



Slum scene in Cebu City, the Philippines ©Mark Edwards/Still Pictures

Climate Change: What does this mean for your city?

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

Overview

For cities, there are three critical climate change issues:

- How to adapt to the changes that global warming is bringing or will bring — for instance, increased storms, flooding, landslides, heat waves and possibly water scarcity
- How to reduce greenhouse gas emissions (mitigation) in order to slow and eventually stop human-induced global warming, and
- The framework of external support from higher levels of government and international agencies that will help city governments to respond.

Cities Alliance presents the first in a series of Notes on what climate change will bring to cities, who is most at risk and what each city government can do. The second Note in the series will discuss the links between climate change adaptation and development, and the kind of support city governments need from national governments and international

agencies deal with these. The third will discuss the city of eThekweni's (Durban) adaptation programme while the fourth will discuss building a city vulnerability risk map for risk reduction.

What will climate change bring to your city?

We know that climate change is increasing average temperatures and causing sea level rise worldwide. It is also changing weather patterns, often making storms and heat waves more intense or more frequent. If the world's governments agree to cut greenhouse gas emissions globally (drastically in high-income nations), serious damage or devastation on a global scale may be avoided.

Governments meeting within the UN Framework Convention on Climate Change in Copenhagen in December 2009 will try to reach agreement on

these issues related to climate change. However, because of time lags in the climate system, several risks will continue to increase even if the growth in emissions is slowed, stopped, and then reversed. If disasters are to be prevented, all cities have to adapt to these changes.

More than half of the large cities in Asia and Africa are located on or close to the coast. The 10 million people affected each year by coastal flooding will increase with sea level rise. Other risks appear less dramatic but are still serious, especially for low-income groups.

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.

Table 1: Some likely impacts of climate change

CHANGE	IMPACT ON URBAN AREAS	IMPACT ON HEALTH AND HOUSEHOLD COPING ABILITY
Warm spells and heat waves: Increased frequency in most land areas	Heat islands with temperatures up to 7°C (44.6 °F) higher; worse incidents of air pollution	Increased risk of heat-related illness and death; more vector-borne diseases; impacts on those doing strenuous labour; increased respiratory disease; food shortages from impact on agriculture
Heavy precipitation events: Increased frequency in most areas Increased intense tropical cyclone activity (including hurricanes and typhoons)	Increased risk of floods and landslides; disruption to livelihoods and city economies; damage to homes, possessions, businesses, transport and infrastructure; loss of income and assets; often large displacements of population, with risks to assets and social networks	Deaths; injuries; increased food and water-related diseases; more malaria from standing water; decreased mobility with implications for livelihoods; dislocations; food shortages; displacement, and associate risks to mental health
Increased area affected by drought	Water shortages; distress migration into urban centres; hydroelectric constraints; lower rural demand for goods/ services; higher food prices	Increased shortages of food and water; increased malnutrition and food- and water-borne diseases; increased risk of wildfires and associated respiratory problems
Increased incidence of extreme high sea level	Loss of property and enterprises; damage to tourism; damage to buildings from rising water table	Coastal flooding; increased risk of death and injuries; loss of livelihoods; health problems from salinated water

Risks and vulnerabilities

Cities concentrate hundreds of millions of people who are at high risk from the effects of climate change listed in Table 1. Cities most at risk from the increased number and intensity of rainstorms, cyclones and hurricanes are those where these phenomena are already common. For any city, however, the scale of this risk is often directly influenced by the quality of housing and infrastructure as well as the level of preparation of the city's population and government.

Risks in high-income nations have been greatly reduced by decades of investment in housing and infrastructure, although even here, damage to such systems as water supply, transport and electricity leave people very vulnerable. The devastation of the city of New Orleans by Hurricane Katrina in 2005, for example, shows that even in high-income nations, flood defences and emergency services can be overwhelmed during climate change disasters.

Urban areas always face some risk of flooding during heavy rainfalls.

Buildings, roads and other paved areas prevent rainfall from infiltrating the soil, and produce more run-offs. In well-planned and well-administered cities, flooding during heavy rainfall and its effects are prevented by storm and surface drains and by complementary measures such as the use of open spaces to accommodate flood waters from serious storms. This is often not the case in poorly managed cities with poor drainage systems and where unplanned buildings or infrastructure obstruct natural drains. Heavy or prolonged rainfall rapidly overwhelms drainage systems — especially if drains are insufficient or have not been maintained and cleared of silt and garbage.

More than half of the large cities in Asia and Africa are located on or close to the coast. The 10 million people affected each year by coastal flooding will increase with sea level rise. Other risks appear less dramatic but are still serious, especially for low-income groups. Many cities will get less fresh water from precipitation or glacier melt. At least 14 African nations already face water stress or scarcity; many more are likely to join this list in the next 10–20 years. Around half of Africa's urban population lacks adequate provision for

water and sanitation, although this has more to do with poor governance than water shortages.

Who is most at risk?

The people most at risk in affected areas are those who are:

- I. **Least able to avoid the direct or indirect impacts of climate change**, including those most exposed to hazards for example, living in makeshift housing on unsafe sites and lacking protective infrastructure for example, drains and roads that allow emergency vehicle access;
- II. **Likely to be most affected by the impacts** especially young children and older people; and,
- III. **Least able to cope** with the illness, injury, premature death or loss of income, livelihood or property.

Within any city, the urban poor — those least likely to afford a move to better quality housing or a less dangerous site are generally most at risk. They are usually also the people least well served in the event of a disaster, with the least legal and financial protection, for example, a lack of legal tenure for housing sites, or lack of insurance.

Young children face particular risks and are less well equipped on many fronts to deal with disaster impacts. Almost all the disproportionate implications for children are intensified by poverty and the difficult choices low-income households make as they adapt to more challenging conditions. Events that might have little or no effect on children in high-income countries and communities can have critical implications for children in poor settlements.

Among the most likely risks to children from climate change, if unaddressed by adaptation, are:

- **Higher mortality in extreme events:** In developing countries, most deaths from extreme events are in low-income settlements, especially among children, women and the elderly.
- **Water and sanitation-related illnesses:** Droughts, heavy or prolonged rains, flooding and conditions after disasters all intensify the risks from water and sanitation-related illnesses. So do climate change-related constraints on fresh water supplies. Children under five are the main victims because of their less developed immunity and because their play behaviour can bring them into contact with pathogens. This results in higher levels of malnutrition and increased vulnerability to other illnesses.
- **Malaria and other tropical diseases:** Warmer average temperatures are expanding the areas where many tropical diseases can occur, with children most often the victims. In many locations, the most serious threat is malaria.
- **Heat stress:** Young children and the elderly are at highest risk from heat stress, especially in poor

urban areas where high levels of congestion and little open space and vegetation result in “urban heat islands”.

- **Malnutrition:** Malnutrition results from food shortages (for instance, interruptions in supplies during sudden acute events), but it is also related to the health effects of unsanitary conditions. If children are already undernourished, they are less able to withstand the stress of an extreme event; malnutrition increases vulnerability on every front.



*Darfur refugees fetching water in Bahai, Chad
©Tom Koene/Still Pictures*

- **Injury:** Due to their size and developmental immaturity, children are particularly susceptible to injury and are more likely to experience serious and long-term effects from burns, broken bones and head injuries, for example.

Women and older girls within low-income populations also face particular risks related to the tasks they undertake or the discrimination they face in accessing jobs, resources or services, or in controlling household expenditures. When homes are destroyed or damaged, women's sources of income are equally destroyed because in most cases they undertake income-earning activities from home. Where women take most

responsibility for children, they are constrained in their capacity to move rapidly — for instance, to avoid flood waters — and their mortality rates are significantly higher than those of men.

For people whose homes and neighbourhoods are destroyed, life in emergency or transitional housing can mean overcrowding, chaotic conditions, a lack of privacy and a collapse of regular routines. Little or no attention is paid to women's needs and priorities, and especially the personal safety of girls and women. All of these factors can contribute to frustration and violence. But it is a mistake to think of children and women simply as victims. With adequate support and protection, children can be extraordinarily resilient in the face of stresses and shocks occasioned by climate change.

What can I do?

- Climate science has established the influence of greenhouse gases from human activities on climate change but as yet cannot state precisely what climate change will bring to each city — apart from sea level rise for coastal cities. However, each city can for its own part undertake the following:
- Review and evaluate past records on the impacts of storms, floods and heat waves and who and which parts of the city were most affected. Such a survey, undertaken in as much detail as possible, provides an initial guide to who is most at risk from climate change. This assessment should also include consultations with youth and women's organisations.
 - Support slum and squatter upgrading. Where large numbers of people live in poor quality housing in informal settlements, improving housing and getting

basic infrastructure in place is a priority for adaptation. If upgrading is linked to the risk surveys recommended above, it can also reduce disaster risk.

- Have a disaster preparedness plan and a set of institutions and funding to be able to implement it. Good citywide provision for infrastructure and services should remove most risks from storms and floods, but many cities have a large backlog in this, or large sections unserved. Good disaster preparedness plans may not reduce hazards, but they can dramatically reduce injury, loss of life, and the loss of property.
- Work on risk reduction with those most affected especially those in informal settlements who lack protective infrastructure (including storm and surface drains) and services (including health care and emergency services). Improvements in living conditions can often be combined with much reduced risk from climate change.
- In areas where there is new urban development or where new infrastructure is being installed, consider building-in increased safety margins for instance, for storm drains.
- Consider what climate change may mean for your city and its surroundings. For instance, does the city draw on fresh water resources in areas predicted to have lower rainfall? Might certain settlements, beaches or river banks be at risk?

What about mitigation?

Many low-income nations have such low emission levels that there is little scope for reducing them — emissions per capita may be less than 1/200th that of the United States and Canada. But the need to reduce emissions globally is so urgent that all cities need to consider what they can contribute — as long as this does not distract from development and from adaptation.



Slum dwellers effected by flooding in Sirajganj, Bangladesh
© Sino Pictures/Peter Arnold Inc.

There are three categories of response:

- **For almost all cities in low-income nations and most cities in middle-income nations:** Priority for adaptation — but with an eye to where present or future emissions can be kept down;
- **For cities in high-income nations:** Priority for mitigation — with an eye to particular locations or populations where risks need to be reduced;
- **For larger, more prosperous cities in middle-income nations:** A strong commitment to adaptation but with a long-term planning and regulatory framework

that reduces carbon-based fuel use — for instance, through vehicles such as well-designed buildings and land use management for city expansion that reduces private automobile use.

FURTHER READING

Climate Change and Urban Children: Implications for Adaptation in Low- and Middle-income Countries, Sheridan Bartlett, IIED, 2008, 74 pages. Downloadable at no charge from www.iied.org/pubs/pdfs/10556IIED.pdf.

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, IIED, 2007, 107 pages. Downloadable at no charge from www.iied.org/pubs/pdfs/10549IIED.pdf.

Gender and Climate Change: Mapping the Linkages, Alyson Brody, Justina Demetriades and Emily Esplen, BRIDGE, Institute of Development Studies (IDS), UK. Downloadable at no charge from www.bridge.ids.ac.uk/reports/Climate_Change_DFDID.pdf.

Some additional on-line resources:

United Nations Framework Convention on Climate Change
<http://unfccc.int/2860.php>

UNEP – Environment for Development
<http://www.unep.org/Themes/climatechange/>

International Strategy for Disaster Reduction
<http://www.unisdr.org/eng/risk-reduction/climate-change/climate-change.html>

Global Facility for Disaster Reduction and Recovery (GFDRR)
<http://gfdrr.org/index.cfm?Page=home&ItemID=200>