LOCAL LEADERSHIP FOR CLIMATE CHANGE ACTION

UN HABITAT
FOR A BETTER URBAN FUTURE

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Foreword

Cities started playing a leading role in addressing climate change as many as fifteen years ago by making efforts to reduce their emissions of climate change causing greenhouse gases. They have done so by putting in place building codes, transport strategies and suitable waste management systems; by promoting renewable energy, by rehabilitating urban ecosystems and by planning more sustainable cities. Yet, greenhouse gas emissions continue to rise and cities are beginning to feel climate change impacts. In anticipation of long term trends such as more severe floods, droughts, sea level rise accompanied by the loss of lives and livelihoods, health impacts and accelerated migration from rural areas, a new generation of visionary city leaders has started to take action, redoubling efforts in reducing green house gas emissions and preparing for climate change impacts.

Over the past few years, cities have attracted more attention on the international and national stages because climate change can be addressed only through local action that is aligned with global and national strategies.
UN-HABITAT's Cities and Climate Change Initiative now works in almost 20 cities around the world collecting information on urban climate change challenges and preparing and implementing local action plans. The Initiative also supports national climate change action in support of local responses and the global discourse on Cities and Climate Change. Working closely with cities, national governments, other UN agencies, the World Bank, Local Governments for Sustainability (ICLEI) and other international NGOs, academia and the private sector, the Initiative identifies emerging innovative practices and comprehensive responses to climate change. We are convinced that sustainable urban development is only possible when cities live up to the challenges that climate change poses. However, the overall message of this publication goes much further and is essentially positive: climate change provides cities with many opportunities and these include taking a long-term perspective, developing an integrated strategy, accessing technologies and practices and urban renewal. This overall call is broken down into 12 simple messages which introduce mayors and city leaders to the need for climate action and offers them ways to get started.

Dr. Joan Clos
Undersecretary General
Executive Director, UN-HABITAT

Climate change is here

"Warming of the climate system is unequivocal as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice and rising global sea level".

- IPCC AR4 report

Scientists now generally agree that climate change is happening, that it is caused by human actions and that there has already been an increase in the earth's average surface temperature by about 1 degree Celsius over the past century. By the last decade of the 21st century, predictions are for further increases ranging between 1.8 and 4 degrees Celsius and sea levels rising by 20 to 60 centimeters.

Greenhouse gases which cause climate change, such as carbon dioxide and methane, have been increasing since the industrial revolution, trapping the earth's heat just as a greenhouse would. Such gases are emitted when fossil fuels such as oil and coal are burnt for heating, cooling, transport, and construction or in agricultural and industrial processes or deforestation.

CASE STUDY: MAPUTO, MOZAMBIQUE

One of the predicted consequences of climate change is worse and more frequent floods in cities across the world. One city already facing this threat is the coastal city of Maputo in Mozambique. The low altitude of many parts of the city also makes it vulnerable to rising sea levels.

One resident describes the challenges its citizens face: "Our houses are built in low areas. We have no shelter when the flood starts. The house owners do not help us drain water from our homes. Once water has gone, the real disaster has just begun. That is diseases."

After the initial flooding period is passed, pools of standing water and contaminated water supplies increase the risk of diseases such as malaria and cholera.

Type of greenhouse gas	Chemical Symbol	Some sources of emissions
Carbon Dioxide	CO_2	Burning fossil fuels, deforestation and changes in land use
Methane	CH_4	Animal manure and gases, rice production and from decomposing waste in landfill
Nitrous Oxide	N_2O	Burning fossil fuels, nylon production, certain kinds of nitrate based fertilizers

Fluorinated gases or F-gases constitute groups of gases some of which are extremely powerful greenhouse gases, including Perfluorocarbons (PFCs), Hydrofluorocarbons (HFC), Sulphur hexafluoride (SF6), Chlorofluorocarbons (CFCs) and Hydrochlorofluorocarbons (HCFCs). These gases are released in industrial process and cooling etc.

Identify your city's risks

"The environmental, economic and political implications of global warming are profound. Ecosystems – from mountain to ocean, from the Poles to the tropics – are undergoing rapid change. Low-lying cities face inundation, fertile lands are turning to desert, and weather patterns are becoming ever more unpredictable."

- Ban Ki-Moon General Secretary of United Nations

The specific impact of climate change will differ between countries and regions but here are some frequently-cited general predictions for climate change impacts in particular geographic locations.

Inland cities in desert and subtropical locations are likely to experience longer and more serious droughts. In mountainous and arctic regions there will be less snow cover as well as shorter winters. Possibly the most serious impacts will be in coastal areas and small islands where the main risks will be rising sea levels and more frequent floods, droughts and cyclones.

Across the world, 310 million inhabitants of coastal cities live at less than 10 meters above sea level.

Increasingly localized information on climate change predictions is available and may be accessed through your country's climate change offices, meteorological departments or research institutions. Cities have often found it useful to conduct a risk or vulnerability assessment for even more localized information. For general information on climate predictions, see the resources section at the back.

CASE STUDY: PORT VILA, VANUATU

Vanuatu, a small Pacific island nation, is one of the countries most vulnerable to climate change. It is threatened by increasing frequency of cyclones, climate variability and especially sea level rises. Port Vila, the rapidly growing capital city, lies on the coast and faces the same problems as the nation. The city, regional and national governments are working together to bring dealing with climate change into their policies. Port Vila embarked on a city-wide vulnerability assessment in 2010.

TABLE: FOUR CLIMATE THREATS AND THE COUNTRIES MOST AT RISK

Threat	Country
Drought	Chad, Eritrea, Ethiopia, India, Kenya, Malawi, Mauritania, Mozambique, Niger, Sudan, Zimbabwe, Iran
Flood	Bangladesh, Benin, Cambodia, India, Lao PDR, Mozambique, Pakistan, Rwanda, Vietnam, China, Sri Lanka, Thailand
Storm	Bangladesh, Haiti, Madagascar, Mongolia, Vietnam China, Fiji, Honduras, Moldova, Philippines, Samoa, Tonga
Coastal Threats	Bangladesh, Mauritania, Myanmar, Senegal, Vietnam, China, Egypt, Indonesia, Libya, Mexico, Tunisia, Small Islands, Developing Countries

Source: World Bank

Cities must act

"We have been building institutions in order to confront the impacts of climate change as well as other disaster risks. We want to be a global role model for resilient cities. In the province of Albay, there is one thing we have done. We are the first in the Philippines to establish a dissemination office, it is institutionalized, a regular position in the government since 1994."

- Jose Ma. Sarte Salceda Jr.,Governor of Albay, Phillipines

Forty years from now, 70 per cent of the world's population will live in cities, compared with 50 per cent today and 36 per cent 40 years ago. It is not a coincidence that the challenges of climate change and rapid urbanization emerged in parallel as they are both driven by industrialization and a change in lifestyles. Rapid urbanization is also associated with ill-planned cities and sprawling slums, which render cities extremely vulnerable to disasters and climate change.

Action on climate change falls into two main categories: adaptation and mitigation.

Adaptation describes policies or actions that help cities adjust to the new climatic conditions. An example would be improving the robustness of homes so that they can cope with cyclones or floods, which may increase with climate change.

Mitigation refers to contributions to the global effort to reduce greenhouse gas emissions, necessary to slow down and reduce climatic change. Examples are the shift to renewable forms of energy or encouraging the use of lower-emitting forms of transport such as trains, buses or bicycles.

Urban areas face a range of climate-related risks. Risk or vulnerability assessments identify the areas, sectors and groups that face the biggest threat from climate change. Conducting a comprehensive vulnerability or risk assessment will help determine priorities for climate action in your city.

CASE STUDY: ESMERALDAS, ECUADOR

Esmeraldas, like most cities in Ecuador, has expanded and now includes increasingly high-risk areas. The hillsides surrounding Esmeraldas have proven to be unstable, particularly during heavy rain.

In recent years the risk of landslides has declined. This is due in part to significant infrastructure improvements in the hillside settlements and also because new settlements avoided such locations, helped by planning which involved the local people's experience. The city is now better placed for future action, which will be needed as in 2007 almost 60% of the population of Esmeraldas were still living in areas with a medium to high risk of floods or landslides.

Get started in your city

"The risks we are facing on climate change are of today… We are facing the risks right now, and we need to act now… Mayors must act in concert. Together, we can take a more active role on global issues. Our cities are sources of wealth, but also of pollution. Environmental matters are common areas of exchange, since we are all linked in the same dire destiny unless we soon enhance our cooperation and our actions."

- Marcelo Ebrard, Mayor of Mexico City, finalist for 2010 World Mayor's Prize

While no one is certain of the exact nature of future climate change, it is clear that specific actions can improve your city's resilience.

Furthermore, many actions against climate change have additional benefits. Those that increase climate change preparedness and reduce greenhouse gas emissions are called 'no regrets' actions or policies. Incorporating climate change into policy making does not require a separate department in most cities but it should be brought into existing areas such as transport, building and urban planning.

CASE STUDY: KAMPALA, UGANDA

Kampala faces a range of climate-related problems. The growing slums have poor sanitation and are prone to flooding while deforestation on nearby slopes and wetland encroachment has increased the flooding risk. Rather than taking on expensive new projects, the strategy was to climate-proof existing plans. Kampala began designing urban areas to increase green space, planted trees to reduce surface water run off (especially on slopes), and widened and cleared all the city's drainage channels.

The ongoing wastewater programme also addresses the predicted increase in rain and the associated flood risks, especially in the slum areas, with the introduction of ECOSAN toilets which reduce the likelihood of cholera occurrence during floods. Communities have been trained to produce briquettes from banana peels for cooking to reduce the deforestation and air pollution caused by charcoal burning and this significantly reduces waste and methane emissions as bananas are the local staple food. A pilot project introducing other sources of renewable energy will further reduce on the use of charcoal in the city.

Ecologically sensitive areas in the low lying parts of town that serve as flood plains are being mapped, guiding planners to control proposed developments in these areas. The city council, together with the central government, has also launched a campaign to evict developers in these areas. In 2008 the mayor launched a programme to reduce commuter taxis in the city by introducing buses, addressing congestion by reducing the number of vehicles on the road and reducing air pollution by phasing out old vehicles.

Visionary leadership can make a difference

"…the world will be sustainable, not when it gives us everything we demand from it but does not have, but when we ask it only for what it can really offer us. To govern is to go against trends. Firm decisions and decisive governing are needed in order to change. The actions to face climate change in the next ten or twenty years will have a big effect on future generations."

- Imma Mayol i Beltran, the Deputy Mayor of Barcelona and Chair of the Sustainability, Urban Services and Environment Commission

Although it is imperative to act now to reduce carbon emissions, the greenhouse gases already emitted mean that some degree of climate change is inevitable. Cities need leaders that keep this long-term issue in mind when making policy. Action taken in advance of climate change will yield benefits to the city far beyond an electoral term.

Local level actions will only make a difference when many local and national governments, households and industry act together. Likewise, the city may only benefit from climate change preparedness years from now such as when a flood plan comes into action long after being devised. While the immediate focus ought to be on the 'no regrets actions' that bring medium-term benefits to the city, leaders must consider long-term issues when making policy today.

CASE STUDY: CHICAGO, USA

Chicago has become a global leader in the area of climate change action. Mayor Richard M. Daley has led an urban strategy that combines city-wide climate targets set by his office with community-level activities. Some of the specific climate actions implemented in the city include 5 million square feet of green buildings and 15 million square feet of public buildings retrofitted to improve energy efficiency since 2000, which reduced energy use in the buildings by 30%.

As part of the campaign the city has increased the number of urban trees to 3.6 million, installed green roofs to reduce run off and reflective roofs to deflect solar heat. These policies not only help adapt to climate change, but also make the city a greener, more pleasant place to live and work. The mayor also led an extensive expansion of the cycle lane network to promote non-motorised transportation.

Dr. Richard L. Sandor, an academic and entrepreneur, is another important local climate action leader. He founded the innovative Chicago Climate Exchange, the first carbon trading scheme in the United States, in 2003.

COMMUNICATING WITH YOUR CITY ON CLIMATE CHANGE

If communities in your city are concerned about climate change they will appreciate their mayor taking action. However, communicating initiatives when benefits may only be visible in the long term or never - as is the case with avoided disasters - is difficult. You may want to emphasize values such as responsibility and vision, highlight that climate action is borne out of new thinking, that new technologies may be applied and that through smart planning a better city will be built for current and future generations.

Inaction now leads to higher costs later

"The costs of stabilising the climate are significant but manageable; delay would be dangerous and much more costly."

- Nicholas Stern, expert in the economics of climate change

Today we still have the opportunity to stabilize global temperatures at 2°C above pre-industrial levels. Holding change to this level would still have major effects on our environment but nowhere near the calamities that will ensue if the world heats up to 5°C by 2100, as may well occur if we do not mend our ways. This opportunity is slipping away. Scientists tell us that the chance of holding global warming to 2°C may be lost if we do not act vigorously within the next decade.

The longer we wait, the higher the costs of holding temperature change to even more modest goals of 3 or 4 degrees Celsius above pre-industrial levels. Economists tell us that delaying mitigation actions in developing countries until 2050 could more than double the total cost of meeting a particular temperature target. With greater climate change we will end up paying much more to move more communities away from rising tides, rebuild flooded cities and reconstruct more kilometers of damaged pipes and streets than if we had taken action.

It is cheaper to build green and climate-proof infrastructure now than to try and fit it later. Buildings and infrastructure involve heavy up-front costs and last a long time. Whether we design compact or sprawling cities today may lock in high- or low-carbon development patterns for a century or more and the costs of dealing with disasters are usually much higher than the costs of preventing them.

CASE STUDY: ROTTERDAM, THE NETHERLANDS

Situated in a low-lying river delta leaves Rotterdam facing tough climate challenges. Rainfall and river and sea levels are predicted to rise which threatens the city with flooding. Rotterdam has embarked on an ambitious project to make the city 'climate proof" by 2025 through investing heavily in infrastructure such as improved sea walls and aims to be a centre of knowledge on climate issues as well as a guide for other deltaic cities in climate change.

Identify fundable climate change projects

"As local governments, we are often ready to act but need funding. With more direct access to resources for climate mitigation and adaptation actions we could relieve the planet from stress and help governments meet their national targets. Let's lobby for it!"

- David Cadman, President of ICLEI-Local Governments for Sustainability

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Some funding is already available for both adaptation and mitigation projects in developing countries (see the resources section at the end of this document). Adaptation funding may currently be difficult for cities to access for various reasons which include excessive bureaucracy and the lack of funding directly earmarked for cities.

However, city-focused adaptation and mitigation funding is likely to become more easily available in the future. There is some mitigation funding available through the carbon market such as the Clean Development Mechanism (CDM). There are also broader sources of development funding for urban areas which also have a climate focus.

Leadership also involves reaching out past the city limits to lobby other levels of government and public institutions. Collectively, mayors need to lobby on behalf of cities for a vital role in the Global Climate Change Frameworks.

CASE STUDY: MEDELLIN, COLOMBIA

The city of Medellin is located in hilly terrain. Combined with heavily-congested roads, it makes it hard to provide public transport such as buses. As an innovative alternative, the city introduced a cable car transport network integrated with the existing metro system using CDM financing.

Each cable car was designed to generate some of its own energy needs through a solar panel installed on the roof. The network carries 50,000 people per day, a large number for the size of the city. Routes were targeted at low-income neighborhoods to improve transport facilities for the poor. The result of the cable car project was cheaper and safer transport than other transportation options with lower green house gas emissions.

This kind of public transport cable car, pioneered in Medellin, is now being investigated by other cities across the world that are looking to upgrade their public transport system in an environmentally-friendly way.

SOME OTHER CDM FINANCED PROJECTS:

RWANDA: Distributing cheap, energy efficient lamps in homes across the country resulting in reduced domestic energy consumption and lower household energy bills.

NIGERIA, Guinea Savannah Region: Subsidizing fuel efficient stoves for households which reduce the fuel needed for heating by 80%.

Cities can adapt to climate change impacts in different ways

"Adapting to inevitable changes and "climate proofing" economies requires new ways of thinking and planning for development using improved science, ecosystem management and development policies."

- United Nations Environment Program (UNEP)

Adaptation actions address the needs of a particular locality in responding to climate change. These measures can usually be completed through a city's existing resources. Protection of forests and tree planting on nearby hills can help prevent landslides and floods. In coastal areas, mangroves can act as a natural sea wall that defends the land from storm surges. Similarly, deforestation or destruction of mangroves in the vicinity of a city can make landslides and floods more likely both in the countryside but also in the city itself.

Climate change adaptation also refers to making existing and new infrastructure resistant to the effects of climate change. Cities where many people depend on weather-sensitive resources for their livelihood should have a local economic development strategy which takes climate change into account.

CASE STUDY: eTHEKWINI MUNICIPALITY (DURBAN), SOUTH AFRICA

eThekwini Municipality (Durban) identified the key impacts of climate change on their area and developed the Headline Climate Change Adaptation Strategy to focus on health, water and sanitation, the coastal zone, biodiversity, infrastructure, food security and disaster risk reduction. The strategy included key adaptation action and later included specific plans for the water, health and disaster management sectors.

This is an example of how climate change concerns are increasingly influencing strategic planning. This is reflected in the need for the development of a Municipal Climate Protection Programme (MCPP) within eThekwini's Integrated Development Plan. The city is in the process of redeveloping its open space system plan, and is researching how to "climate proof" the biodiversity resources that the system protects. A green roof pilot project is also under way; planting on roofs can reduce the 'heat island' effect and can reduce water runoff.

Reducing green house gas emissions yields additional benefits

"Seoul is also encouraging the construction of green buildings by providing tax incentives for those built as eco-friendly. So far, around 60 environmentally friendly buildings have been constructed. For example, the new Seoul City Hall follows the traditional Korean style and design and is also expected to increase the new or renewable energy supply rate to 12.2 percent."

- Oh Se-hoon, Mayor of Seoul

Mitigation actions contribute to the global effort to reduce greenhouse gas emissions. While it is imperative for developed countries to reduce their emissions there are some 'no regrets' forms of mitigation that can be beneficial for developing countries, too.

A first step can be to conduct a green house gas inventory to find out where emissions are coming from in your city as a basis for future action. In most cities, the construction and running of buildings is a large source of emissions and making sure that new buildings are designed with less need for heating and cooling will reduce emissions and energy bills.

Encouraging compact rather than sprawling urban development can help reduce transportation emissions as well as making the provision of public services cheaper. The investment decisions taken today in cities in sectors such as construction and urban planning can 'lock in' a particular level of emissions for the future.

CASE STUDY: DENSITY, BARCELONA AND ATLANTA

Cities, where the number of people per square kilometer is comparatively high will have comparatively lower emissions because residential and working areas are more likely to be located near one another, reducing the average length of commuting trips as well as the need for motorized transport. Dense cities also allow more people to access public services such as water and public transport at a lower cost. This is because when more people live in a smaller area, the built train network and the water piping system can be smaller and therefore cheaper to build.

Barcelona in Spain and Atlanta in USA have similar populations but Atlanta uses 26 times more space for housing and 11 times more energy per inhabitant for urban transport than Barcelona, which has far more people per square kilometer.

WHAT CITIES ARE DOING ON MITIGATION

Transport			
Municipal bicycles available to rent across the city	Barcelona, Spain Paris, France London, UK Copenhagen, Denmark Gyeongnam, Korea	Extension of bicycle lanes	New York City, USA Chicago, USA Montreal, Canada Seoul, Korea
Waste			
Recovering cooking oil for use as fuel Transforming waste oil into biodiesel	Atlanta, USA Volta Redonda, Brazil Kyoto, Japan	Recovering bio gas from waste	Madrid, Spain Philadelphia, USA Vancouver, Canada Aguascalientes, Mexico Helsingborg, Sweden Sao Paolo, Brazil
Green Buildings			
Retrofitting existing buildings to improve energy efficiency and install green roofs	Melbourne, Australia Austin, Texas Chicago, USA London, UK Valga, Estonia Atlanta, USA Austin, USA Seoul, Korea	Retrofitting street and traffic lights for energy efficiency	Paris, France Melbourne, Australia Seoul, Korea Bhubaneswar, India Albertslund, Denmark Barcelona, Spain Calgary, Canada
Renewable Energy			
Promoting solar power Solar heating Municipal Public loans for solar power	Baoding, China Betim, Brazil Iida, Japan	Promoting wind power Railway powered by wind energy Wind turbines	Calgary, Canada Copenhagen, Denmark Freiburg, Germany Tocco da Casuria, Italy

Prioritise the actions that suit your city

"I firmly believe we can approach this task [climate change action] with optimism rather than gloomy defeatism. There are a myriad of ways detailed in this strategy, many of them supremely straightforward, to ensure that we collectively work to prepare for extreme weather while creating a more pleasant city to boot…Alongside the eco-creativity required to weatherproof our city also comes considerable untapped employment opportunities."

- Boris Johnson, Mayor of London

It is possible to make a big difference in adaptation and mitigation at little cost and, sometimes, at a profit. Rainwater harvesting and ground water recharging can be done at low costs to reduce the severity of floods and store water for extended drought periods. Disaster risk reduction can include improved building codes and regulations, enforcement of construction bans in environmentally-risky locations, strengthening community organizations and developing early warning systems which also bring large potential benefits for little cost.

CASE STUDY: LIVING WITH FLOODS, MOZAMBIQUE

Extreme rainfall far exceeding long-term averages have become increasingly frequent in Mozambique. On 27 January 2010 many parts of Maputo were severely flooded after 12 hours of heavy rain, totaling 290.4 mm which is more than the normal monthly mean precipitation (165.9 mm). The "Living with Floods" initiative aims to protect lives and livelihoods by building elevated schools or community halls at low cost in communities living in flood prone areas, with particular attention to those poorest neighborhoods of Maputo City. These elevated buildings serve as shelters during floods.

CASE STUDY: RETROFITTING OF BUILDINGS ULAANBAATAR, MONGOLIA

Heating represents around 60% of total household electricity costs in Ulaanbaatar. Many existing residential buildings lose a lot of heat so apartment buildings were retrofitted to provide a model for future energy efficiency measures in the city. Before the project the internal temperature of the buildings was an uncomfortable 16°C in winter with draughts around doors and windows and a leaking roof leading to heat loss. At a cost of $200,000 per building, the facades were renewed with thicker insulation, the roof was improved, the basement floor upgraded, improved cable linkages to power lines installed and the heating system upgraded.

As a result of the project the building now consumes 50-60 % less energy per year and internal temperatures in the winter months are more comfortable. The next steps in the project are a public awareness campaign to raise awareness of the benefits of rehabilitating similar apartment buildings using this case as an example.

WHAT OTHER CITIES ARE DOING:

Bhubaneswar and Coimbatore India: reduced energy expenditure by the city council through improving energy efficiency of lighting in municipal buildings and temples

Volta Redonda, Brazil: used cooking oil is collected by the city and processed into biodiesel

Cities around the world have introduced public bicycles for rent at different 24-hour terminals across the city. This reduces carbon emissions as well as promoting the health of citizens

Maputo: drainage systems are upgraded in low-income neighbourhoods

Sorsogon City: community is mobilized to replant mangroves

Dar-es-Salaam: introduced a one-way street system reducing traffic jams and subsequently emissions

Following the 2004 tsunami, many coastal settlements introduced community-based early warning systems and disaster preparedness plans

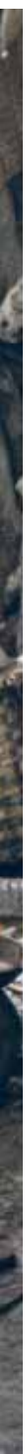
A climate strategy needs a pro-poor element

"Climate change is currently the most pressing development and environmental problem facing the world. We, on the African continent, face significant challenges as Africa is the continent most at risk from climate change."

- Councillor Logie Naidoo, Deputy Mayor of Durban

The urban poor are the group most exposed to climate risks because they tend to live in the most disaster-prone areas. Slums throughout the world are often located along river banks, the seashore and on slopes prone to floods and landslides. The non-permanent structures are liable to collapse during extreme weather that will occur more frequently in the future. Poor women tend to be particularly vulnerable to climate change because they often rely more on natural resources.

For cities, it makes sense to improve the poor housing and basic infrastructure as this can often be cheaper than supporting large numbers of homeless and destitute people after disaster strikes. In this context, it is also important to recognize that migration to the cities from the countryside may increase as farming communities can cope less and less with climate change, further increasing the pressure for cities to provide shelter and basic services.



CASE STUDY: PABEAN, CENTRAL JAVA, INDONESIA

In low lying, coastal Pabean, 75% of adults depend on the manufacture of batik fabrics for their livelihoods. The processes of dyeing and drying batik fabrics are intertwined with the patterns of rainfall: too little rain and there is insufficient water for dyeing, too much, and the dyed fabrics cannot dry.

The effects of climate change are expected to make the rainfall even more variable and, since a majority of the batik workers in Pabean live below the poverty line, this will hit them hard.

Your city does not need to act alone

"Adapting to climate change is a key concern for human settlements in both developed and developing countries, and devastating consequences, particularly affecting urban poor, will increase dramatically, if appropriate measures are not implemented at the local, subnational, national, regional and international levels."

- Mayor's Adaptation Forum 2010

Climate change is an issue that extends beyond city or district boundaries so there are great benefits to coordination with the national government and between cities within a country as well as between different countries. Local governments can partner with NGOs, academia and the private sector to achieve their climate goals.

CASE STUDY: COOPERATION BETWEEN LOCAL AND NATIONAL INSTITUTIONS, SORSOGON CITY, PHILIPPINES

A vulnerability assessment was the starting point for adaptation planning in Sorsogon. Sharing the city's experiences with national institutions such as the League of Cities of the Philippines, the Department of the Interior and Local Government, the Housing and Urban Development Coordinating Council and the Philippines Urban Consortium started addressing climate change concerns. Recently, the Climate Change Act of 2009 harmonized the national approach to Climate Change and strongly emphasizes the role of local governments in addressing climate change.

CASE STUDY: PARTNERSHIP WITH THE PRIVATE SECTOR, SAO PAULO, BRAZIL

In partnership with a private company the City of São Paulo, Brazil has turned two foul-smelling and unsightly landfills into sources of energy and hard cash. São Paulo's ten million inhabitants generate about 15,000 tonnes of garbage a day. Rotting garbage produces methane gas. The challenge was to recognize and harness that gas as an asset, while reducing GHG emissions.

The City of São Paulo entered into agreements with the Brazilian company Biogás. Biogás constructed facilities at two landfill sites for a total investment of US$ 90 million. At the Bandeirantes site a system captures the methane gas and channels it to a combined heat and power plant. The two landfills together now generate 10% of the city's electricity requirement. To date, the credits generated by reduced emissions have yielded some Euros 48 million, which the city splits 50/50 with Biogás. The City Council of São Paulo has used its share of the revenues to develop parks and squares in the poor neighbourhoods surrounding these landfills.

RESOURCES

FURTHER READING

For a comprehensive introduction to current climate research:
http://www.ipcc.ch/publications_and_data/publications_ipcc_fourth_assessment_report_synthesis_report.htm

For the most recent updates to the above publication:
http://siteresources.worldbank.org/INTWDR2010/Resources/5287678-1255547194560/WDR2010_BG_Note_IPCC_Update.pdf

On identifying risks in your city:
For information on climate projections and vulnerabilities in your region see:*http://www.ipcc.ch/publications_and_data/ar4/wg2/en/contents.html and on risk assessments see http://www.itc.nl/unu-dgim.html*

On reducing emissions:
"Kick the Habit" A U.N. Guide to Climate Neutrality: *http://www.unep.org/publications/ebooks/kick-the-habit/*

On the importance of acting now and the economics of climate change:
The Stern Review on The Economics of Climate Change, Cambridge,2007 can be found at:
http://webarchive.nationalarchives.gov.uk/20100407010852/http://www.hm-treasury.gov.uk/sternreview_index.htm

On climate change and poverty: The 2010 World Bank World Development Report "Development and Climate Change":
http://econ.worldbank.org/WBSITE/EXTERNAL/EXTDEC/EXTRESEARCH/EXTWDRS/EXTWDR2010/0,,menuPK:5287748~pagePK:64167702~piPK:64167676~theSitePK:5287741,00.html
Action aid "Climate Change, Urban Flooding and the Rights of the Urban Poor in Africa", 2006:
http://www.actionaid.org.uk/doc_lib/urban_flooding_africa_report.pdf
R. Mearns and A. Norton (eds.) Social Dimensions of Climate Change,Washington D.C., World Bank 2010

On compact cities and density:
H. W. Richardson and C. Bae, Urban Sprawl in Western Europe and the United States, Ashgate, 2004
http://sapiens.revues.org/index914.html

On UN-HABITAT's Cities and Climate Change Intitiative:
www.unhabitat.org

INFORMATION ABOUT CITY CASE STUDIES

Rotterdam:
For more on Rotterdam's climate action see *http://www.c40cities.org/bestpractices/water/rotterdam_climate_proof.jsp*
Mexico City
For an interview with Marcelo Ebrard the Mayor of Mexico City see: *http://www.citymayors.com/interviews/ebrard-interview.html*

SOME FUNDING RESOURCES:

General funding information for cities:
ICLEI Cities financing document: *http://www.iclei.org/fileadmin/user_upload/documents/Global/Services/Cities_in_a_Post-2012_Policy_Framework-Climate_Financing_for_City_Development_ICLEI_2010.pdf*

For Adaptation funding:
Adaptation funding search engine for projects in your region:
http://unfccc.int/adaptation/implementing_adaptation/adaptation_funding_interface/items/4638.php
UNFCCC adaptation funding:
http://unfccc.int/cooperation_and_support/financial_mechanism/adaptation_fund/items/3659.php

For Mitigation funding:
World Bank Community Development Carbon Fund: *http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/ENVIRONMENT/0,contentMDK:20276742~pagePK:210058~piPK:210062~theSitePK:244381,00.html*
UN Strategic Climate Fund provides funding for mitigation projects: This is carbon finance for small projects in developing countries funded by public-private partnerships. *http://cdm.unfccc.int/index.html*

Climate investment funds:
http://www.climateinvestmentfunds.org/cif/designprocess
UN Clean Technology Fund provides tradable carbon credits where projects mitigate greenhouse gas emissions:
http://cdm.unfccc.int/index.html

This publication is a call to action for cities to address climate change. It takes the view that this challenge also presents cities with an opportunity to review urban policy and local strategies which can lead to greater livability and vibrancy. To that end, it offers twelve key messages and a series of practical case studies showing how cities can respond to the challenge of climate change in a way that ultimately improves urban sustainability.

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