is the second in a series of Notes on climate change and cities. The first Note considered what city governments must do regarding climate change. The third Note will discuss what a climate change adaptation programme looks like based on Durban’s experience while the fourth will consider how

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The CIVIS series shares knowledge and learning arising from Cities Alliance projects and other activities in slum upgrading and city development strategies. It also serves as a platform for policy dialogue and debate among city development stakeholders, including national and local governments, donors and slum dwellers to impact change in the lives of the urban poor and advance the urban development agenda.

## Examples of major projected impacts of climate change on selected sectors

| Climate driven phenomena  | Agriculture, forestry and ecosystems  | Water resources  | Human health  | Industry, settlements and society   |
|---|---|--|---|---|
| <p><b>TEMPERATURE CHANGE</b></p> <p>Over most land areas, warmer and fewer cold days and nights, warmer and more frequent hot days and nights</p> | <p>Increased yields in colder environments</p> <p>Decreased yields in warmer environments</p> <p>Increased insect outbreaks</p> | <p>Effects on water resources relying on snow melt</p> <p>Effects on some water supply</p>   | <p>Reduced human mortality from decreased cold exposure</p>   | <p>Reduced energy demand for heating and increased demand for cooling</p> <p>Declining air quality in cities</p> <p>Reduced disruption to transport due to snow, ice</p> <p>Effects on winter tourism</p> |
| <p><b>HEAT WAVES / WARM SPELLS</b></p> <p>Frequency increases over most land areas</p>  | <p>Reduced yields in warmer regions due to Heat stress</p> <p>Wildfire danger increases</p>                                     | <p>Increased water demand</p> <p>Water quality problems, e.g. algal blooms</p>   | <p>Increased risk of heat-related mortality, especially for the elderly, chronically sick, very young and socially isolated</p> | <p>Reduction in quality of life for people in warm areas without appropriate housing</p> <p>Impacts on elderly, very young and poor</p>   |
| <p><b>HEAVY PRECIPITATION EVENTS</b></p> <p>Frequency increases over most land areas</p>  | <p>Damage to crops</p> <p>Soil erosion</p> <p>Inability to cultivate land due to waterlogging of soils</p>                      | <p>Adverse effects on quality of surface and ground water</p> <p>Contamination of water supply</p> <p>Water stress may be relieved</p> | <p>Increased risk of deaths, injuries, infectious respiratory and skin diseases</p>   | <p>Disruption of settlements, commerce, transport and societies due to flooding</p> <p>Pressures on urban and rural infrastructures</p> <p>Loss of property</p>   |
| <p><b>DROUGHT</b></p> <p>Affected areas increase</p>  | <p>Land degradation</p> <p>Crop damage and failure</p> <p>Increased livestock deaths</p> <p>Increased risk of wildfire</p>      | <p>More widespread water stress</p>  | <p>Increased risk of malnutrition</p> <p>Increased risk of water and food-borne diseases</p>                                    | <p>Water shortages for settlements, industry and societies</p> <p>Reduced hydropower generation potentials</p>  |
| <p><b>CYCLONES AND STORM SURGES</b></p> <p>Frequency increases</p>  | <p>Damage to crops</p> <p>Windthrow (uprooting) of trees</p> <p>Damage to coral reefs</p>                                       | <p>Power outages cause disruption of public water supply</p>   | <p>Increased risk of deaths, injuries, water and food-borne diseases</p> <p>Post-traumatic stress disorders</p>                 | <p>Withdrawal of risk coverage in vulnerable areas by private insurers</p> <p>Potential for population migrations</p> <p>Loss of property</p>   |
| <p><b>SEA LEVEL RISE</b></p> <p>Increased incidence of extreme high sea-level (excluding tsunamis)</p>  | <p>Salinisation of irrigation water, estuaries and freshwater systems</p>   | <p>Decreased freshwater availability due to salt-water intrusion</p>   | <p>Increased risk of deaths and injuries by drowning in floods</p> <p>Migration-related health effects</p>                      | <p>Costs of coastal protection versus costs of land-use relocation</p> <p>Potential for movement of populations and infrastructure</p>  |

*Source: Climate in Peril - A Popular Guide to the Latest IPCC Reports, United Nations Environment Programme, 2009.*



*Heavy monsoon rains in metropolitan Mumbai, India.  
© Joerg Boethling/Peter Arnold Inc.*

to build a city vulnerability risk map for both disaster risk reduction and climate change adaptation.

### **Do I focus on development, disaster preparedness or adaptation?**

At present, development, disaster preparedness, and adaptation to climate change are considered separately within international agencies and governments at all levels. But there are strong complementarities. It would be counter-productive if funding for urban poor communities to adapt to climate change does not address the risks of earthquakes or tsunamis or monsoon rains that have long been causing serious floods. Good city

development programmes may be among the most effective ways of adapting to climate change – in decreasing the damage done by storms and floods whose frequency or intensity may have increased as a result of climate change. Slum and squatter upgrading programmes may also be the most effective ways of reducing disaster risk, yet agencies responsible for disaster response do not see this – or if they do, they lack the knowledge and capacity to support it. A well-governed city with good basic provision for all is also far better equipped to cope with climate change.

Support for **local development + disaster risk reduction + adaptation** is guided by identifying the most serious environmental health risks faced by a city's population, including disasters, climate change, and such everyday risks as lack of sanitation.



The particular vulnerabilities of low-income groups and high-risk groups must also be identified (described in the first Note). An integrated approach addresses current problems while anticipating future ones – for instance, considering the effect of a small expansion in the capacity of new storm and surface drains in growing cities on future increases in flood risk. City plans and land use management regulations and practices need to keep development away from high-



*Overview of the flooded city of Dhaka, Bangladesh.  
© Trygve Bolstad / Peter Arnold Inc.*

risk and protective areas such as mangroves, and encourage development in low-risk areas. Settlements and infrastructure built now will need to cope with many decades of climate change impacts. However, this is all good development practice as well as adaptation.

## **Resilient cities**

Cities in high-income nations and some in middle-income nations are resilient to climate change because of good quality housing, infrastructure, and services for all. The populations of these cities take for granted a protective web of institutions, infrastructure, services, and regulations that will keep adapting in order to continue protecting them. Many measures to protect against extreme weather also meet everyday needs: healthcare services can respond to emergencies, and sewer and drainage systems cope with storms, as well as meeting daily needs. The police, armed services, health services, and fire services provide early warning with details of what actions should be taken, and ensure rapid emergency responses. The costs are paid for as service charges or through taxes, and for most people represent a small proportion of their income.

Therefore, extreme weather events in high-income nations rarely cause large loss of life or serious injury, Hurricane Katrina's impact in the USA was exceptional in this. Although some cause serious property damage, the economic cost is reduced by insurance. In addition, it is assumed that city planning and land use regulation will adjust to any new or heightened risk that climate change may bring, encouraged and supported by changes in private sector investments, shifting over time from high-risk areas and changes in insurance premiums and coverage.

However, most cities in developing countries have very large sections of their population living in poor quality housing, lacking provision for piped water, sewers, drains, all-weather roads, and health care and emergency services. Here, even unexceptional storms cause serious flooding and damage to housing. Even when warnings are given, many low-income households will not move despite the risks, knowing that the police will not protect their homes from looting – or, if they lack tenure, worrying that they will not be allowed back.

### **Does adaptation conflict with development?**

As the risks facing so many cities become better known, will this draw attention and investment away from unmet development needs? Might far more international funding be available for adaptation, while urban development continues to be a low priority? And if city and national governments and international agencies do begin to include climate change-related risk reduction in their urban policies, how can this avoid further disadvantaging the urban poor? How can those living in informal settlements and working in the informal economy ensure that risk reduction investments benefit them? For city governments under pressure to address more immediate needs – improve education, health care, security, water and sanitation, and attract new investment – climate change might seem less pressing, a problem for the future. But cities can invest in protection against floods and sea level rise in ways that have strong “co-benefits” with development, as this improves the homes and neighbourhoods of low-income groups.

### **Local governments’ central role**

Effective climate change adaptation programmes need competent, capable local governments able and willing to work with the inhabitants of the settlements most at risk – usually informal/illegal settlements. Local governments also have to provide the framework and policies that encourage and support the contributions of individuals, households, community-based organisations, non-governmental organisations (NGOs), and private enterprises – and to coordinate with the actions and policies of agencies from higher levels of government.

City plans and development strategies together with the land use management and building standards that should support them have to ensure that sufficient land is available for housing, including low-cost housing but without expanding over land that is dangerous or needed for city or regional flood protection. Present and future risks will be reduced considerably if governments ensure that low-income households can find and afford land or housing on sites that are less at risk from flooding; something easily stated but almost always difficult politically.

There are also considerable synergies between successful adaptation and poverty reduction – including improvements in housing and living conditions and in provision for infrastructure and services. Well-governed cities greatly reduce climate-related risks for low-income populations; unsuccessful, badly governed cities do not, and may greatly increase such risks.





*Cite du Soleil Shanty Town. Port-au-Prince. Haiti. As top soil leaves the countryside so do the peasants. These environmental refugees are among the most disadvantaged people in the world. © Mark Edwards / Peter Arnold Inc.*

Adjusting building and land use standards and regulations to climate change risks is necessary, but at the same time, can make it more difficult for the urban poor to find or build safe shelter. These standards are intended for finished buildings, yet financial constraints mean most low-income groups build incrementally. More flexible standards can encourage and support low-income urban residents to construct incrementally in a safe way, rather than making all their efforts illegal. As discussed below, so much risk reduction can be achieved by governments working with community organisations.

### **The potential and limits of community-based adaptation**

Many low-income communities take measures to protect themselves from storms and floods and can contribute to adaptation; their capacities in this area are often underestimated. But community-based organisation and action cannot provide the citywide infrastructure and service provision and the city–region management that is central to adaptation. Many of the risks that low-income groups face are from deficiencies in infrastructure provision that they alone cannot address. They may be able to help

construct or improve drainage and collect solid waste within their settlement, but they need a larger drainage and solid waste collection system to feed into. Reducing risks may also require “upstream” investment and action – for instance, to reduce the volume and speed of flood waters.

The real potential of community-based adaptation in cities comes when city governments work with communities and support people-centered processes. The best slum and squatter upgrading programmes show the necessary combination of community-based action and local government support.

In many nations, city governments have a powerful ally in citywide or national federations of slum/shack dwellers composed of savings groups formed primarily by women. Their federations not only implement initiatives such as upgraded or newly built houses, improved infrastructure and services but also offer city governments partnerships, which greatly increase the scale and scope of what can be achieved – as is evident in South Africa, Thailand, and India. One particular contribution they make for adaptation is community-managed enumerations and surveys of all informal settlements at a citywide scale – for instance, in Johannesburg and Cape Town in South Africa, in Kisumu and Nairobi in Kenya, and in Phnom Penh in Cambodia. These initiatives not only identify risk but also focus on populations that are particularly vulnerable and engage them in identifying appropriate responses. In many cities, these federations and their support NGOs have also undertaken land surveys to identify safe, appropriate sites for relocation when *in-situ* upgrading is not possible; also, many comprehensive household

surveys produce detailed maps that show plot boundaries and existing infrastructure provision. This provides the information base needed for investment plans for infrastructure and services, for upgrading housing, and for plot regularisation and land tenure provision for households (see fourth Note for details).

Effective adaptation and development and disaster preparedness may depend on aid agencies learning to support this work. In recognition of the accountability issues that external donors face, many federations have set up their own Urban Poor Funds to manage their savings and to provide external funders with the accounting they require to ensure their funding is well used.

## Some conclusions

City governments need to build resilience to the many impacts of climate change in ways that:

- Support the reduction of risks from other environmental hazards, noting the strong complementarities between reducing risk from climate change, non-climate change-related disasters, and most other environmental hazards;
- Are strongly pro-poor (most of those at highest risk from climate change and from other environmental hazards have low incomes and very limited financial assets);
- Are based on and build a strong local knowledge base of climate variabilities and of likely local impacts from climate change;
- Encourage and support actions that reduce risks and vulnerabilities now, while recognising the importance of reducing risks that may develop in the future;

- Recognise the core importance of building the competence, capacity, and accountability of local government and learning to work with those living in informal settlements and their organisations;
- Recognise that government policies must encourage and support the contributions to adaptation of individuals, households, community organisations, and enterprises;
- Recognise the complementary roles of higher levels of government and international agencies; and,
- Build into the above a mitigation framework; if successful cities in low- and middle-income nations develop without this, global greenhouse gas emissions cannot be reduced.

Building resilience and adaptive capacity in rural areas is also essential, not only because of the serious risks there but also because of the dependence of urban centres on rural production, ecological services, and rural demand for producer and consumer goods and services.

### Key areas for action for international funders

Most of the battle to prevent climate change from becoming a global catastrophe will be won or lost within urban centres and by urban governments. A clear global agenda for climate change depends on more competent and accountable city and municipal governments, where adaptation is built into development

plans and mitigation measures are included when relevant. But there is little evidence of national governments and international agencies responding to this. Aid agencies and development banks must establish ways of providing long-term support to city governments, showing what is possible, learning how best to support local processes, and then increasing their capacity in this regard. This also applies to any new funds or funding agencies set up to support adaptation.

### FURTHER READING

*Community-driven Disaster Intervention: Experiences of the Homeless People's Federation in the Philippines*, Jason Reyos, HPFP, PACSII and IIED, Manila and London 2009, 70 pages. Available on request from eandu@iied.org.

*Adapting to Climate Change in Urban Areas; The Possibilities and Constraints in Low- and Middle-income Nations*, David Satterthwaite, Saleemul Huq, Mark Pelling, Hannah Reid and Patricia Lankao-Romero, International Institute for Environment and Development, 2007, 107 pages. Downloadable at no charge from [www.iied.org/pubs/pdfs/10549IIED.pdf](http://www.iied.org/pubs/pdfs/10549IIED.pdf)

"Thinking globally, acting locally – institutionalizing climate change at the local government level in Durban, South Africa", Debra Roberts, *Environment and Urbanization* Vol. 20, No. 2, 2008, pages 521–538. Available on request from eandu@iied.org.

"Climate change risk: a mitigation and adaptation agenda for Indian cities", Aromar Revi, *Environment and Urbanization* Vol. 20, No. 1, 2008, pages 207–230. Available on request from eandu@iied.org.