COP21 EDITION

LOCAL GOVERNMENTS' POCKET GUIDE TO RESILIENCE

ONE UNITED NATIONS FOR CLIMATE ACTION

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ACRONYMS

ACCCRN:	Asia Cities Climate Change Resilience Network
COP21:	21st Session of the Conference of the Parties
COSOC:	Council of representatives of civil society, City of Concepción
CRF:	City Resilience Framework
CRI:	City Resilience Index
CRO:	Chief Resilience Officer
CRPP:	City Resilience Profiling Programme
DAC:	Durban Adaptation Charter
DFID:	UK Department of International Development
DRM:	Disaster Risk Management
DRR:	Disaster Risk Reduction
FCA:	Future Cities for Africa Programme
GFDRR:	Global Facility for Disaster Reduction and Recovery
GRP:	Global Resilience Partnership
Habitat III:	United Nations Conference on Housing and Sustainable Urban Development
HCMC:	Ho Chi Minh City
HUD:	US Department of Housing and Urban Development
IPCC:	Intergovernmental Panel on Climate Change
JWP:	Cities Alliance Joint Work Programme on Resilient Cities
KCCA:	Kampala Capital City Authority
MCUR:	Medellín Collaboration on Urban Resilience
OECD:	Organization for Economic Co-operation and Development
ONEMI:	Chile's National Emergency Office
PPP:	Public Private Partnerships
SDGs:	Sustainable Development Goals
SIDA:	Swedish International Development Cooperation
UCLG:	United Cities and Local Governments
UNEP:	United Nations Environment Programme
UNFCCC:	United Nations Framework Convention on Climate Change
UN-Habitat:	United Nations Human Settlements Programme
UNISDR:	United Nations International Strategy for Disaster Risk Reduction/ UN Office for Disaster Risk Reduction
WIEGO:	Women in Informal Employment: Globalizing and Organizing
WHS:	World Humanitarian Summit

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your future
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FOREWORD

Cities are essential to our well being, not only for the people who live and work in them, but for all of those who rely on the goods and services they provide. They are vibrant hubs of economic services and growth, culture, and innovation. Many are expressions of our potential, and exemplary of how we want to live – inclusively, equitably, justly, securely, and prosperously. At the same time, cities contribute to some of society's most pressing challenges. Among these are the increasing number of urban poor and people living in slums and informal settlements without adequate access to basic services and safe shelter; high unemployment, especially among young people; unsustainable use of natural resources; high levels of air and water pollution; and rising levels of global greenhouse gas emissions.

Cities' ability to tackle these challenges and realize the "urban dividend" will be determined largely by how well they manage rapid urbanization. Within the next decade, there will be nearly five billion urban dwellers. Within a generation, cities will be home to two-thirds of the global population. Building resilience in cities starts with understanding the many social, environmental, and economic challenges and opportunities this growth brings. It includes improving the capacity of people, communities, and local governments to respond to major shocks, as well as cope with on-going stresses and emerging threats. More, it inspires actions that are ambitious and transformative, and which ultimately serve to benefit all human settlements.

The purpose of this guidebook is to illustrate how cities everywhere - from Eastern and Southern Africa to Western Europe, to Southeast Asia, to the Southern United States - are responding to current and future challenges by thinking differently about how to strategically design, plan, and manage for resilience. The case studies presented here highlight the experiences, lessons learnt, and stories of resilience building from the perspective of local authorities and communities actively engaged in the programmes and initiatives led by the Medellín Collaboration on Urban Resilience (MCUR).

Launched during the World Urban Forum in Medellín, Colombia in April 2014, MCUR member organizations include: C40 Cities Climate Leadership Group; Cities Alliance; the Global Facility Disaster Reduction and Recovery (GFDRR); ICLEI-Local Governments for Sustainability; the Inter-American Development Bank; UN-Habitat; the UN Office for Disaster Risk Reduction (UNISDR); the Rockefeller Foundation; 100 Resilient Cities –Pioneered by the Rockefeller Foundation, and; the World Bank Group.

As this guidebook went to press, an exemplar resilient city - Paris - experienced France's worst terror attack since World War II. This book is dedicated to the City and citizens of Paris, and all of those who were affected by this tragic event.

Collectively, these organizations work in over 2,000 cities and commit more than $2 billion annually towards advancing resilient urban development. Our individual commitments and this collaboration are grounded in the pursuit of empowering cities to better understand themselves and the inter-connected nature of the urban system.

MCUR's overarching goal is to facilitate the flow of knowledge and financial resources necessary to help cities become more resilient to disruptions related to climate change, disasters caused by natural hazards, and other systemic shocks and stresses, including the socio-economic challenges associated with rapid urbanization.

This guidebook was made possible through a grant from the Cities Alliance, which recently formed a partnership with the MCUR to create a new Joint Work Programme on Resilient Cities. Running through 2017, the programme comes at a critical juncture as nations prepare for the implementation of the 2030 Sustainable Development Agenda, the Sendai Framework for Disaster Risk Reduction, and the outcomes from the 21st Session of the Conference of the Parties to the UN Framework Convention on Climate Change, taking place in Paris in December. The programme will further complement on-going work towards the United Nations Conference on Housing and Sustainable Urban Development (Habitat III), in Quito, Ecuador in October 2016.

PARTNERS

Paris, France.
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TRIBUTE TO PARIS

For more than 150 years Paris has largely preserved its celebrated urban landscape, characterized by its winding narrow streets, traditional low-rise apartments sat atop bustling cafes and bistros, and magnificent boulevards and architecture. The 13th November tragedy, as with the previous attack on the staff of the satirical newspaper, Charlie Hedbo, just 11 months prior, have only served to unite the "City of Lights" as a global symbol of resilience.

An icon of cuisine, art, culture, philosophy, and fashion, Paris has long exemplified a dedication to the resilience of its people, heritage, economy, and the environment. Over the past decade, Paris has put climate change at the centre of its urban planning and design policies and investments, making it a world-renowned thought leader in resource management, transport, and energy, among other areas. Paris is also a key partner city in a number of global urban resilience programmes – among them the C40 Cities

Climate Leadership Group, the 100 Resilient Cities initiative of the Rockefeller Foundation, and ICLEI-Local Governments for Sustainability. Through these and other multi-stakeholder efforts, Paris is pursuing several actions to strengthen the resilience of its 2.3 million inhabitants to a variety of shocks and stresses. As with most cities with high urban population densities, Paris's climactic threats range from heat waves and pollution, to pressures on social services and availability of jobs and affordable housing, to security and –more recently—the influx of a new generation of refugees.

PARIS AT A GLANCE

The most densely populated city in France, Paris is one of the world's most popular tourist destinations, attracting about 28.9 million visitors a year. It is the biggest financial centre in France and revered as one of the global capitals of the multi-trillion dollar fashion industry. The river Seine passes through the city dividing it into two parts. Paris has a temperate climate with moderate winters and relatively mild summers. Average temperature in summers is around 20 °C and in winters 5 °C.

PARIS AND CLIMATE CHANGE: LEARNING FROM THE PAST AND PREPARING FOR THE FUTURE

In 2003, Paris experienced a massive heat wave, with the temperature rising up to 40°C (20 °C over the average summer temperatures in the city). The event claimed the lives of over thousand people. Of these, 88 per cent of people were living alone and the majority of them were aged 75 or over.

Climate change could increase the frequency and intensity of such events in future, posing significant threats not only to Parisians' health and well-being, but also to the city's public services, electricity consumption, and economy. Since the economy of the city depends heavily on tourism, higher temperatures could negatively affect visitor rates and corresponding tourism revenues.

> *"Forging and restoring links between the capital city and nature is not only a question of providing Parisians with a better living environment in which they can thrive. We are also laying new foundations for forms of urban progress that can then be applied throughout the metropolitan area in the near future."*
>
> ***Mayor of Paris Anne Hidalgo***

In order to address the extreme heat and better understand the potential future impacts of climate change on the city, in 2008 Paris undertook a research project called EPICEA (SPRUCE). A five-year joint collaboration between the City of Paris, the French Meteorological Office, and the National Research Centre funded by City of Paris, the study found that Paris is expected to experience a significant increase in temperature (2-4 degree C) by the end of the 21st century, with changes more apparent in summers and more during the day than at night, varying with the level of urbanization. Analysis of the 2003 heat wave reflected the formation of urban heat islands with a 4-7 degree C tem-

perature differential between the center of Paris and neighboring rural areas. The study emphasized pursuing urban heat adaptation strategies such as enhancing the reflective properties of roofs and walls, adding watered vegetation, and increasing permeability of pavement to reduce the temperature in urban areas.

The EPICEA study served as the first stage of a larger vulnerability and strengths diagnostic in order to equip the city for climate change and resource scarcity, undertaken in 2012. The results of this diagnostic served as the foundation of Paris's Adaptation Strategy approved by City Council September 2015. The adaptation strategy contains four pillars:

- Protect Parisians from climate change induced disasters
- Maintain water, energy and food supply
- Building climate into sustainable urban development
- Fostering new lifestyles and boosting solidarity

> *"The City of Paris is an enduring example of strength, innovation, and reconciliation in times of crisis. As a major metropolitan area, we welcome their commitment to creating a more robust and resilient city through targeted actions against a variety of shocks, including climate change, socio-economic disruptions, and manmade tragedies. Through these efforts, they continue to inspire others around the world."*
>
> ***Gino Van Begin,***
> *Secretary General, ICLEI – Local Governments for Sustainability*

Within the 4 pillars, the adaptation strategy contains 30 objectives and recommends 35 concrete actions, including reinforcing the presence of water in parks and urban developments, drafting building standards for climate change and encouraging passive cooling, creating an eco-district pilot in Saint-Vincent-de-Paul, establishing a green fund to help other cities, and undertaking study to

The Paris Climate Action Plan aims to achieve a 75% reduction in greenhouse gas emissions by 2050	
Key objectives of the 2015 Paris Adaptation Strategy include:	
• All Parisians within a 7 minute walk of a cool place by 2020	• Create "coolest places" map
• Plant 20,000+ trees by 2020	• Reinforce access to free drinking water fountains on Paris streets
• Parks open 24 hours a day during the hottest days of summer	

Source: *Paris Climate and Energy Action Plan*[2]

People on bicycles and pedestrians enjoying a car free day on Alexandre III bridge in Paris, France.
© Shutterstock

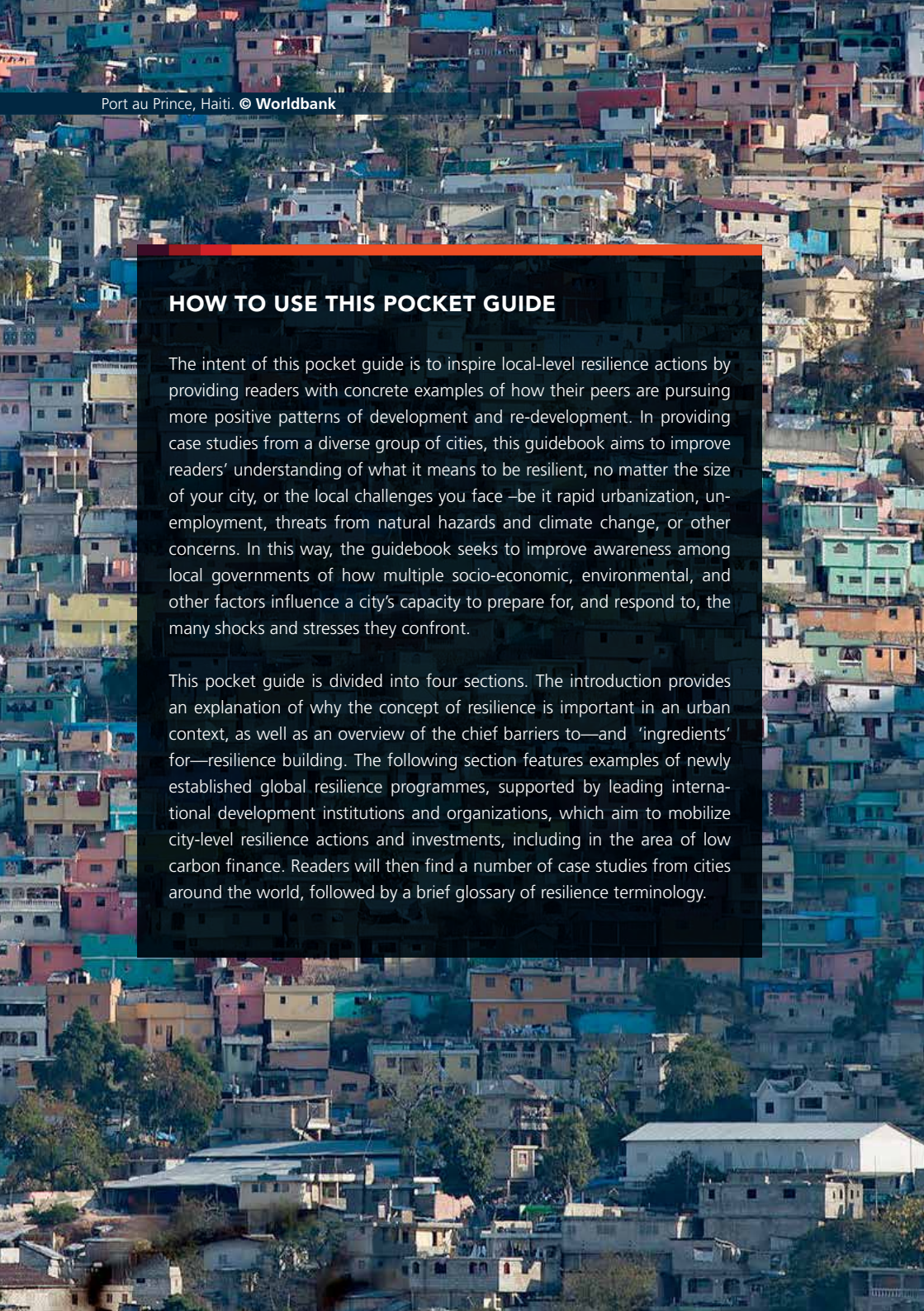
anticipate climate-driven migration. The adaptation strategy will serve as a foundation for the larger Resilience Strategy the city aims to develop.

One of the key goals of the Adaptation Strategy is to reduce the urban heat island effect. The 'Paris Greening Programme' helps in achieving this goal by increasing the green cover of the city. The programme also includes a strong community engagement by providing the citizens an opportunity to contribute to the city's Biodiversity Plan.

> *"The City of Paris truly embodies the spirit of urban resilience. Within weeks of experiencing unspeakable tragedy, Paris has graciously hosted leaders from around the world to address the shared global issue of climate change, exemplifying the essential ability of major global cities to address various shocks and stresses simultaneously."*
>
> ***Mark Watts,***
> *Executive Director,*
> *C40 Cities Climate Leadership Group*

ENDNOTES

1 *Paris Climate and Energy Action Plan (2012). [Online] http://api-site-cdn.paris.fr/images/70923*
2 *Paris Climate and Energy Action Plan (2012). [Online] http://api-site-cdn.paris.fr/images/70923*



Port au Prince, Haiti. **© Worldbank**

HOW TO USE THIS POCKET GUIDE

The intent of this pocket guide is to inspire local-level resilience actions by providing readers with concrete examples of how their peers are pursuing more positive patterns of development and re-development. In providing case studies from a diverse group of cities, this guidebook aims to improve readers' understanding of what it means to be resilient, no matter the size of your city, or the local challenges you face –be it rapid urbanization, unemployment, threats from natural hazards and climate change, or other concerns. In this way, the guidebook seeks to improve awareness among local governments of how multiple socio-economic, environmental, and other factors influence a city's capacity to prepare for, and respond to, the many shocks and stresses they confront.

This pocket guide is divided into four sections. The introduction provides an explanation of why the concept of resilience is important in an urban context, as well as an overview of the chief barriers to—and 'ingredients' for—resilience building. The following section features examples of newly established global resilience programmes, supported by leading international development institutions and organizations, which aim to mobilize city-level resilience actions and investments, including in the area of low carbon finance. Readers will then find a number of case studies from cities around the world, followed by a brief glossary of resilience terminology.

Ghanaian people at the market in Ghana. People of Ghana suffer of poverty due to the unstable economic situation.
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INTRODUCTION

All cities aspire to be great cities. This pocket guide aims to demonstrate why resilience is for everyone and for every city. While there is often an emphasis on planning for resilience in the world's most rapidly urbanizing areas, many of the case studies featured here express the need for, and value of, resilience building in those regions where urban population growth has peaked. Shifting demographics, geo-political conditions, and climate change, among other factors, are challenges for all cities, as well as their citizens who rely upon the goods and services cities provide.

The term 'resilience' has become ubiquitous in public and private sectors alike, referring to everything from crop yields to the health of the global financial system. This pocket guide situates the concept of resilience in a purely urban context in order to clarify the implications for city leaders, their communities, and citizens. It comes at a time when already over half of the world's population resides in urban areas, and there is set to be an explosion in city-level development and infrastructure investment over the coming decades. This pocket guide is also being published at a time when world leaders are collectively being called upon to address some of the most pressing challenges of our time - from eradicating extreme poverty, to reducing people's exposure and vulnerability to disasters, to combating the causes of climate change, to fostering global peace and security. As the global urban population continues to grow, local governments and communities will play an increasingly instrumental role in meeting these challenges. Their capacity to do so will start by building resilience at home.

The cities featured in this guidebook are in various stages of resilience building. For Rotterdam, building resilience to water stress has inspired actions to improve various other parts of the city and take on a role as a global ambassador of best practice in environmental sustainability. Borrowing lessons from Rotterdam's experience, the development of New Orleans' resilience strategy was a hard-won effort in response to the devastating impacts of Hurricane Katrina in 2005, which has inspired multiple socio-economic improvements, and demonstrated the value of city-to-city cooperation. Rapid urbanization in Addis Ababa has prompted a holistic inspection of the city's systems and services, from understanding the impacts of climate change, to monitoring traffic patterns, to improving delivery of basic services and other efforts to reduce inequality and poverty. In Durban community groups are working hand-in-hand with local government to improve the lives and livelihoods of informal settlement dwellers and provide economic empowerment to women. Cities like Barcelona and Shimla exemplify the critical role of local governments in moving towards a low carbon, climate resilient, and equitable society. In some way or another, all cities featured here highlight sound governance at multiple levels (national, regional, municipal, and community) as a critical building block of resilience.

"

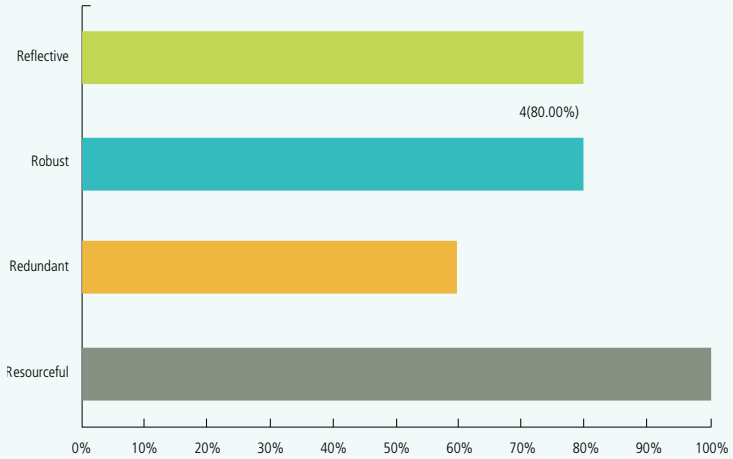
Shared MCUR Purpose:
Empowering cities to understand themselves better, so they can make better decisions.

The stories told here serve as a companion to a new online knowledge platform for local governments, *www.resiliencetools.org*. The purpose of this platform is to help local governments and other municipal professionals understand the primary utility of the vast array of tools and diagnostics designed to assess, measure, monitor, and improve city-level resilience. Some tools are intended as rapid assessments to establish a general understanding and baseline of a city's resil-

ience and can be self-deployed. Others are more action-oriented and demand more sophisticated technical and financial capacities to implement. A common intention for most tools is to enable cities to identify and prioritize areas for intervention and investment.

The resilienetools.org platform offers a comprehensive overview of how different tools compare so local governments can match the variety of solutions available to their specific needs and ambitions.

FIGURE 1: KEY CHARACTERISTICS/TRAITS OF A RESILIENT CITY



Source: *MCUR Survey 2015*

WHAT IS MEANT BY URBAN RESILIENCE?

While exact definitions of resilience vary, the organizations that have contributed to this book broadly agree that resilience, in an urban context, is about sustaining – and, in some cases, transforming - the systems and conditions within a city that affect its ability to function and deliver essential services, especially to poor and vulnerable communities.

Whether in the face of minor disruptions, major shocks, or perennial stresses, resilience is ultimately about securing and bettering people's lives and livelihoods.

Critically, resilience is about taking a holistic view of the various elements of the 'urban system' and understanding the inter-connected nature of the urban risk spectrum (see Figure 2).

FIGURE 2: CLASSIFICATION URBAN HAZARDS

Natural	Technological	Socio-economic
Earthquake	Fire	Political conflict
Flooding	Building collapse	Social conflict
Severe storm	Exposion	Labor strike/unrest
Wildfire	Transport accident	Terrorism
Extreme temprature	Gas leak	War
Drought	Oil spill	Economic crisis
Tsunami	Chemical spill	Business discontinuity
Epidemic/pandemic	Poisoning	High unemployment
Insect infestation	Radiation	Corruption
	System breakdown (e.g ICT, water, energy, health,education, etc)	Supply crises (e.g. food, water, housing, energy, etc.)

Source: *World Bank/GFDRR*

As highlighted by the Cities Alliance, economic resilience may be undermined when a city invests heavily in one sector at a cost to others, and when there are inadequate social and governance structures in place that can act as buffers to economic threats. At a larger scale, cities also need to respond to shifts in the global economy and political climate in order to avoid economic decline. In this regard, many cities have transformed from manufacturing hubs to leaders in finance in order to maintain their comparative advantage.

Likewise, although environmental resilience in urban areas is often associated with physical adaptation measures to meet the impacts of climate change, there is an increasing emphasis on shared solutions that address other social needs and challenges. One is the preservation of valuable ecosystem services upon which all cities and all human settlements depend. This book provides just a few examples of infrastructural improvements and other innovations that are helping cities prepare for the impacts of climate change and balance the relationship between people's needs and the natural environment.

Achieving ecosystem resilience at both global and local scales is a challenge considering our current patterns of consumption and production. Overconsumption makes it difficult for the environment to replenish itself and bounce back from shocks and stresses. Water availability and quality, the availability of prime agricultural land, fish stocks, forests, and biodiversity are in decline, and air pollution and greenhouse gas levels increasing. Towns and cities - especially small to medium

scale cities - are the ones most exposed to the impacts of extreme weather events such as inland flooding, rising sea levels, hurricanes and heat waves. Such events can have negative impacts on local and national economies, as well as on people (on their livelihoods and health) and increase risk to disasters. The risks are often greater for those living in informal settlements and slums, where there is a disproportionate exposure and vulnerability to disasters.

Although cities generate the lion's share of global wealth, they are also home to a growing proportion of the world's poorest communities. There are now some 1 billion people living in informal settlements. Within five years, the number could reach 1.5 billion people in the developing world. By mid-century, cities may be home to the majority of people who earn less than $1 per day.

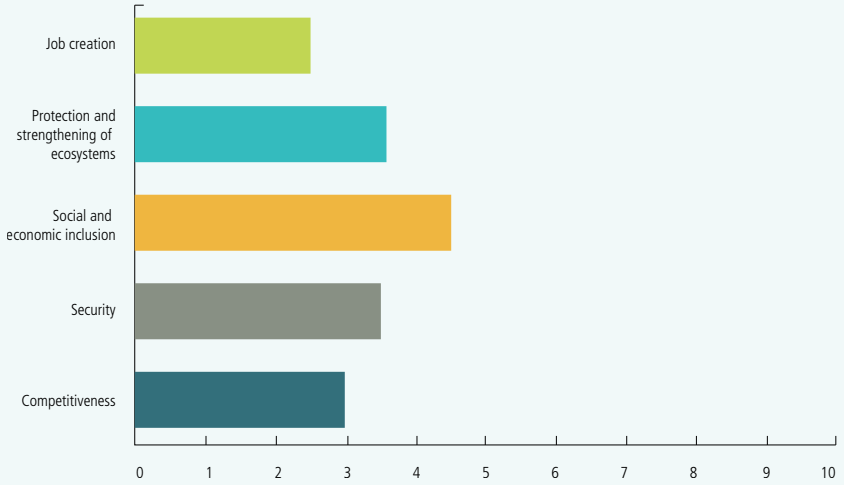
Issues that block groups and individuals from participating in a city's growth such as intolerance, isolation of marginalized groups (i.e. differential access to land and services), and political uncertainty, can undermine the potential "urban advantage". Studies (Florida 2003, Glaeser 2005a, Clark et al 2002) have shown that cities which are able to maximize human capital and foster diversity tend to be the most liveable and most competitive.

In her book, The Resilience Dividend (Rodin, 2014), Rockefeller Foundation President Judith Rodin observes that as communities, cities, companies and countries become more adept at managing disruption and skilled at resilience-building, they are able to create and take advantage of new opportunities in good times and bad. "The resilience dividend means more than effectively bouncing back from a disruption [but] also achieving

Four days after Hurricane Katrina on the Gulf Coast, many parts of New Orleans remain flooded.
© Shutterstock

significant transformation that yields benefits even when disruptions are not occurring." Such benefits include job creation, protecting and strengthening ecosystems, fostering social and economic cohesion, and improving a city's overall security and competitiveness. (See Figure 3).

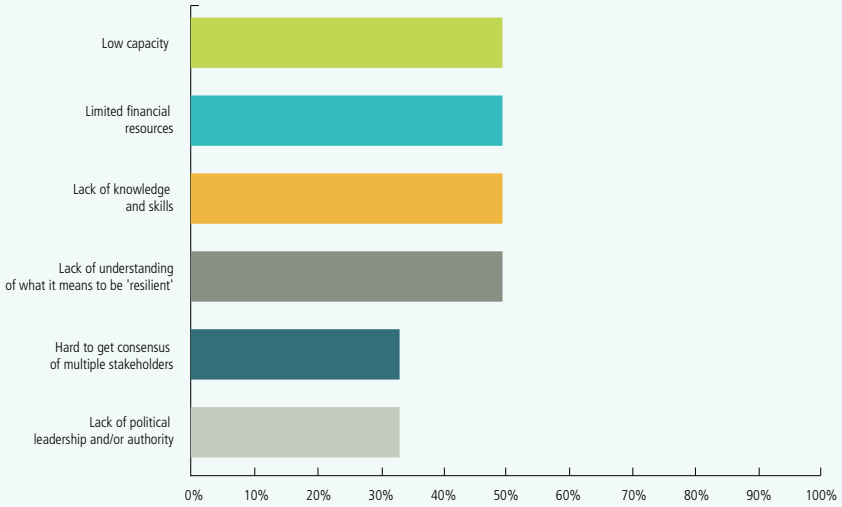
FIGURE 3: THE TOP RESILIENCE DIVIDENDS CITIES CAN EXPECT FROM INVESTING IN URBAN RESILIENCE PLANS



Source: *MCUR Survey 2015*

Resilience necessitates integrated approaches and solutions that are designed to meet several challenges simultaneously. For example, investing in equitable transit-oriented infrastructure can improve the economic welfare of poor communities by connecting them with jobs, drive down crime rates, and foster more environmentally sound practices. Likewise, the equitable provision of reliable basic services, such as wastewater collection and energy distribution, fosters dignity, improves health, and encourages social and economic inclusiveness. The case studies featured here all emphasize the value of this holistic approach to resilience building.

FIGURE 4: CHIEF BARRIERS TO BUILDING RESILIENCE



Source: *MCUR Survey 2015*

The risks that cities face are becoming more complex and unpredictable. Urbanization, globalization, and climate change are interacting in a way that is unprecedented and, at the same time, urban service delivery systems are becoming increasingly interlinked and interdependent. This requires us to think differently about cities and how to address the shocks and stresses –both natural and human induced—that could inhibit their ability to achieve their development goals.

The complexity of cities also makes resilience building especially challenging. Focusing on one policy goal, such as climate protection, without considering others can lead to undesirable outcomes and asymmetric investments. These decisions may come as explicit trade-offs, unintended consequences, or some combination of the two. Building a resilient city, therefore, requires a holistic, multi-sectoral, and flexible approach to urban development.

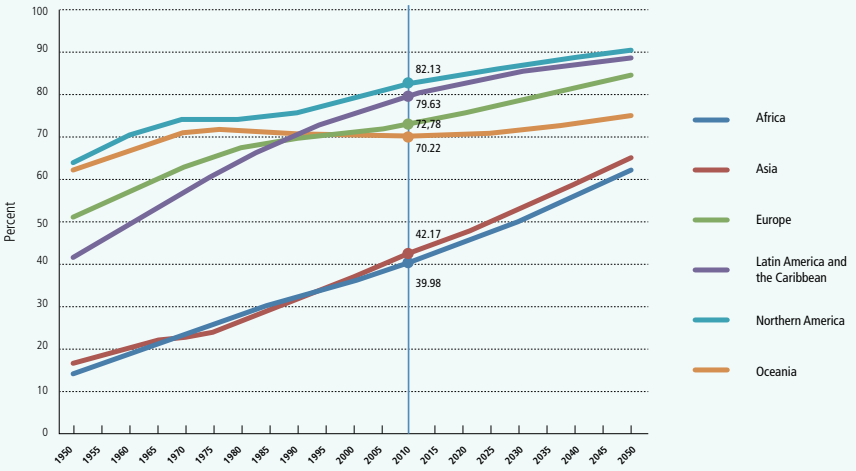
Source: *World Bank, 2015*

RESILIENCE IN THE AGE OF THE CITY

As the global urban population swells towards five billion over the next 15 years, there is a huge potential to make cities and people more prosperous and accelerate national development. A major challenge to realizing this potential - and sustainable urbanization, generally - is that the multitude of shocks and stresses facing cities are not comprehensively observed, nor the linkages fully understood. The most rapidly urbanizing areas in developing economies in particular have found themselves largely unprepared for the array of spatial, demographic, social and environmental challenges they face.

As the Overseas Development Institute (ODI) observes, a key challenge to financing resilience is the uneven level of attention given to certain types of shocks and stresses over others. For instance, there is an imbalance between the level of understanding and preparedness for natural disasters versus conflicts, epidemics, and other threats, and the linkages between these hazards. Similarly, the World Bank estimates that, between 1980 and 2012, nearly $4 trillion has gone into relief and recovery efforts in response to natural disasters. "But that figure includes only quantifiable damage, and only from one kind of disruption. It does not account for the greater toll on people, the environment, and economies exacted by the interruption of activity, loss of opportunity, and other factors" (The Resilience Dividend, 2014).

FIGURE 5: URBAN POPULATION GROWTH BY REGION (1950-2050)



Source: ***United Nations***

While the projected urban growth brings many challenges –among them, keeping up with the corresponding demands for land, transport, employment, energy, and multiple other social and environmental services – it holds a generational opportunity to positively shape future physical, social, and environmental global landscapes. For instance, some 60 per cent of the area expected to be urban by 2030 remains to be built. The projected expansion in urban land cover between 2000 and 2030 is in the range of 56-310 per cent.[1] By 2030, an estimated $25- $30 trillion will be invested in new infrastructure, including urban road construction, water and sanitation, energy and transport systems, and buildings. It is expected that roughly $700 billion a year will be spent on financing new urban infrastructure in low- and middle-income countries over this period.

Designing, planning and building for resilience from the start will help ensure cities are able to absorb their projected growth safely and sustainably. More, it will enable them to leverage their growth to combat other local and global challenges such as inequality and poverty, pollution and climate change, and pressures on natural resources.

WHY EVERY CITY SHOULD PLAN FOR RESILIENCE

Every city - irrespective of its geographic location, population, or economic conditions - has a reason to plan for resilience. All cities, for example, have a social obligation to protect the most vulnerable and guard against self-interest development, which may marginalize certain communities, drive up poverty and inequality levels, and increase people's risk to disasters.

BOX 1: THE ECONOMIC CASE FOR RESILIENCE

The United Nation's Global Assessment Report on Disaster Risk Reduction highlights that for three consecutive years direct economic losses from disasters have soared past US$100 billion—total expected annual global loss from earthquakes and cyclone wind damage alone now amounts to US$180 billion per year (UNISDR, 2013). Moreover, sea-level rise and subsidence in the 136 largest coastal cities could result in losses of US$1 trillion or more per year by 2050 (Hallegate et al., 2013). The Arab Spring resulted in US$800 billion in lost output (HSBC, 2013) and over 50,000 deaths (Ibish, 2012) in the seven hardest-hit countries. Singapore's exposure to SARS cost the government nearly US$570 million (Sitathan, 2003), while the collapse of the Rana Plaza building in Dhaka, Bangladesh in April 2013 resulted in the death of over 1,000 people.

Because the infrastructure of informal settlements and other poor communities are generally of low quality and built in highly exposed areas, the vulnerability of these populations, including to the effects of climate change, is typically increased by an order of magnitude.[2] During the 2011 Thailand floods, 73 per cent of low-income households in Bangkok were affected compared to only 21 per cent of the total city population.[3]

Likewise, cities everywhere have an economic incentive to ensure their resilience against not only major shocks, but also deeper social concerns and stresses that can erupt in the face of internal or external crises (see Box 1). The cascading consequences of one event, or the prolonged neglect of underlying socio-economic tensions, can set back development gains and have long-lasting local and global implications. The 2011 floods in Bangkok, as with the Tohoku earthquake that same year, had significant impacts on global supply chains.

Of particular concern is the accumulation of risk in urban areas and fragile states, characterized by political instability and borne out of social inequality and protracted crises and conflicts. In 2010, 15 per cent of the world population lived in fragile and conflict-affected countries. This same population comprises one-third of people living in extreme poverty.[4] By 2050, it is expected that more than 50 per cent of those living in fragile states will reside in cities. The pace of urban growth in these areas is exacerbating vulnerabilities and bringing more pressure to bear on urban basic services, social cohesion, and the capacity of public institutions to respond to people's needs. The impacts of natural hazards and climate change could likely lead to further displacement and instability in these areas, with far-reaching consequences for cities around the world.[5]

Cities have a further cause to both mitigate their impact on the environment and prepare for the anticipated consequences of climate change (see Box 2[6]). More than two thirds of the world's largest cities are vulnerable to rising sea levels as a result of climate change.[7] A risk analysis[8] of 616 major metropolitan areas, comprising 1.7 billion people, or nearly 25 per cent of the world's total population, and approximately half of global GDP, found that flood risk threatens more people than any other natural hazard. The number of poor exposed to natural hazards, including those triggered by climate change, is expected to reach 325 million by 2030.

> *"Planning for resilience is about planning for the well-being, security, and prosperity of all people. Resilience driven urban development and re-development fosters social inclusiveness and equity, promotes civic pride and community, preserves environmental resources, and invigorates economic activity."*

Meanwhile, current urbanization and development patterns mean cities are contributing to an increasing share of the global greenhouse gas emissions responsible for more frequent and devastating climactic events that will impact on urban areas.

BOX 2: CLIMATE CHANGE: IMPLICATIONS FOR CITIES

1. Many emerging climate change risks are concentrated in urban areas. Urban areas hold more than half the world's population and most of its built assets and economic activities. They also house a large propotion of the population and economic activities most at risk from climate change.

2. Climate change impacts on cities are increasing. Key issues include rising tempratures, heat stress, water security and events, heavy rainfall and strong winds, inland flooding, food security, and ocean acidification.

3. The world's urban population is forecast almost to double by 2050. Increasibg the number of people and assests exposed to climate change risks. Rapid urbanisation in low- and middle-income countries has already increased the number of highly vulnerable urban communities living in informal settlements, many of which are at high risk from extreme weather events.

4. Steps that build resilience and enable sustainable development in urban areas can accelerate successful climate change adaptation globally. Adaptation options exist ares such as water, food, energy and transport.

5. The greatest potential for mitigating greenhouse gas emissions may ile in rapidly development cities in industrialising countries. City-based sectors with potetial for mitigating include buildings, energy transport, and industry. Howevr, many rapidly developing cities lack the financial, technological, institutional and governance capacity required for effective mitigation.

Promoting high density, compact cities can encourage the sustainable use and management of ecosystems; facilitate low carbon public transport; and encourage walking, cycling, and other forms of eco-friendly mobility, all of which lead to a reduction in emissions and lessen a reliance on high-carbon fuels. By focusing on accessibility, optimizing urban densities, and increasing the proximity between where people live and the goods and services they need, cities can also improve access to diversified income options, and encourage investment and equitable economic opportunities. In turn, such actions can foster social cohesion and inclusiveness. At the same time, cities must be mindful that the greatest strengths for economic growth – efficiency and interrelation of infrastructure and density of population — can also be their potential weaknesses to cascading failure during overstress from disasters (Graham, 2010).

A common thread among all cities featured in this pocket guide is the recognition that no single problem is entirely independent of the multitude of other challenges they face. Whether their resilience building efforts were driven out of a response to a singular crisis, the need to address multiple current challenges, or prepare for future ones, all stories reflect an understanding of the inter-connected nature of the urban system, and the relationship between the various factors and conditions that influence resilience.

BOX 3: THE TOP 5 REASONS CITIES NEED TO PLAN FOR RESILIENCE

1. Natural hazards like storms, droughts, and earthquakes are not the only risks cities face. Cities are also vulnerable to economic downturns, crime and violence, public health epidemics, and even infrastructure failure. These shocks can have devastating effects, bringing some or all elements of an urban system to a halt, often causing damage to assets and loss of life.
2. Acute shocks and chronic stresses can also have a deep and lasting negative impacts on human development.
3. Disaster losses are often linked with, or exacerbated by poverty and vulnerability of the poor that stem from socio-economic and environmental imbalances that mostly impact the urban poor..
4. While the origins and long-term impacts of shocks may differ dramatically, the necessity of the city to absorb, adapt, and continue functioning in the short-term remains constant.
5. Investment in building resilience is far more cost-effective than bearing the full brunt of urban shocks and stresses that occurs when there is no preparation or risk mitigation.

Source: *Worldbank*

BOX 4: THE RESILIENCE PRIORITIES COMMON TO ALL CITIES, REGARDLESS OF GEOGRAPHIC LOCATION (EXPOSURE TO HAZARDS), SOCIOECONOMIC CONDITIONS, ETC.

1. Protection of lives and livelihoods and safeguarding of local development goals throughcross-sectoral coordination, political leadership on resilience and a solid understanding of risks (broad range of shocks and stresses);
2. Spatial implications for communities and assets (buildings and infrastructure) to inform urban plans and budgets; and
3. Stakeholder inclusion and engagement.

ENDNOTES

1 *Intergovernmental Panel on Climate Change Fifth Assessment Report, Working Group III, 2014*

2 *Turn Down the Heat: Climate Extremes, Regional Impacts, and the Case for Resilience, World Bank, 2013*

3 *Global Assessment Report, UNISDR, 2013*

4 *World Bank inputs to the post-2015 HFA, 2014*

5 *UN-Habitat submission to GAR 2015*

6 *ICLEI-Local Governments for Sustainability (2014). Climate Change:Implications for Cities. University of Cambridge: London, UK. http://www.iclei-europe.org/fileadmin/templates/iclei-europe/files/content/Topics/Adaptation/IPCC_AR5__Implications_for_Cities__Briefing__WEB_EN.pdf*

7 *C40 Cities Climate Leadership Group (2015). Connecting Delta Cities. http://www.deltacities.com/about-c40-and-cdc*

8 *Swiss Re Mind the Risk*

Pedestrians and cyclists moving through city street of Bogota, Colombia. **© Shutterstock**

GLOBAL RESILIENCE PROGRAMMES

The programmes featured here underscore the global momentum around urban resilience. Backed by multi-lateral financial institutions, foundations, bi-lateral development agencies, and the private sector, these initiatives collectively cover more than 200 towns and cities in over 30 countries.

CLIMATE-SMART, FINANCIALLY-SOUND DEVELOPMENT: THE CITY CREDITWORTHINESS INITIATIVE

THE IMPORTANCE OF CREDITWORTHINESS

In an increasingly urban world, cities have an enormous opportunity to drive innovation, improve the life of residents and combat the effects of global climate change. Yet for cities to effectively assume their place at the vanguard of climate-smart development, two significant challenges must be met: cities must be able to plan and implement climate-smart projects and then cities must be able to find the right financing solutions.

THE FINANCING GAP	THE CLIMATE PLANNING GAP
For climate smart development to become a reality, cities require access to more than one trillion US$ per year in financing.	Only 2 per cent of cities worldwide (81 of 3500+ cities) have climate action plans.
Just 4 per cent of the 500 largest developing country cities have globally recognized credit ratings, and only 20 per cent in local markets.	Only 32 of the 150 largest cities in the world have published GHG inventories, which is the fundamental diagnostic for low carbon planning.

In order for cities to meet these challenges at the scale required they must become creditworthy.

In the eyes of investors, a creditworthy city can reliably provide returns on investments or debt obligations. Naturally a creditworthy city has therefore achieved financial sustainability by maximizing revenues and minimizing costs in a way that emphasizes sustainability and transparency.

However, it is equally important that a creditworthy city demonstrates investment planning processes that reflect a long-term vision that will stimulate growth and mitigate risks, such as those associated with climate change. A creditworthy city also has a well-trained staff with the capacity to manage resources and prioritize projects according to a well-conceived development strategy. In this sense, creditworthiness is a goal that can empower cities to both plan and finance climate-smart development.

A open air market in Arusha, Tanzania.
© Shutterstock

GLOBAL MOMENTUM - THE CITY CREDITWORTHINESS INITIATIVE

In 2013, the World Bank, in partnership with the Public-Private Infrastructure Advisory Facility (PPIAF) and other development partners, launched the City Creditworthiness Initiative (the Initiative) to help up to 300 cities enhance their creditworthiness and develop more attractive and climate-smart opportunities for investors. The goal of the initiative is to enable cities to identify what are the key challenges to creditworthiness, develop an action plan to remedy the challenges and bring resources/capacity to bear in the implementation of a creditworthiness action plan.

IMPLEMENTATION UPDATE

Since the Initiative's launch, 186 municipalities have been engaged through eight City Creditworthiness Academies: in Nairobi (for East Africa), Seoul (for East and Southeast Asia), Arusha (for Tanzania), Bogota (for Colombia), Kampala (for Uganda), Kigali (for Rwanda), Amman (for C40 member-cities), Amman 2 (for Jordan and West-Bank/Gaza):

- Total participants = 584
- Total countries covered = 32
- Total cities and towns engaged = 186
- Creditworthiness Action Plans creates = 186

- Long-term technical assistance programs are under implementation in 35 municipalities, with 40 more municipalities in the process of finalizing their technical assistance programs.

IMPACT MILESTONES

- After undertaking a series of revenue management reforms, the city of Arusha in Tanzania has increased its own-source revenue levels by a multiple of 30 over the past two years. These reforms were independently undertaken by Arusha and demonstrate the tremendous potential impact of creditworthiness activities for municipalities in low-income developing countries.

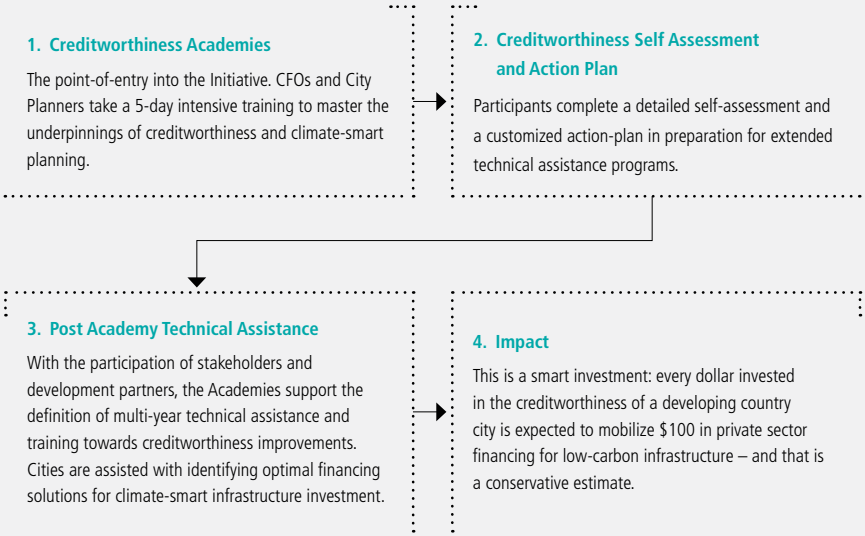
BOX 5: KAMPALA CAPITAL CITY AUTHORITY (KCCA) & THE CITY CREDITWORTHINESS INITIATIVE

The KCCA requested support to further increase efforts to improve its financial management and its provision of infrastructure. With assistance from the World Bank & the Initiative, KCCA has worked to improve financial management standards; the city has achieved investment-grade creditworthy status (A1 Rating, National Scale) and sounded out the potential for a sub-sovereign bond market, thus supporting an investment environment that allows Kampala to carry out its ambitious plans.

Souvenirs street in Madaba, Jordan. Madaba dates from the Middle Bronze Age and called "The City of Mosaics". **© Shutterstock**

The city is also working closely with the Initiative to develop its first capital investment plan, which will allow Kampala to make infrastructure investments strategically, factoring in measures to make the city more resilient to shocks and stresses, while remaining energy efficient.

Kampala was already taking impressive steps toward sustainability, particularly in the areas of own-source revenue mobilization and financial reporting. By working with the Initiative, it has been to leverage the experience of other cities in Africa. For example, KCCA leaders consulted with the chief financial officer of Durban, South Africa, on Durban's financial and fiscal sustainability accomplishments.



- Colombian Development Bank FINDETER is leading the finalization of the post-Academy technical assistance effort in Colombia in collaboration with the Initiative.

- In Tanzania, the Initiative is providing multi-year support to 34 local governments through a set of technical assistance and training activities, including project financing support on PPPs at the local government level, support to enhance local government own-source revenue collection and management; and activities to showcase opportunities for private investments for local government projects.

- Further 40 municipalities in 5 countries are in the process of finalizing their technical assistance programs, with funding to be provided by the Initiative's donor group.

CONTACT

For more information about the Creditworthiness Initiative, please contact Joshua Gallo, Senior Municipal Finance Specialist at ***jgallo@worldbank.org.***

For more information, visit ***www.worldbank.org***

ENHANCING URBAN RESILIENCE THROUGH COMMUNITY PARTICIPATION: LESSONS FROM SLUM PROFILING IN MBALE (UGANDA) FROM THE FUTURE CITIES FOR AFRICA PROGRAMME

Mbale, Uganda. **© Shutterstock**

As urbanisation continues apace worldwide, the attendant development of slums and informal settlements is also taking firm roots. Occupied mainly by the urban poor, slums and informal settlements are often flash points of urban tenure insecurity, land conflicts and evictions. According to the UN-Habitat, one of the main challenges facing the poor in slums and informal settlements is tenure insecurity. Participatory approaches to secure tenure address urban inequality, build social capital and therefore strengthens community resilience. Furthermore, land planning serves to minimize the risk of disasters to vulnerable communities. Communities should always be actively involved in resilience development programmes (UN-Habitat, 2010, p. 5). Their participation can provide transparency, build trust and elicit cooperation in providing information and in implementation of development programmes.

The Future Cities Africa (FCA) is a project that aims to make cities work for the poor, with a focus on resilience and economic growth. Implemented by the Cities Alliance and funded by the UK Department for International Development (DFID), it is designed to support at least eight cities in four African countries to anticipate and minimise future climate, environment and natural resources challenges – essentially giving them the tools to future proof themselves so that they will be inclusive, resilient and have growing economies. The FCA aims to strengthen the focus on resilience of existing initiatives through various means including by supporting the ongoing preparation of municipal development plans, and via increased participation of the urban poor in city planning processes. The project is currently being implemented in 21 cities in Ethiopia, Ghana, Mozambique and Uganda, with a focus on different city typologies, including: (a) a metropolitan region in Ghana; (b) a system of secondary cities in Ethiopia and Uganda; and (c) a city development corridor in Mozambique.

Uganda's rapid urbanisation[1] has attracted attention of different local and intentional stakeholders with the view of supporting sustainable urban development, addressing urban poverty and enhancing city resilience. Cities Alliances and UN-Habitat supported the implementation of the Social Tenure Domain Model (STDM) tool to address the land tenure issues in the slums across five secondary cities namely: Mbale, Masaka, Entebbe and Tororo. STDM is a pro-poor, gender responsive and participatory land information system developed by the Global Land Tool Network (GLTN).[2] It is useful in generating data on informal settlements and their residents on a number of aspects including households, resources, challenges and access to services. This enables residents to demand access to services, to improve land tenure, plan the provision of infrastructure and services, to redevelop slums or plan to resettle people in new areas, and to guide land allocation and adjudication.

Community participation is integral in implementation of the STDM as it provides transparency and builds trust in the exercise among local residents. Local residents can more easily cooperate and provide the information required and can have a say in the methods being used. The case study highlights application of the STDM in Mbale, a rapidly growing secondary city in eastern Uganda. The case points to the centrality of community driven processes in building resilient, inclusive and sustainable cities across different socio-economic contexts.

"STDM allowed for a people-focused development approach because the process allowed communities to take charge from the onset by ensuring they administer the appraisal collecting the critical data after fully mobilizing locals from their settlements"

MDF President,
Masaka Municipality.

ABOUT MBALE

Mbale Municipality is located in eastern Uganda in Mbale District. Mbale is the location of the district headquarters and is the central town and commercial centre. It is located 245 kilometres from Kampala and about 50 kilometres from Uganda's border with Kenya. In 2014, the municipality had a population of 96,189. Mbale Municipality experienced an annual average growth rate of 2.9 per cent between 2002 and 2014. Almost one fifth of households in the municipality live in slums, while the poverty head count stands at 11.3 per cent.

KEY CHALLENGES

Dobson et al (2015) argued that building resilience in African urban centres, where the bulk of the population are slum dwellers, is dependent upon the active participation of the urban poor and their partnership with local authorities. Active community participation is important in generating data needed for effective planning. The paucity of data on the scale and characteristics of urban poverty and vulnerability in the global South is a key factor that impedes the ability to build resilience (ibid, p.6). The development of reliable land information systems becomes strategic and useful to bridge the information divide (Antonio, 2013, p. 2).

"Communities in Entebbe have embraced the STDM tool that can be used for city planning but having data per se is not enough because data must be for a particular purpose. stronger community information centres have been created and the pace has been set in our town, it is now upon us to drive the process further… urban challenges will continue to exist but we need to critically look at number of interventions that can be employed to combat these challenges of urbanization starting with fully incorporating the STDM process in information gathering systems in all municipalities"

Deputy Mayor,
Entebbe Municipality.

The primary source of data for municipal planning are the community surveys. Besides being expensive and unaffordable in many situations, their findings are often devoid of community ownership and hence implementing the recommendations becomes a difficult task. A more sustainable alternative is to rely on the target community for enumeration of the required data. Interventions for enhancing citizen participation in generating local data and planning for local needs and problems is integral for building urban resilience.

PRIORITY AREAS FOR INTERVENTION

- Land tenure security improvement
- Improved service delivery to slums and informal settlements
- Improving existing data for municipal planning

"The pilot allowed different stakeholders to sit at one table and address a need. Now the informal settlement residents in Mbale to capture the different claims to land, and have their relationship to land registered in order to improve their tenure security,"

Shack/Slum Dwellers International.

EXAMPLES OF RESILIENCE BUILDING EFFORTS

With support from Cities alliance and UN-Habitat, the Government of Uganda piloted the STDM in Mbale municipality. Implementation involved many stakeholders including the central government, municipal government and civil society organisations representing the urban poor in Uganda including ACTogether, Slum Dwellers International and the National Slum Dwellers Federation of Uganda. The STDM was linked to earlier work by the government-led Transforming Settlements of the Urban Poor in Uganda (TSUPU) program which was launched in 2010 in partnership with the Government of Uganda and the Cities Alliance.

Most of the work including mapping, enumeration, community mobilisation, local consultations and sensitisation, data entry, analysis and validation were done by Mbale Slum Federation and community members themselves. The STDM implementation in Mbale is a case of a locally-driven process of ensuring community access to services, improved leadership accountability and community participation which are central issues for enhancing urban resilience. Successfull outcomes in Mbale led to scaling up the initiative to 4 other municipalities in Uganda in a bid to address the increasing cases of tenure insecurity.

Kampala, Uganda. **© Shutterstock**

Project implementation led to the opening of data centres in the participating cities aimed at bridging the data gaps that hitherto had constrained local planning. Municipal authorities reportedly expressed strong interest to work with communities in strengthening the data centres and provision of adequate space for training and technical support. Through the collection of critical community data, community members are able to identify gaps and take action in lobbying for improved service provision.

One of the success factors for the STDM implementation in Mbale was the presence of Municipal Development Forums (MDFs) and settlement level forums that were established under the Cities Alliance-funded TSUPU programme. These were instrumental in mobilising communities in slums to participate in slum profiling and enumeration.

FUTURE PLANS AND INVESTMENTS

The municipality has prioritised issues identified during profiling for implementation. Communities are lobbying for support from the government through Uganda Support to Municipal Infrastructural development (USMID), a 6-years' World Bank and government partnership program spearheading implementation of infrastructure development in urban poor areas in fourteen cities.

Furthermore, peer-to-peer exchanges between slum dwellers and local government partners will be a fundamental learning tool and lessons sharing through the data centres will extended to other municipalities. Country lessons will be shared with partners in Kenya and Tanzania.

Data centres will be used as a central point of access for settlement data and other stakeholders have been encouraged to use the facility rather than repeating the processes.

ACTogether will use its extensive knowledge base to support capacity building of communities in the use of social tenure domain model through workshops and practical field training. Communities will also be supported to utilise data generated for settlement planning and in promotion of secure tenure for the most vulnerable.

Mbale, Uganda - basic street sweeping tools.
© Shutterstock

ENDNOTES

1 *According to the World Bank, (2015, p. 38), Uganda is urbanising at a rate of 5.2 percent per annum making the fastest urbanizing country in Africa.*

2 *http://gltn.net/index.php/land-tools/gltn-land-tools/social-tenure-domain-model-stdm*

For more information, visit ***www.citiesalliance.org***

Trade in animals in Djenne, the market day in town, come from all over the country to sell their merchandise in Djenne, Mali.
© Hector Conesa/ Shutterstock

THE GLOBAL RESILIENCE PARTNERSHIP

The Global Resilience Partnership is a public-private initiative convened by the Rockefeller Foundation, the United States Agency for International Development (USAID), and the Swedish International Development Cooperation Agency (Sida). With US$ 160 million in contributions – including a recent US$ 10 million commitment from Zurich Insurance Group – the Partnership is committed to fostering resilience at scale and transforming humanitarian and development assistance.

The Global Resilience Partnership focuses on building resilience across the Sahel, the Horn of Africa, and South and Southeast Asia – three regions that are particularly susceptible to chronic stresses and extreme shocks and caught in cycles of humanitarian crises that make it hard to maintain hard-won development gains.

WHY THE GLOBAL RESILIENCE PARTNERSHIP

Natural and manmade disasters and shocks are multiplying, and the effects of climate change combined with population growth means more people stand in harm's way, with the poor on the front lines. The statistics are alarming:

- The number of reported disasters has nearly tripled since 1980.
- The collective cost of climate change disasters is estimated at US$ 200 billion every year.
- In 2011 and 2012, 23 million people in the Sahel and Horn of Africa were affected by food insecurity due to drought.
- Over 400 million people in Asia are expected to be vulnerable to flooding by 2025.

Shocks like droughts and typhoons are not always preventable, but the degree of destruction and devastation can be reduced and managed with meaningful investments in preparedness and adaptation.

While there are many actors helping to respond to immediate crises, these interventions have traditionally focused on relief and rebuilding, or on longer-term development, without planning for unforeseen events. As a result, significant development spending is lost to recurrent crises.

A woman wades her way on Imelda avenue circa in the Philippines. Typhoon Ondoy left hundreds of thousand families displaced and killed hundreds of people. **© Timothy Medrano/Shutterstock**

The focus needs to shift towards bridging humanitarian and development efforts to build resilience against a range of future threats. This requires working in partnership with regional and local stakeholders to coordinate resources and engage new actors. The Resilience Partnership will help drive a shared global resilience agenda, where humanitarian and development planning is better aligned.

Through a network of regional hubs, the Resilience Partnership aims to identify and scale innovative solutions that are tailored to local needs, by:

- Identifying critical capacity gaps
- Catalyzing alliances across all sectors
- Enabling regional and global learning
- Creating tools to help measure, visualize and predict resilience needs
- Designing flexible financial mechanisms, such as micro-finance and risk insurance

GLOBAL RESILIENCE CHALLENGE

The Resilience Partnership is committed to utilizing innovative methods to reveal and harness new solutions to resilience issues from both the usual and new innovators. In this respect, one of the Resilience Partnership's first initiatives is the Global Resilience Challenge, launched in September 2014. The response was overwhelming: nearly 500 applications were received.

The eight winning teams have been announced, and they are focusing on building resilience in some of the most vulnerable communities in the world. The solutions presented by the winning teams demonstrate how the Resilience Partnership challenged teams to think differently about old problems, using a resilience mindset.

Follow the Global Resilience Partnership on Twitter; Global Resilience (@grp_resilience)

For more information, visit ***www.globalresiliencepartnership.org***

Headquarters for UN- Habitat's City Resilience Profiling Programme Barcelona, Spain. **© Shutterstock**

THE UNITED NATIONS GLOBAL COMPACT CITIES PROGRAMME

The United Nations Global Compact is the world's largest voluntary corporate social responsibility initiative. In February 2015 the UN launched the Global Compact Cities Programme City Scan survey to progress social equity and justice, environmental sustainability and good governance in the urban environment. City Scan helps cities identify critical challenges, and provides a platform to report on their strategies and initiatives to address these challenges using the lens of the Global Compact's Ten Principles (see Table 1). The City Scan survey covers three main categories of municipal activity: City Development, City Sustainability and City Governance. The International Secretariat for the Cities Programme is based in Melbourne at RMIT University.

The following outlines Barcelona City Council's efforts to build its resilience to multiple shocks and stresses in line with the United Nations Global Compact Ten Principles.

TABLE 1: THE TEN PRINCIPLES AND BARCELONA

A summary of some of the key challenges facing the City of Barcelona, and municipal actions taken or initiatives underway relevant to the Ten Principles are presented below.

Global Compact Principles		Key Challenges and Actions
Human Rights	**Principle 1:** Businesses should support and respect the protection of internationally proclaimed human rights; and **Principle 2:** make sure that they are not complicit in human rights abuses.	In the City Scan Survey, the principles related to Human Rights and Labour are addressed under City Development. Barcelona City Council identified 22 critical issues under this category, including: women's rights, discrimination, poverty, access to sports facilities, access to, and provision of, social care services, access to adequate housing, access to social or public housing, affordability and availability of housing, access to housing support services, persistent and/or increasing poverty, access to fair work, access to local employment, process to establish local enterprises, unemployment levels, access for women to employment opportunities, availability of cleaner transport options, safe passage of bicycles and safe pedestrian mobility. These are being tackled through a range of measures including the Barcelona Social Inclusion Plan, the Municipal Plan for Young People and Adolescents, the Barcelona Health Plan, Municpal Plan for the Elderly, and Municipal Plan for Equal Opportunities for Women and Men.
Labour	**Principle 3:** Businesses should uphold the freedom of association and the effective recognition of the right to collective bargaining; **Principle 4:** the elimination of all forms of forced and compulsory labour; **Principle 5:** the effective abolition of child labour; and **Principle 6:** the elimination of discrimination in respect of employment and occupation.	

Global Compact Principles		Key Challenges and Actions
Environment	**Principle 7:** Businesses should support a precautionary approach to environmental challenges; **Principle 8:** undertake initiatives to promote greater environmental responsibility; and **Principle 9:** encourage the development and diffusion of environmentally friendly technologies.	**The environment related principles are addressed under City Sustainability.** In relation to City Sustainability, the municipality identified only three critical issues. These are air pollution levels and greenhouse gas emissions from industry and transportation. The municipality identified several city strengths in the area of potable water supply and sewerage treatment and disposal.
Anti-Corruption	**Principle 10:** Businesses should work against corruption in all its forms, including extortion and bribery.	**Anti-corruption falls under the City Governance category.** Fifteen critical issues were identified in relation to City Governance, including public access to information, city leader accountability, transparency of political and procurement processes, accountability of city officials, public reporting against urban objectives, interest and the capacity of community to engage with municipal government, trust in local government, lack of formal processes for community engagement and lack of national government support. Among other actions, the municipality works closely with Transparency International to implement measures to counter corruption through the provision of information.

Barcelona is Spain's second most populous city after Madrid, with a population of 1.6 million, and is the capital of the autonomous community of Catalonia. The city faces a number of challenges, ranging from employment opportunities for youth and demographic shifts, to ensuring social equity, and mitigating the environmental footprint of its transport and industrial sectors.

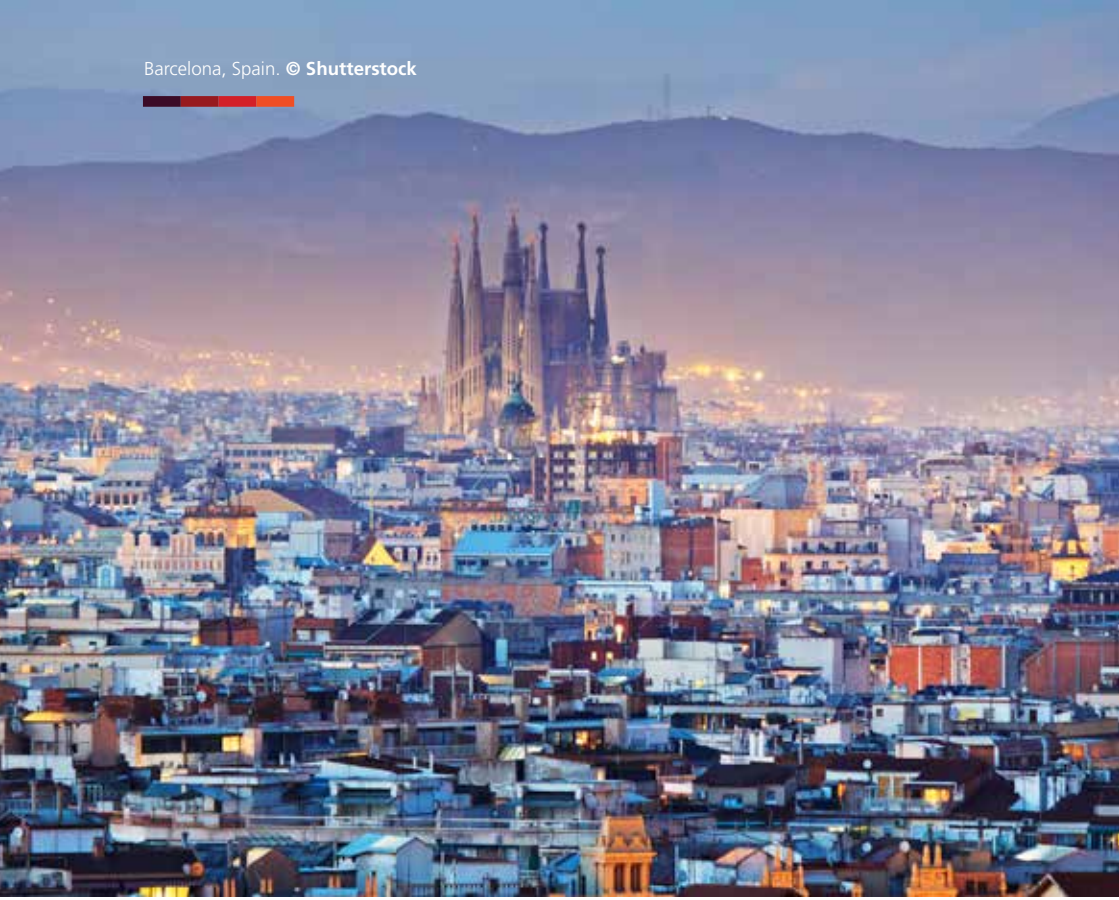
The Barcelona City Council initiated the Barcelona Age-Friendly City Project to encourage the health and well-being of the elderly. The Vincles BCN project, designed to relieve the isolation of the elderly, won the 2014 Bloomberg Innovation Challenge Award.

Examples of Barcelona's Resilience Building Efforts:

- Promoting the use of public transport and eco-mobility (public transport plus journeys made on foot or by bicycle), and increasing the percentage street space designated for pedestrian right of way.
- Improving access to affordable housing through the Barcelona Housing Plan (2008 to 2016), targeting groups that face difficulty accessing housing and those at risk of losing their homes.
- Greening of the municipal operations as part of Barcelona's Agenda 21.
- Increasing access to safe and potable water for all citizens, and improved levels of water consumption and awareness.
- Encouraging the business sector to have better environmental and social practices (see graphic below)

MECHANISMS USED TO INCENTIVISE THE BUSINESS SECTOR

- Promotional campaigns
- **Awards:** The Barcelona City Council Awards
- **Training and capacity building:** Barcelona Activa
- **Partnerships:** Smart City Campus, Barcelona Institute of Technology (BIT), 22@district, The PPP for cities. BCN Urban Resilience Partnership, City OS, Almogàvers Business Incubator,
- OAE - Business Support Office, Ateneus de Fabricació BCN / Open Challenge
- Incorporating environmental and social practices in public procurement
- **Financial incentives:** Incentives for new business
- **Code of conduct:** BSM's Code of Ethics
- **Accreditation:** Marca Barcelona
- **Other:** Strategic Plan for the Metropolitan Region



Barcelona, Spain. © **Shutterstock**

FUTURE PLANS AND INVESTMENTS

BARCELONA ENERGY, CLIMATE CHANGE AND AIR QUALITY PLAN (2011-2020)

The three main goals of the plan are to;

1. reduce energy electricity consumption by 9 per cent;
2. cut CO_2 emissions by 16 per cent, and;
3. improve overall air quality in the city. Reducing greenhouse gas emissions from industry and transportation is a key focus of the Plan. One measure designed to reduce emissions is the introduction of a fleet of electric mopeds for the city police, which will result in a savings of 87,660 litres of petrol and represents a 12,170 tonne reduction in CO_2 emissions each year.

For more information, visit ***www.globalresiliencepartnership.org***

Addis Ababa, Ethiopia.
© 100 resilient cities

CITY RESILIENCE PROGRAMMES

This section highlights the resilience building efforts of a dozen cities across Africa, Asia, Europe, Latin America, and the US. From the devastating shocks of Hurricane Katrina in 2005 and the 2010 Chilean earthquake, to chronic stresses such as unemployment and poverty, these are stories of complex challenges and hard-won battles that have led all cities on a common path towards resilience.

New York City, USA. **© 100 resilient cities**

NEW YORK CITY

The BIG U, New York City - Developed by The BIG TEAM which is comprised of BIG (Bjarke Ingels Group) with One Architecture, Starr Whitehouse, James Lima Planning + Development, Project Projects, Green Shield Ecology, AEA Consulting, Level Agency for Infrastructure, Arcadis, and the Parsons School of Constructed Environments for the Rebuild by Design Competition

This case study focuses on Lower Manhattan, New York City, home to approximately 220,000 people. This area contains some of the largest central business districts in the country, which are at the core of an economy with an annual GDP of approximately $500 billion, influencing economic activity throughout the world. More than 52 million visitors annually come to Lower Manhattan to see sites as the 9/11 memorial, Wall Street, Battery Park and take ferries to the Statue of Liberty and Ellis Island. The Lower Manhattan area also contains 35,000 affordable housing units, many of which were hit hard by Hurricane Sandy, and over 94,000 of the residents in this area are low-income, elderly, and/or disabled. The most vulnerable of the population live along the East River.

> *"We never thought we were going to be working on protecting our community against climate change. We will do whatever it takes, learn what we need to learn so we can be the support we need to be for our community."*
>
> ***Damaris Reyes,***
> *Executive Director, GOLES (Good Old Lower East Side).*

© 100 resilient cities

The challenge was to create protection for Lower Manhattan to ensure that New York City's financial district and other key infrastructure can operate during and after a storm while maintaining and enhancing, local residents' connection to the waterfront. Flood protection would be designed to enhance everyday life and address existing social, economic and health challenges.

PRIORITY AREAS FOR INTERVENTION

The priority areas of proposed intervention, named "The BIG U" for the shape of the protection around the exterior of Lower Manhattan is addressed in three compartments that reflect different typologies: 'East River Park', 'Montgomery Street', and 'Berms in the Battery'.

At East River Park, an undulating berm along the path of an existing service road inside the park would provide a new flood protection measure. Contoured to avoid interfering with existing sports fields, the berm provides topographic relief and new vistas for the back of the park. The new landscape also increases the resilience of the park with more diverse, salt-tolerant trees and plantings. Generous landscaped bridges will connect East River Park to the community, replacing the now narrow, chain linked passageways. A series of ramps allow residents and visitors a way to move between the park and the bridges. Plazas connect the park with a new scenic bikeway and enhance access to the East River, where a series of new waterfront activities are arrayed along the edge. The flood protection continues to Montgomery Street by fortifying the new Pier 42 Park, where a deployable barrier helps protect the on-ramp to the FDR Drive.

FIGURE 7: TOP SHOCKS IDENTIFIED IN CITIES' 100 RESILIENT CITIES APPLICATIONS

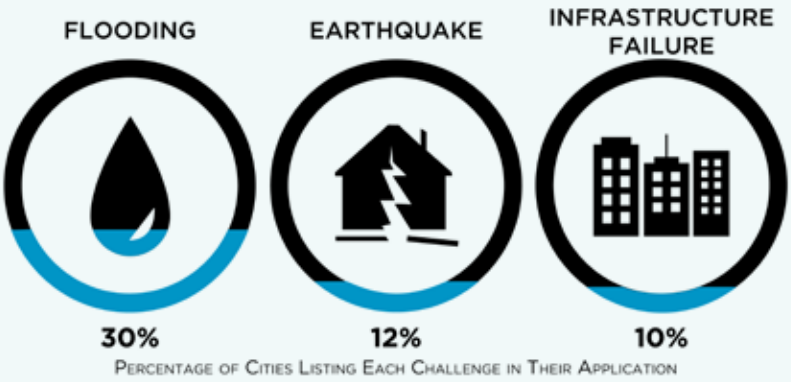
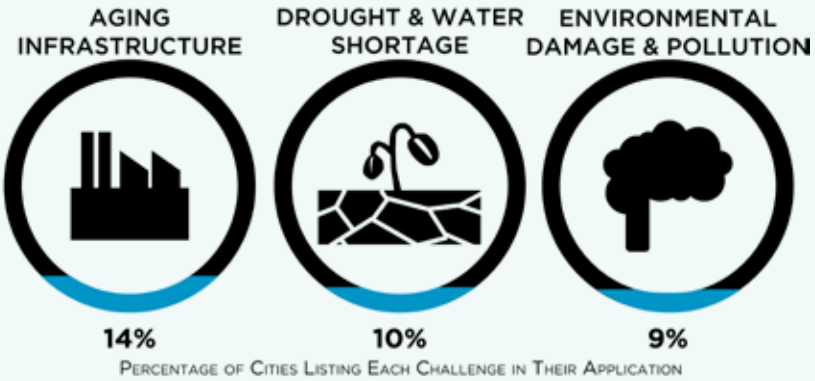


FIGURE 8: TOP STRESSES IDENTIFIED IN CITIES' 100 RESILIENT CITIES APPLICATIONS



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In the area of Montgomery Street, the team proposed the use of deployable barriers on the underside of FDR Drive. These flood protection devices, which would double as a public art project, are designed to provide lighting and security in these now-dark spaces. Opposite the Public Housing complex Smith Houses, flood protection would come in the form of benches, skate parks, tai chi platforms and a swimming pool, which would be enclosed in glass from four feet up. These features will enliven the waterfront and provide amenities such as laundromats, shops, and spaces for community functions. One of the ground floors is fortified, housing a cogeneration plant for the entire Smith Houses campus. Limited-height flood barriers shield the area against most recurrent floods while allowing waterfront views.

Aerial view of Manhattan, New York City. USA.
© Luciano Mortula/Shutterstock

'Berms in the Battery', strategically located to protect ducts to critical infrastructure, create a continuous protective upland landscape. In place of the existing Coast Guard building at the tip of Battery Park, the plan envisions a new maritime museum and environmental education facility. This signature building could feature a "reverse aquarium," with its form derived from the flood protection at the water-facing ground floor, as well as a new Harbor Middle School that will educate students and visitors on our rising sea level.

"

"There's no question: Superstorm Sandy made clear just how vulnerable we are when it comes to climate change. The risks are real-and growing-and it's vital that we continue to innovate toward a stronger and more resilient New York"

Bill de Blasio,
Mayor, New York City.

EXAMPLES OF RESILIENCE BUILDING EFFORTS

The multidisciplinary BIG Team brought together a diversity of knowledge, from urban ecology to infrastructure engineering. The collaboration was catalyzed by the Rebuild by Design competition, which was spearheaded by the US Department of Housing and Urban Development (HUD) and the Rockefeller Foundation to bring in-depth research, cross-sector, cross-professional collaboration, and iterative design development to the Hurricane Sandy region. The competition allowed the BIG Team to combine local expertise in community outreach, with global experience protecting the world's most vulnerable coastlines.

The BIG Team worked with a coalition of 26 community groups to inform their design solutions for the three distinct compartments and created multiple design solutions for each compartment for the community members to provide feedback on. The resulting proposal, "The BIG U" was unified in function but diverse in character, responding to the specific needs of communities but flexible enough to develop over time, as sea level and climate continue to change.

FUTURE PLANS AND INVESTMENTS

As a winner of the Rebuild by Design competition, the East River Park compartment of the proposal was awarded $335 million dollars by the federal government. The program's planning is currently underway. This compartment, named the East Side Coastal Resiliency Project will also receive an additional $100 million from the City of New York. Future targets of investment include funding additional compartments of the proposal via National Disaster Resilience Competition funding. To learn more about the status of the project visit *www.rebuildbydesign.org*.

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For more information, visit ***www.100resilientcities.org***

City skyline and construction of Rotterdam Central Station, an important transport hub with 110,000 passengers per day on Sept 5, 2012 in Rotterdam, Netherlands. **© Shutterstock**

ROTTERDAM – CREATING AN OFFICE OF RESILIENCE

Rotterdam, Netherlands is a City located in Southern Holland. The municipal population of 620,000 is split into 14 boroughs, governed centrally by a city council, currently headed by Mayor Ahmed Aboutaleb.

Rotterdam has achieved a high level of success in developing best-in-class climate adaptation and water management strategies to address the threats of sea-level rise and pluvial flooding inherent in their unique geography and morphology. The City is currently striving to link these achievements with strategies for addressing other risks and in particular emerging social cohesion challenges. The range of shocks and stresses Rotterdam faces include: heat waves, aging infrastructure, fossil fuel dependence (Rotterdam is home to the largest port in Europe), unemployment and shifting demographic & macroeconomic trends, lack of community preparedness, weak citizen engagement and cohesion, and exposure to cyber/ICT disturbances or failures.

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PRIORITY AREAS FOR INTERVENTION

Addressing these shocks and stresses with innovative and integrated solutions required a new direction and vision for resilience that would build off of the City's recognized leadership in water and climate risk resilience. The City wished to assess the gaps and opportunities in preparing for relevant shocks and stresses as well as an unknown future, but also recognized the acute need to take action on a multitude of issues already present. To align their work and set out a clear vision and actions for the future, they needed additional capacity to build coalitions, political and public buy-in to tackle resilience more holistically, and to leverage resources across diverse stakeholders to get the work done.

> *"Cities could lead us towards new solutions, because cities are capable of connecting people."*
>
> ***Ahmed Aboutaleb,***
> *mayor of Rotterdam*

EXAMPLES OF RESILIENCE BUILDING EFFORTS

As part of their engagement with 100 Resilient Cities, Rotterdam appointed Arnoud Molenaar to act as Chief Resilience Officer and lead an Office of Resilience in September 2014. Arnoud already had a strong local and global reputation having worked 20+ years on climate adaptation for the City, but with

the new position was challenged to scale his success across many more topics and issues. In order to fulfil this transversal role the City positioned Molenaar as the highest level Program Manager reporting directly to the directors of City Planning and Economic Development, who are members of the General Board of the City Development Dept. Initial funding for the CRO position was provided by 100 Resilient Cities – Pioneered by the Rockefeller Foundation, and the City provided three additional staff to the CRO in support of the effort.

Molenaar began developing a Resilience Strategy for the city of Rotterdam as a whole, as the role of national and local government in the Netherlands is currently changing. Governments on all levels are going through a transition of 'big government' to 'facilitating, partnering government' in many aspects of their work, requiring closer partnerships and collaboration with the other entities in society, such as corporations, SMEs and NGOs. As Molenaar and his team undertook stakeholder engagement and people became aware of the City's work on resilience, interest in the work grew as did willingness to participate. The Rotterdam Resilience Program has emerged as one of the City's top strategic programs, and due to the active involvement of staff from other agencies, Rotterdam's CRO now receives dedicated support from 5 staff members and has the engagement of over 100 municipal employees through thematic working groups.

> *"The resilience of any city lies in the strength of all of people, businesses and organizations combined. We focus on their strength and their cohesion: the city as a habitat, with future-proof infrastructures and resilient citizens. Citizens are key!"*
>
> ***Arnoud Molenaar,***
> *Chief Resilience Officer, City of Rotterdam*

In addition to being a catalyst within City government, Molenaar has leveraged and strengthened public-private partnerships and connections with academia and built off of existing multi-sector initiatives and networks.

The office is also working actively to liaise with private sector partners and is currently collaborating with Microsoft to assess how the city can move from a cyber-security posture, towards a vision for creating integrated cyber-resilience that puts people at the centre of its strategy.

Molenaar is also already realizing the vision of applying the City's expanded view of resilience to its existing reputation as innovators in the field. In October 2015, the City led a learning exchange for eight Chief Resilience Officers from around the globe which focused on the intersection of social cohesion with water management.

FUTURE PLANS AND INVESTMENTS

As the Rotterdam approach to resilience includes integration of resilience aspects in several well-organized fields, investments in resilience are expected to be operationalized through 'regular' activities and investments.

Rotterdam's water and climate plans may serve as an example: Investments in water and climate resilience are combined with new activities and scheduled maintenance. This accelerates integration and reduces additional cost.

For more information, visit ***www.100resilientcities.org***

New Orleans, USA. New Orleans. Immediately following Hurricane Katrina. **© Shutterstock**

NEW ORLEANS – RESILIENCE STRATEGY

New Orleans, USA is a city located on the Gulf Coast of Louisiana. The municipal population of 380,000 is governed by the City Council and Mayor's office.

In 2005 New Orleans was devastated by Hurricane Katrina, resulting in flooding of an estimated 80per cent of the city. The City's recovery from the storm demonstrated their inherent resilience and capacity to bounce back with demonstrable improvements in economic resilience, strong leadership capacity, and resource commitment to the environment. However, many stresses that faced the city prior to Hurricane Katrina persisted, and have been coupled with growing inequality.

Shocks	
Hurricanes	Extreme temperatures
Flooding	Infectious disease epidemics
Infrastructure failtures	Drought
Economic shocks	Civil unrest
Terrorism	
Stresses	
Climate change and sea level rise	Lack of social mobility
Coastal erosion and wetland loss	Lack of affordable housing
Land subsidence	Crime
Aging infrastructure	Violence
Poor air quality	Poor public health access
Lack of risk awareness	Lack of reliable and efficient public transit
Poverty and inequality	Demographic-led social change
Unemployment	Disproportionate risk to vulnerable communities
Educational attainment disparities	

Furthermore, the City must address risks unrelated to storm events, like the devastating impacts of the BP Deepwater Oil Spill of 2010 which released over 30 million gallons of oil onto the Gulf Coast's beaches and wetlands. As stated by the City's Chief Resilience Officer (CRO), Jeff Hebert, "the challenges we have faced over the past three centuries are different from what we'll face in the future, we need to be prepared to stand up to these challenges in order to thrive With guidance from 100 Resilient Cities – Pioneered by the Rockefeller Foundation (100RC), the city identified 20 emerging resilience challenges and opportunities ranging from housing affordability, violence, trust in government, coastal protection, energy infrastructure, and culture. This process grounded the cities resilience strategy *"Resilient New Orleans: Strategic actions to shape our future city"* (resilientnola.org). The goals which the strategy aims to achieve are: 1) adapt to the changing environment by investing in coastal protection, restoration, and comprehensive urban water management; 2) invest in equity for all by promoting better public health outcomes, workforce participation, and social cohesion; and 3) transform city systems by redesigning regional transit systems and improving energy infrastructure. Highlights from the strategy development process below:

> *"Being resilient means more than having levees and wetlands to hold back water. To be a truly resilient society means also combating the longstanding, generational challenges around crime, education and income inequality. It means replacing hatred with empathy, disassociation with harmony, and striking a balance between human needs and the environment that surrounds us. Now, the opportunity is to position New Orleans as a global leader on resilience. The people of New Orleans are a profile in resilience, but more must be done to adapt to new and forthcoming challenges facing our environment and opportunity gaps that persist in our City. We don't want a New Orleans in which people live a block away but are a mile apart in terms of economic opportunity, and our vision with this strategy is to ensure that as we continue rebuilding our city, no one gets left behind."*
>
> ***Mayor Mitch Landrieu***

PRIORITY AREAS FOR INTERVENTION

Two phases make up the 100 Resilient Cities strategy development process:

- Preliminary Resilience Assessment to diagnose the City's resilience challenges and broad focus areas in the first phase.

- Deeper diagnostic work to develop a vision of the future, ambitious measurable goals and a plan of action for achieving them in the second phase.

To develop a holistic and credible strategy, the development process deliberately engaged stakeholders of all sectors who held relevant knowledge and expertise, and sourced best practices from around the world. Over 350 individuals participated and provided valuable insight into what contributes to and detracts from the city's resilience, what local expertise and knowledge exist, and what specific needs are not being met.

As focus areas emerged from the Preliminary Resilience Assessment, working groups composed of local and outside experts were convened to further explore them and propose potential approaches and solutions. This led to a more detailed analysis of the specific opportunities within each focus area and resulted in additional workshops on more narrow topical issues such as financing, risk modelling, and design. The stakeholder working group model was crucial to creating ownership of the approaches included in the strategy and the design of projects across sectors. Many of the projects are not designed to be managed directly by the CRO office, so cultivating committed partnerships early in the process has been a key to the strategy's success. Throughout the iterative process, the CRO and his team relied heavily on the participation of actors across the city and partners outside the city who gave their time and attention to the process because of CRO Hebert's compelling vision for a more resilient New Orleans. The proposals developed through this process and a thorough review and inventory of planned and ongoing actions already underway in the City were critical in establishing a course of action and inspired much of content for the strategy.

"Resilient New Orleans represents a pivotal step down the city's path to becoming a resilient city, not the destination. By building the capacity of individuals, institutions, and systems to quickly recover and adapt, New Orleans is poised to become a model of urban resilience, and a great city partner of 100 Resilient Cities."

Michael Berkowitz,
President, 100 Resilient Cites

People enter the riverfront Streetcar Line in New Orleans, USA. Revamped after Hurricane Katrina in 2005, the New Orleans Streetcar line began electric operation in 1893. **© Jorg Hackemann/Shutterstock**

Resilient New Orleans: *Strategic actions to shape our future city* was as a concrete, strategic roadmap for the City of New Orleans to build urban resilience, marking the start of significant action in the city and a renewed commitment and focus on the future. The strategy proposed 41 actions to build city-wide resilience and help New Orleans become a more equitable, adaptable and prosperous place for all of its residents as the City approaches its tri-centennial in 2018. The full Resilient New Orleans strategy, along with information about project partners, is available online at *resilientnola.org*.

The CRO team is currently engaged in designing a comprehensive implementation strategy in partners with the City's Office of Performance and Accountability. Performance metrics are being identified at both the project and goal-level for short- and long-term data tracking.

The Comeback City, New Orleans 10 Years After Hurricane Katrina. **© Shutterstock**

FUTURE PLANS AND INVESTMENTS

The newly formed Mayor's Office of Resilience and Sustainability, led by the City's CRO, will be responsible for coordinating with partners and agencies to implement the strategy. They city has already begun implementation by leveraging nearly $2 million (USD) of resources from 100RC Platform Partners as well as other local, national and global commitments.

The Office of Resilience and Sustainability will also advise the Mayor on policy, guide prioritization, and provide regional leadership on resilience. New Orleans has also created a monitoring plan to measure its resilience performance over time.

For more information, visit ***www.100resilientcities.org***

The largest African market-Merkato in Ethiopia Addis Ababa. **© Aleksandr Hunta/Shutterstock**

DEPLOYMENT OF THE CITYSTRENGTH DIAGNOSTIC IN ADDIS ABABA, ETHIOPIA

Addis Ababa is the capital of Ethiopia and home to 25per cent of the urban population (approximately 3.3 million) and is one of the fastest growing cities in Africa. The city is located in the central part of the country at an altitude of 2300 meters.

KEY CHALLENGES

The primary shocks that Addis Ababa faces are floods, urban fires and earthquakes. At the same time, the city faces a multitude of stresses, many of which are directly related to its current level of development, including unprecedented urban growth, water scarcity, unemployment, and social vulnerability.

Enhancing resilience in Addis requires actions and investments that are oriented toward implementing existing plans and regulations, establishing clear and capable leadership on risk management topics, and investing in infrastructure that meets existing and future needs.

- The effective implementation of the Integrated Development Plan and related regulations;
- Establishment of a risk management unit under the Mayor;
- Strengthening transport agencies (including their role in stormwater management), and;
- Strengthening citizen engagement in disaster risk management.

These actions need to be coupled with investments in water supply and sanitation, transit-oriented development, flood reduction, energy system upgrades, and economic safety nets. As an integrated set of initiatives, implemented by Addis Ababa City Government with strengthened coordination among city departments and development partners, these actions and investments could have a transformational impact on the resilience of the city and provide manifold economic, social and environmental co-benefits.

In February 2015, Addis Ababa invited a team of specialists from the World Bank Group to implement the CityStrength Diagnostic in close collaboration with local officials, technical staff and other key stakeholders. The CityStrength Diagnostic methodology facilitates a dialogue among stakeholders about risks in their city and the performance of urban systems. It helps identify priority actions and investments that will enhance the city's resilience as well as transform planned or aspirational projects into investments that will also help to build resilience. CityStrength stresses a holistic and integrated approach that encourages cross-sectoral collaboration to more efficiently tackle existing issues and unlock opportunities within the city.

For Addis Ababa, the team worked with local officials to identify six priority sectors/cross-cutting thematic areas for further diagnosis, including urban development, disaster risk management and climate change adaptation, community and social protection, transport, energy, and water and sanitation.

"Climate change impacts in Ethiopia, such as the increase in average temperature and changes in rainfall distribution, exacerbate current vulnerabilities that are highly interlinked with other shocks and stresses such as rapid urbanization. To support our cities in their pursuit of sustainable development, it is a necessity as well as an opportunity for our country to embark on a resilient development path."

Ato Deriba Kuma,
Mayor, Addis Ababa

CITY STRENGTH IMPLEMENTATION IN ADDIS ABABA CONSISTED OF FIVE STAGES:

1. A pre-diagnostic review was carried out prior to the visit in February to collect information and leverage efforts that have already been undertaken in the city. As part of this, a review was conducted of all relevant studies, reports and plans developed by the city, the World Bank and other development partners to identify key risks and trends and get an overview of the performance of the different sectors.

2. A launch workshop with key stakeholders in Addis Ababa helped validate the findings of the pre-diagnostic review, created a shared understanding of urban resilience and provided an opportunity to learn more about the city's goals and objectives.

3. Following the workshop, interviews with key city stakeholders were carried out in combination with site visits across the city to better understand the challenges and opportunities, and to qualitatively assess the performance of different urban systems.

4. Based on the findings, urban stakeholders and the World Bank team identified priority cross-sectoral actions and investments that could help Addis enhance its overall resilience.

5. The recommendations were discussed with the Mayor and the Deputy Mayor of Addis and compiled in a report that the city can take forward in collaboration with the World Bank and other development partners.

The unprecedented urban growth that Addis Ababa will face over the coming decades – the city is expected to double its population by 2030 – could create an agglomeration of people and economies that can catapult the city towards its long-term goals but, if not well managed, could also exacerbate existing shocks and stresses related to natural hazards, access to basic services, congestion, economic opportunity, and individual well-being. Despite the strong economic growth trends, Addis Ababa faces significant development challenges. For example, unemployment and poverty levels in Addis Ababa remain high, estimated at 23.5per cent and 22per cent respectively. The local government is struggling to deliver basic services to all its residents, providing clean water to only 44per cent of the population and sewerage services to less than 30per cent. Moreover, the physical development patterns witnessed in recent years are driving up the cost of infrastructure delivery. Addis is expanding in a sprawling manner, with growth in urban extent outpacing population growth.

Addis Ababa, Ethiopia.
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FUTURE PLANS AND INVESTMENTS

There is a strong commitment from the Addis Ababa City Government and the Mayor to strengthen the resilience of the city. The World Bank in collaboration with the City Government and further partners are currently preparing two major activities related to resilience-building – a $300 million project on urban land-use and transport and a $550 million project on urban safety nets that are incorporating the recommendations of the CityStrength Diagnostic. In addition, an urban wide risk assessment is planned for Addis Ababa to better address at-risk communities, buildings and infrastructure that can inform planning and investments in the future.

UNISDR
The United Nations Office for Disaster Risk Reduction

UNITED NATIONS
INTERNATIONAL STRATEGY
FOR DISASTER REDUCTION
Website: ***www.unisdr.org***

"RESILIENCE SUCCESS STORIES FROM UNISDR'S MAKING CITIES RESILIENT CAMPAIGN"

Monsoon rain and dangerous flash flood yet for these rickshaws and passengers it's business as usual in Varanasi, Uttar Pradesh, India.
© Daniel J. Rao/ Shutterstock

UNISDR launched the Making Cities Resilient Campaign in 2010 and through it has developed a global network of more than 2,500 local governments committed to reducing risk and building more resilient cities. These local governments represent cities of different sizes, characteristics, risk profiles and locations. Their efforts are reinforced by a supportive group of partner organizations.

The Campaign's focus is on disaster resilience – that is, the ability of a city to plan for, mitigate, respond, recover, adapt and grow after major in the light of its unique physical, economic, environmental and social circumstances.On a spectrum ranging from chronic stresses (environmental, social or economic imbalances) through to acute stresses, disasters are at the acute pole, but may be exacerbated by a background of chronic stress – where for example upstream deforestation increases the propensity for flash flooding, or where economic imbalances hinder the recovery process.

"It is clear that the risk in cities is growing faster than our ability to reduce them. We need to innovate and ensure that solutions, tools and methods for resilience building are not only available, but also accessible. We need to accelerate resilience building at the local level, and this partnership will contribute to do this."

***Margareta Wahlström** at the Third UN Conference on Disaster Risk Reduction in Sendai, Japan in March, 2015.*

ODISHA, INDIA: INVESTMENT IN RISK REDUCTION PAYS OFF

Cyclone Phalin struck the coast of the Indian State of Odisha in October 2013 and affected more than 13 million people, including almost one million who had to be evacuated. It damaged 420,000 homes and 5,825 schools, and is estimated to have cost in excess of US$700 million. This figure would be higher if not for Odisha's strong disaster management record, according to a leading urban activist based in the State capital of Bhubaneswar, pointing to the need to continue developing policy, technical and institutional capacities and mechanisms for disaster risk management, with a disaster risk reduction perspective. Included in the cost of recovery is US$39 million in school repairs and rehabilitation of the education system.

Indian woman walks in the flooded street in India.
© Saikat Paul/Shutterstock

"Most of our towns are part of the UNISDR Campaign and the successful management of [Cyclone] Phalin highlighted the effectiveness of investments made over the last ten years. However, the still exorbitant economic losses experienced indicate strongly that in the future, both the national and state governments have to focus more on reducing economic exposure."

***Dr Piyush Ranjan Rout,** co-founder and executive director of the Local Governments Network and an advocate for the Making Cities Resilient Campaign*

STEPANAVAN, ARMENIA: CITY RESILIENCE PLAN A CATALYST FOR CHANGE

Stepanavan is one of Armenia's most earthquake-prone cities. In 1988, the city was badly damaged in the Spitak earthquake, which struck with a magnitude of 6.8 and left 25,000 dead and 500,000 homeless. Almost 1,000 buildings either collapsed or had to be demolished. This experience, and a growing demand for disaster-resilient development, prompted Armenia to undertake a pilot project in Stepanavan, with a goal of replicating the project in 12 other Armenian cities.

Thanks to the political will of Stepanavan city Mayor Mikael Gharakeshishyan and his interest in mainstreaming disaster risk reduction and climate change adaptation into the city's broader development plan, a City Resilience Task Force was created to assess Stepanavan's resilience to disasters, using the UNISDR Local Government Self-Assessment Tool (LGSAT). Developed as a supportive resource for signatories to the Making Cities Resilient Campaign, the LGSAT aims to help cities set baselines, identify gaps, plan actions and measure advancements over time.

UNISDR Chief Margareta Wahlstrom and Sao Paulo State Governor Geraldo Alckmin at a ceremony where Sao Paulo was recognized as a role model in UNISDR's Making Cities Resilient Campaign. **© Diogo Moreira.**

Stepanavan's resulting City Resilience Action Plan was mainstreamed into the citywide development plan, which received funding support from the national government as well as four agencies already working in Armenia: UNDP; UNOCHA; World Vision; and the Armenian Red Cross.

SAO PAULO, BRAZIL: CIVIL DEFENCE HELPS CITIZENS KNOW THEIR RISK

In the state of Sao Paulo, Brazil, the Civil Defence System has taken an active role in raising awareness of disaster risk reduction and prevention, using campaigns and training opportunities to stimulate a culture of disaster resilience, with outreach to urban and rural communities.

One innovative approach, in partnership with the Department of Education, teaches students to reduce risks caused by rain events. The goal is to train 30,000 students in public schools throughout the State of Sao Paulo. A virtual game called "The Adventure" teaches students what they can do to prevent floods and other hazardous conditions brought about by rain, landslides and lightning storms. The course uses an interactive platform, is free, and can be accessed from any computer. The virtual environments replicate real situations, and working with an avatar (a figure that represents the user in computer-based games), the young participants' mission is to make these environments safe and secure. Each of the nine game modules depicts a different scenario, such as open areas on rainy days, buildings near the slopes or water tanks and garbage dumped in inappropriate open spaces. To complete each level, students must perform all tasks and advise on how to avoid problems. Students who have successfully completed all levels receive a certificate.

> *"Sao Paulo is the only state in Brazil that has specific resources for the Civil Defence to sign agreements with its cities for preventive and recovery actions," thereby enabling the cities to carry out structural works that minimise the damage caused by natural disasters.*
>
> ***Geraldo Alckmin,***
> *Governor of the State of Sao Paulo*

ENDNOTES

http://www.unisdr.org/archive/40965
http://www.unisdr.org/archive/38708
http://www.unisdr.org/archive/40966

Ho Chi Minh City, Vietnam.
© Dung Pham Hoang Tuan/Shutterstock

HO CHI MINH CITY

Ho Chi Minh City (HCMC) is located in the delta area of the Saigon and Dong Nai rivers. It is Vietnam's largest city and an important economic, trade, cultural and research centre, both within the country, and in South-East Asia. HCMC has a diversified topography, ranging from mainly agricultural and rural areas in the north to a widespread system of rivers, canals and dense mangrove forest to the south. The urban areas are located approximately 50km (31.1 miles) inland from the Pacific Ocean.

Similar to other evolving mega-cities in South-East Asia, Ho Chi Minh City has experienced rapid changes in recent decades. The city's population has more than doubled from 3.9 million in 1989 to approximately 8 million inhabitants in 2010. The regional economy has continuously grown with double-digit growth rates and HCMC contributes nearly 30 per cent to the national GDP and received 37 per cent of total foreign direct investments in 2009.

"Ho Chi Minh City is a major centre of economic, cultural, education and training, science and technology. And the leading economic city of the country and the southern key economic region. Ho Chi Minh City faces many challenges with regard to climate change, which directly threatens social life, damages the economy and degrades the quality of the living environment of the city. The jointly developed Adaptation Strategy is the basis for further developing the city towards a climate-proof future. "

Professor Mr. Nguyen Huu Tin,
Mayor of Ho Chi Minh City,
HCMC Vice Chairman

KEY CHALLENGES

HCMC faces major challenges in terms of infrastructure development, public transport, flood prevention and the provision of other public services due to its ongoing rapid growth. These challenges will be amplified given the projected changes in climate. The main climate challenge is urban flooding due to heavy rainfall and insufficient drainage capacity, exacerbated by fast urban development occurring on low-lying marshland, higher frequency of heavy rainfall events (attributed to the urban heat island effect) and projected or already occurring sea-level rise.

Urban flooding has become a wide-spread phenomenon and a major concern in HCMC in recent years that has been accompanying the city's rapid growth. Especially since the beginning of the 1990s the amount of flooded locations, flood frequencies and flood duration has steadily increased and has caused substantial economic and social losses, such as damage to infrastructure and assets, water pollution as well as traffic jams.

PRIORITY AREAS FOR INTERVENTION

Vietnam in general, and HCMC in particular, have been identified as one of the most severely affected places by future climate change and especially sea level rise. During recent decades, changes in the regional climate have already been observed. The average annual temperature has increased by 0.6 degrees during the last seven decades. Whilst the annual volume of rainfall has remained fairly stable, the number of heavy rainfall events (>100 mm/3.94 inches of rain) has increased remarkably. The sea level rose by 20cm in the last 50 years with a rate of about 3mm (0.1 inch) per year during the period 1993- 2008. It is projected to rise another 28 to 33cm by 2050, posing a major challenge to low-lying HCMC. Today, approximately 60 per cent of the urban area is located less than 1.5 Meter above sea level, making it highly vulnerable to projected sea-level rise. That is even increasing with the land subsidence of several centimetres per year in some parts of the city.

PRIORITY FOR INTERVENTION

RESILIENCE BUILDING EFFORTS

To address these multiple climate-change related impacts, HCMC adopted its comprehensive Climate Adaptation Strategy in April 2013, within the *'Moving Towards the Sea with Climate Change Adaptation'* project initiated in 2011 with assistance from Rotterdam. Based on the Triple-A Strategic Planning method (Assessment Atlas – Adaptation Strategy – Action Plan), the integrated Strategy consists of six directions: create smart urban density with connected living and working areas; develop step-by-step multi-scale flood protection measures; avoid local rainwater flooding by improving drainage and storage systems; reduce salinisation problems by relocating drinking water intakes upstream; and reduce land subsidence by restricting groundwater abstraction and improving surface water quality; reduce urban heat stress through developing the urban green-blue network.

Currently in implementation, the Climate Adaptation Strategy has divided the City into implementation zones, with on-going pilot projects in each. The pilot activities include relocation of harbour infrastructure from the dense city area (District 4) – which opens space for climate adaptation measures including improvements in the urban landscape such as parks to provide stormwater attenuation - towards the sea and onto low-lying areas (Nha Be District). These low-lying areas and the new harbour facilities on them are adapting flood proofing measures as they are located outside of planned dykes. The larger city-wide Strategy is being complemented by other measures, including: a mandate for all new developments to be elevated 2 - 2.5 m above mean sea level; a polder system to be built around the city with around 200 km of dykes and hundreds of tidal gates; and workshops on community based adaptation (early warning systems in communities and design of evacuation routes and drainage channels); in addition to on-going research by HCMC University on entire city modelling and simulations of probable flooding events.

Residential area right in the center of Jakarta, the capital city of Indonesia.**© Shutterstock**

JAKARTA, INDONESIA

The Indonesian capital of Jakarta, with an estimated 10.2 million (2014), is the largest city in the nation. and its capital. Jakarta is located in a lowland area with a relatively flat topography in the delta of several rivers, the main one being the Ciliwung River. Due to its naturally flood-prone location, Jakarta has a long history of both coastal and riverine flooding.

Jakarta's tropical climate is characterized by year-round high temperatures of 24-33°C. Jakarta has frequent high intensity, short duration storms, especially in the afternoons and evenings. The highest observed precipitation total for a single month in Jakarta is more than 800 mm (31.5 inches).

Jakarta is also a growing, economically active city. The GDP projections for Indonesia as a whole show overall growth rates of 4.5 per cent per year between the periods 2005 and 2030, and the population of Jakarta is expected to grow from 8.8 million to up to 25 million by 2025.

The mean annual temperature in Indonesia increased by ca. 0.3°C over the course of the 20th century and the average annual rainfall decreased by ca. 2-3 per cent across Indonesia. However, extreme rainfall events will increase in severity and frequency in the 21st Century. In addition, in South East Asia tropical cyclones are predicted to increase in intensity, which could lead to increased storm surge heights.

KEY CHALLENGES

Sea level rise is currently taking place at a rate of ca. 1-3 mm (0.04-0.12 inches) per year in coastal areas of Asia, and is projected to accelerate in the future. However, the rapid rates of land subsidence play a more prominent role in relative sea level change: recent estimates suggest an average subsidence rate of 40 mm (1.6 inches) per year in Jakarta and in some places in northern Jakarta up to 20cm subsidence per year. This is likely due to the high volume of groundwater extraction from the middle and lower aquifers, with secondary contributions by building/construction loading and natural consolidation of sedimentary layers.

> *"… The approach to the community and community development has become the main focus of the government in order to deal with flooding. Although establishing cooperation in order to overcome the flooding is undeniably crucial, the cooperation itself should be carefully planned and executed to avoid being a burden to the government and community. Furthermore, sharing knowledge and cooperation development at local, regional and international level is urgently needed in order to overcome the issue of floooding."*
>
> ***Ir. Basuki Tjahaja Purnama***
> *Mayor of Jakarta,*
> *(Vice Governor of Jakarta)*

The high population growth is likely to further intensify the already severe land use pressures that play a role in flooding. Jakarta faces competing interests for land use and other issues causing land encroachment, such as informal settlement, where buffer areas for flood protection are needed.

PRIORITY AREA FOR INTERVENTION

The city's priorities are adaptation to climate change and increasing social inclusiveness.

Through the *Spatial Plan 2030, Jakarta Water Management Strategy 2030* and *Climate Adaptation Road Map for 2030*, Jakarta aims to promote a safe and sustainable city. A key element is prevention or reduction of annual floods, which are caused by sea-level rise, storm surges and land subsidence, but also by insufficient flow and infiltration capacity of Jakarta's watercourses (due to illegal waste disposal clogging and insufficient blue-green networks). This is why Jakarta launched the Socially Inclusive Climate Adaptation for Urban Revitalization Project (USD1.3 billion to be invested over 2012-2017) that aims to relocate close to 400,000 illegal squatters from riverbanks and nearby reservoirs, within "a humanized and participative process". Jakarta already succeeded in implementing most of its pilot project around the Pluit Reservoir in North of Jakarta.

As part of the pilot project, the Government of Jakarta has already built 14,201 new apartment units towards the target of 52,656 units by 2017 and relocated around 50,000 people to government subsidised high-rise low-cost housing, while not only providing them with basic amenities (electricity, water), but also taking into account their job security through an economic empowerment scheme. This allowed Jakarta to expand and deepen the Pluit Reservoir to increase its water storage capacity and develop surrounding green spaces to improve water infiltration. The project also delivers multiple co-benefits, including improved livelihood and sanitary conditions for relocated citizens, carbon sequestration and urban pollution reduction. Finally, reduced flood frequency and duration coupled with less people living in flood-prone areas helps prevent disease outbreaks, such as malaria and typhus.

The Government's success in addressing initial residents' opposition to the project is largely based on the community multi-stakeholder approach, with leadership from the Governor, officials, private sector and community heads, as well as intensive communication and public information campaigns. These campaigns had to address in particular the issue of residents not being accustomed to living in rented vertical housing and reluctance to relocate without compensation fuelled by lack of knowledge about new housing's benefits. Another reason for success was the private-public scheme, in which private companies holding property development permits in the affected area were obliged to participate in the project under a cross-subsidy scheme.

Vietnamese persons during the Floating Market in Can Tho, Vietnam.
Cai Rang Market is the most important floating market on the Mekong Delta.
© Shutterstock

DEPLOYMENT OF THE CITYSTRENGTH DIAGNOSTIC IN CAN THO, VIETNAM

With a population of 1.25 million, Can Tho is the largest city in the Mekong Delta and the fourth largest city in Vietnam. Can Tho City has been ranked since 2009 as a first-class city, putting it under the direct management of the central government. Geographically, Can Tho holds a key position in Vietnam and in the wider Mekong Delta Region — a region that has huge economic potential but at the same time is highly vulnerable to a number of shocks and stresses.

KEY CHALLENGES

Can Tho is dealing with chronic seasonal flooding, periodic flood disasters, riverbank erosion, saltwater intrusion, possible land subsidence, economic transition, and rapid urbanization. The city is also aware of challenges that lay on the horizon like sea level rise, a labor force that is unprepared for high-technology industry and an urban population that expects high-quality urban infrastructure and services from its government. These challenges are interlinked—encroachment on canals and riverbanks increases flood risk, while flooding and rampant growth impact the safety and quality of life in urban areas.

Can Tho can address the two primary threats to its socio-economic development goals—flooding and uncontrolled urbanization—by more proactively guiding urban growth to areas with lower flood risk, including the higher-elevation areas near the heart of the city.

The following actions and investments could have a transformational impact on the resilience of the city as a collection of initiatives implemented by Can Tho with more effectively coordinated support from development partners.

- Strengthen institutional capacity and legislative frameworks for an effective, integrated flood risk management approach.
- Enhance the collection, sharing and use of data on public assets, buildings, population, and risks.
- Improve the analysis of climate impacts in Can Tho by introducing standardized damage and loss assessment procedures that will enable local officials to quantify the impact of flooding on the local economy and budget.
- Strengthen financial management to enhance the sustainability of infrastructure investments and strengthen capital investment planning to facilitate better prioritization, monitoring and achievement of economic development goals.

The CityStrength Diagnostic was conducted in Can Tho, Vietnam in June 2014 at the request of the city. A team of specialists from the World Bank Group worked with local officials, technical staff and other stakeholders to identify priorities for investment and appropriate areas for action to help build resilience in Can Tho.

For Can Tho, the team in collaboration with local officials identified seven priority sectors/cross-cutting thematic areas to cover in the diagnostic, including urban development, disaster risk management and climate change adaptation, community and social protection, municipal finance, transport, energy, and water and sanitation.

"We need to ensure that we address the threats to our future success. We need to take proactive measures to deal with recurrent flooding, the pressures of rapid urbanization and the anticipated impacts of climate change to ensure that we reap the benefits of economic growth in a safe, sustainable, and inclusive way. In short, we need to become more resilient. This will be a long-term journey, and the implementation of the World Bank's CityStrength Diagnostic represents just one milestone."

Mr. Le Hung Dung,
Chairman, Can Tho City People's Committee

CITYSTRENGTH IMPLEMENTATION IN CAN THO CONSISTED OF FIVE STAGES:

- A pre-diagnostic review was carried out prior to the visit in June to collect information and leverage efforts that have already been undertaken in the city. As part of this, a review was conducted of all relevant studies, reports and plans developed by the city, the World Bank and other development partners to identify key risks and trends and get an overview of the performance of the different sectors.

- A launch workshop with key stakeholders in Can Tho helped validate the findings of the pre-diagnostic review, created a shared understanding of urban resilience and provided an opportunity to learn more about the city's goals and objectives.

- Following the workshop, interviews with key city stakeholders were carried out in combination with site visits across the city to better understand the challenges and opportunities, and to qualitatively assess the performance of different urban systems.

- Based on the findings, urban stakeholders and the World Bank team identified priority cross-sectoral actions and investments that could help Can Tho enhance its overall resilience.

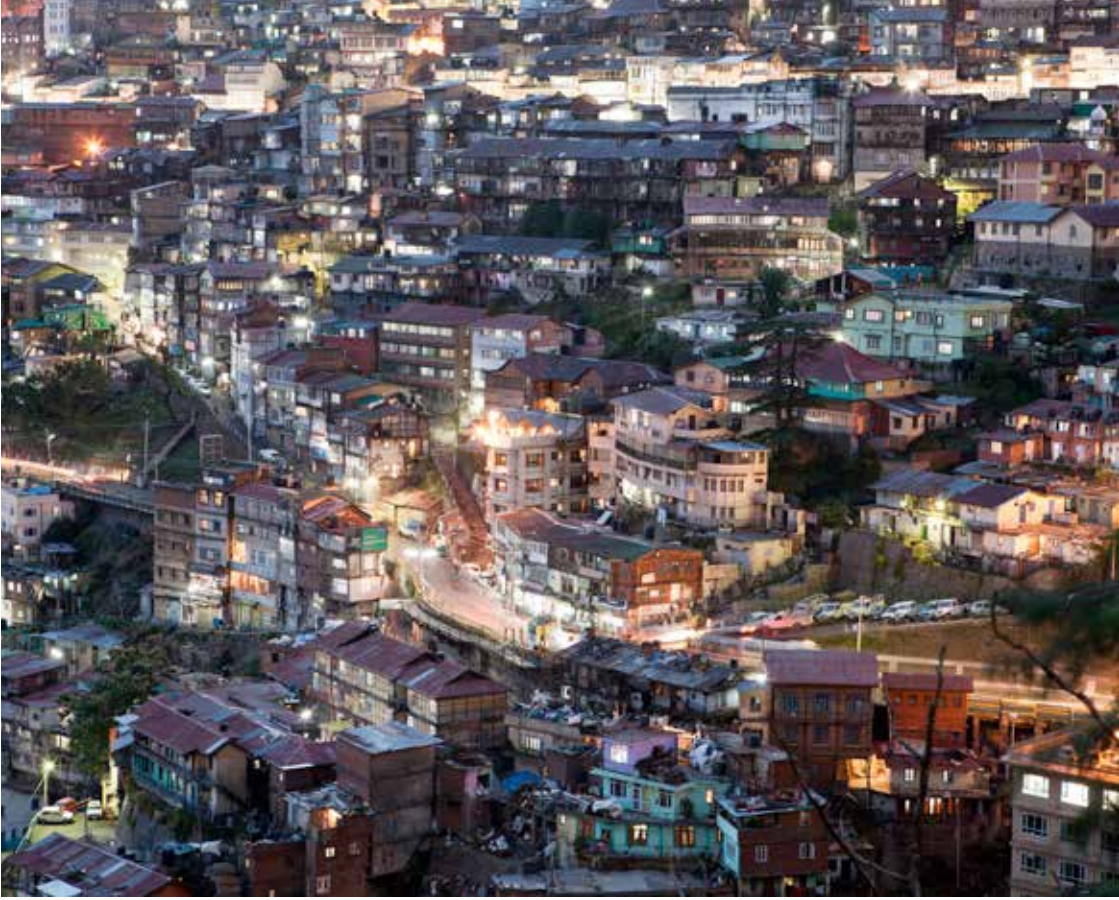
- The recommendations were discussed with the Chairman and Vice-Chairwoman of the Can Tho City People's Committee, and compiled in a report that the city can take forward in collaboration with the World Bank and other development partners.

Priority investments include:

- Focus on implementing flood protection measures in the urban core to make it a more attractive and safe place to live and do business.
- Use transport investments to guide urban growth to higher elevation areas and meet the needs of a modernizing city.
- Invest in sanitation to protect public health and support the economic base of the city.
- Continue to focus on urban upgrading as a means of addressing encroachment on drainage canals and targeting support to poor and vulnerable groups in the city.

FUTURE PLANS AND INVESTMENTS

The CityStrength Diagnostic is informing follow-on activities in Can Tho. The World Bank and partners are currently preparing a $250 million project on urban resilience, an open data initiative and a study of logistics and the role of Can Tho in the regional economy.



Shimla, India. © **Shutterstock**

SHIMLA, INDIA

Shimla is the capital of Himachal Pradesh and is perched in the southwestern ranges of the Himalayas of Northern India. It is built over several hills and connecting ridges, occupying an area of approximately 20 km². Formerly the British 'Summer Capital' of India, it is now one of the most popular tourist destinations in the State, both for Indian and international travelers alike. Shimla's popularity has led to a rapidly increasing population that is far greater than its infrastructure can bear. In a 2011 census, the urban agglomeration of the city was a population of over 171,000, while the growth rate is 16.21 per cent (Municipal Corporation of Shimla 2009).

KEY CHALLENGES

According to the Indian earthquake hazard zoning, Shimla is classified as Zone IV - Higher Danger Risk Zone. In recent years the risk of landslides, following heavy rains, has increased the city's risk profile even further. In 2013, several hundred houses were destroyed in landslides (see photo). Water supply is another chief concern. The Shimla District lies within the catchment area of three rivers, the principal of which is the Sutlej River that is located 21 kilometers from the city. Freezing of the pipes in winter and the increasing population during the summer places stress on the water supply and sanitation systems. To meet the increasing demand, water has to be pumped up to Shimla, and is done so at a significant and increasing cost to the Shimla Municipal Corporation (SMC). Another challenge is the city's ageing sewage system that handles waste, which is over 117 years old and suffers many failings. Additionally, several emerging health issues in Shimla have increased awareness of the impacts of climate change, including the rising incidence of vector borne diseases such as malaria and dengue fever.

EXAMPLES OF RESILIENCE BUILDING EFFORTS

In 2008 Shimla was selected as a pilot city in the Asian Cities Climate Change and Resilience Network (ACCCRN), funded by the Rockefeller Foundation. Together, the ACCCRN ICLEI-Local Governments for Sustainability developed a six-phase process to enable the identification of vulnerable urban systems, capacity constraints, and opportunities under a future climate scenario (see box).[1] Since then, Shimla has engaged in a number of resilience building efforts, including signing onto the Durban Adaptation Charter and the Compact of Mayors[2]. In October 2015, the SMC participated in the development of a resilience profile using the City Resilience Index, a combined effort of the Rockefeller Foundation, Arup and ICLEI South Asia, in order to understand the range of systems and factors that contribute to the resilience of the city. As part of the prioritization phase of the project, the city selected solid waste management as its priority sector, leading to the implementation of a multi-year public-private partnership based Integrated Solid Waste Management project. The $2.53 million project, includes 10 components, ranging from the door-to-door collection of waste, to an integrated waste treatment and disposal facility, and capacity building to strengthen waste management information, education and communication.[3]

> *"Urban Local Bodies are the most important part of the government with direct linkages to the community and the local people. Cities entrusted with planning and implementation are the ones who have the power to shape the future"*
>
> ***Sanjay Chauhan***
> *Shimla Mayor*

Water management	Rainwater harvesting
City Sanitation Plan	Decentralized wastewater treatment systems
City Mobility Plan	**Focus:** Rapid Transit, walking and cycling paths CMP has recommended implementation of a number of projects by 2031 to improve mobility: Pedestrian Phasing Signalization, Bike Sharing Scheme, Development of Lifts and Escalators to access locations at higher elevations
Solar City Master Plan	Solar street lights, solar water heaters, 5000 solar panels, LED Energy Efficient Lighting
Solid Waste Management	"zero waste zone", door to door waste collection, recycling, SWM processing plant under PPP mode
Capacity Building	Knowledge sharing, technical skills and training

FUTURE PLANS AND INVESTMENTS

Shimla's Climate Resilience Strategy successfully integrates climate adaptation strategies with low emission development targets (see table). Action plans are being implemented in five key sectors: water supply, sanitation, transport, tourism and solid waste management. The strategy assists decision-makers in identifying key challenges, best practices, and priorities in the short, medium, and long term.

> *"We have witnessed a move toward implementation with more concrete case studies that demonstrate how progress is being made in all aspects and phases of resilience planning ... Cities are moving quickly from planning to action, but are held back by a lack of financial and technical resources. The new global partnerships, mechanisms, and tools that have emerged in the past few years can provide much needed support to address chronic gaps in measuring and financing resilience in order to accelerate local efforts toward implementation."*
>
> ***Gino Van Begin,***
> *Secretary General, ICLEI – Local Governments for Sustainability*

BOX 6: IAP PROJECT PHASES

IAP consists of 6 phases as outlined in the image. Shimla has thus far been taken through the first 4.

- **Phase 1.** Engagement: P olit ic al com mit m ent , Institutional set-up, Identification of perceived threats, past practices and opportunities; Communication.
- **Phase 2.** Climate Research and Impact Assessment: Assessing projected climate trends, Identifying existing fragile urban systems, Expected impacts of climate projections on fragile systems, Prioritization based on risk assessment.
- **Phase 3.** Vulnerabilities Assessment: For each impact, identification of vulnerable areas, vulnerable social groups, data gaps.
- **Phase 4.** Resilience Strategy: Resilience actions identified, Actions prioritized based on resilience indicators and feasibility criteria.
- **Phase 5.** Implementation: Identifying funding options, feasibility and project planning, monitoring framework and implementation.
- **Phase 6.** Monitoring and Review: Perf ormance indicators and reporting system, Monitoring and Review.

ENDNOTES

1 *ICLEI-Local Governments for Sustainability Case Studies, No. 181 (2015). Addressing future climate change by building institutional capacity, Shimla, India. [Online] http://www.iclei.org/?id=1163*

2 *Compact of Mayors, Shimla (2015). [Online] http://www.compactofmayors.org/cities/shimla/*

3 *ICLEI-Local Governments for Sustainability (October, 2015). Shimla will soon have its own City Resilience Index. [Online] http://southasia.iclei.org/newsdetails/article/shimla-will-soon-have-its-own-city-resilience-index.html*

Concepcion city, Chile.
© Shutterstock

CONCEPCIÓN, CHILE

Concepción lies in Central Chile, 500 kilometres south of the capital, Santiago. The city sits within the larger urban area of Greater Concepcion, where a population of 1,026,425 reside across 10 municipalities. As the 11th largest municipality in Chile, Concepción is home to 231,233 people. Located 10 kilometres upstream of the mouth of the river Biobio, the city is also a capital, major port, and important administrative hub for the wider Bio-Bio region.

KEY CHALLENGES

Concepción was among the areas most severely impacted by the 2010 Chile earthquake. The 8.8 magnitude quake was followed by a devastating tsunami, which affected over 500 kilometres of the Chilean coast. Although extensive areas of the Greater Concepción coastline were destroyed in the event, high construction standards and strong enforcement of national construction codes were credited for low overall levels of damage to buildings.

Damage done to houses by the 2010 earthquake with 8.8 magnitude in Concepcion city, Chile. **© Shutterstock**

PRIORITY AREAS FOR INTERVENTION

Following the devastating events of 2010 the Municipalidad de Concepción, along with civil society and National Government, expressed a strong interest in measuring city resilience. With support from the Rockefeller Foundation, Arup is undertaking a series of pilot research studies in five global cities to test the feasibility, suitability and effectiveness of the City Resilience Index (CRI). Concepción was selected as an example of a Global South city that has undergone wide scale reconstruction and transformation following a major natural disaster. The CRI pilot offered the city the opportunity to evaluate strengths and weaknesses across the range of systems and processes which shape its resilience profile. The findings provided the city with a robust evidence base from which to identify future resilience-building activities, prioritise investment, and inform local policy change.

"As a city we must learn, prepare and know how to act in an emergency. We also need to understand that the preparation work before a tragedy must be made in advance. When we speak about resilience we believe it is the ability to stand up to a tragedy and learn from the mistakes we have made".

Alvaro Ortiz,
Mayor of Concepcion, Chile

EXAMPLES OF RESILIENCE BUILDING EFFORTS

The pilot assessment in Concepción brought together a diverse range of stakeholders from government, civil society and private sector. Some five years after the earthquake and tsunami, stakeholders identified a diverse range of interconnected stresses, which persist in the wake of the disaster. In particular, economic inequality has been strongly felt throughout the reconstruction and recovery process; characterised by unfair distribution of wealth and lack of quality access to basic services such as health, education, and housing.

> *"Resilience is the result of a culture that is permanently reinforced at all levels of the society. This is why it is important to measure it: so we know how well prepared we are".*
>
> ***Victor Orellana,***
> *Vice-Director, National Office of Emergencies, Chile*

CRI pilot participants in Concepción agreed that the city has undergone significant transformation since the 2010 earthquake. Most public services have developed or improved emergency plans, while the National Emergency Office (ONEMI) has increased staff numbers by three-fold and launched a continuous 24-hour service. Several civil society-led initiatives were established in the last five years; such as Fundacion Alto Rio, a major civil-led initiative which aims to create a more resilient society through education, awareness, and disaster risk reduction.

> *"What and who makes a city resilient – and not just livable now or sustainable for the long term – has become an increasingly critical question, one we set out to answer with our partners at Arup through the creation of a City Resilience Index. Both the framework and the index are intended to facilitate a process of engagement with and within cities that generates dialogue and deeper understanding. Ultimately, this will lead to new ideas and opportunities to engage new actors in civil society, government and business on what makes a city resilient."*
>
> ***Nancy Kete,***
> *Managing Director for Resilience, The Rockefeller Foundation*

Consultees also highlighted the importance of city participation as a foundation for building resilience. In the last year the City of Concepción has established a council of representatives of civil society (COSOC), which includes representatives from 28 local organisations. Stakeholders suggest that this initiative is a strong starting point for increasing civil involvement in policy making, though the city still has a long way to go in improving levels of engagement and participation.

FUTURE PLANS AND INVESTMENTS

Pilot fieldwork in Concepción demonstrates how measuring city performance across the 12 goals of the CRI can provide a strong basis for understanding urban resilience. Although many governmental agencies in Concepción have improved their capacity to respond to major disasters, a number of crucial challeng-

es associated with deepening civil society participation in planning still remain. Participants in our pilot agreed that a holistic, collective approach to understanding and addressing urban resilience would constitute a significant step-change for the city.

Important themes that emerged from the Concepción pilot include the need for the municipality to restructure key policies and improve cross-departmental working. The assessment also catalysed discussions to improve data sharing practices between city departments and key collaborators, such as utility companies and regional authorities.

ABOUT THE CITY RESILIENCE INDEX (CRI)

The CRI supports integrated decision-making and provides a framework to observe and track broad scale change, as cities are shaped over time by resilience strategies, policies, and major projects. In 2016, Arup and The Rockefeller Foundation will further validate and refine the tools through implementation in a second core group of cities. Upon launch of our innovative and user-friendly online platform, cities around the world will be free to access the CRI, while Arup will play an ongoing role in managing users, verifying assessments, and ensuring continual improvement of the tools.

Effects of the earthquake of 2010 of Chile taken at the city of Valparaiso. The epicenter was 500 miles to the South. **© FXEGS Javier Espuny/ Shutterstock**

Street vendor stall in Durban's Golden Mile beachfront in Durban, South Africa. **© Shutterstock**

COMMUNITY RESILIENCE PROGRAMME

No city can be truly resilient without community support. Durban exemplifies how city leaders can work with communities to address localized challenges such as poverty and inequality, as well as contribute solutions to global challenges, including climate change.

Durban, South Africa. **© UN-Habitat**

EMPOWERING STREET TRADERS THROUGH URBAN DISASTER RISK MANAGEMENT

The east coast city of Durban is South Africa's third largest city with a **population of about 3.5 million**. Durban is a commercial and transport hub, and has the busiest port in Africa. Since the decline of key manufacturing industries in Durban, informal employment in the municipality, renamed eThekwini in 2000, has been increasing. According to city government estimates, a third of economically active adults worked in the informal sector in the late 1990s and growth in this sector was far outpacing that of the formal sector. Durban initially responded positively toward this growth in informal workers, implementing progressive legislation, although more recent changes in the municipality's approach to informal workers, especially street vendors and market traders, have seen a breakdown in integrating them into urban plans.

> *"Small-scale operations and the informal sector are important sources of employment and innovation."*
>
> ***Nomvuzo Shabalala,***
> *Deputy Mayor of eThekwini Municipality*[3].

In 2014, Women in Informal Employment: Globalizing and Organizing (WIEGO) and Asiye eTafuleni (AeT) launched a pilot project, the Phephanathi Project (*"phephanathi"* means "be safe with us" in isiZulu) aimed at empowering informal traders to be part of city planning through participatory disaster risk management. The intent was to collaborate with city officials and thereby build a foundation to develop a more resilient city for all.

The 6,000 – 8,000 traders in Warwick Junction, a sprawling informal market complex in the heart of Durban, provide essential goods and services to the city —food, haircuts, clothing and household goods — at affordable rates. Yet the market also poses many health and safety hazards to both traders and visitors. Fires are one of the main concerns, since many traders use open-flame cooking stoves to prepare food for their stalls.

The Phephanathi Project started by forming risk-management sub-committees to raise awareness and monitor health and safety issues in the markets. Sub-committee members conducted a participatory digital mapping exercise of fire hazards in one of the Warwick Junction markets. This first phase successfully brought together municipal representatives and traders. Vendors and traders along with staff from the eThekwini Metro Fire Department and the Provincial Disaster Management Department developed a digital map of hazardous areas by marking the points using GPS. They found many issues, such as gas canisters being stored inappropriately and blocked fire exits. The Metro Fire Department officials also tested existing fire equipment, and provided fire safety lessons about cooking with gas.

The next phase of the Phephanathi Project focused on responding to the health and safety needs of the market by installing prototype first aid stands (now referred to as "green crosses" by the traders) and sand-filled fire cones. Prior to rolling out the stands into the market, the WIEGO and AeT team undertook a detailed siting exercise with the help of traders in each market. During this exercise, the number and placing of the stands in each market was decided upon together. Measurements were also taken to ensure that the stands could be tethered to appropriate infrastructure (trader tables, poles, etc.) that suited everyone's needs.

Shops in Thohoyandou, South Africa.
© UN-Habitat

DURBAN: LEADING INTEGRATED CLIMATE ACTION

- Durban was the first city in South Africa to adopt the Local Agenda 21 mandate in 1994 and was also the first city in South Africa to accept the Local Action 21 mandate in 2003.
- Committed local government with leading national and international role to combat climate change
- EThekwini Municipality hosted COP17 (UNFCCC) in December 2011 at which over 900 mayors adopted the Durban Adaptation Charter for Local Governments committing local authorities to developing adaptation plans that assist in directing urban development and investment.
- Partner city of the 100 Resilient Cities - Pioneered by the Rockefeller Foundation initiative.
- Committed to the Compact of Mayors
- National finalist in the 2013-2014 WWF-ICLEI Earth Hour City Challenge
- Supporter of Local Climate Roadmap, a broad coalition of local government networks in response to the Bali Action Plan that aims to ensure a strong and ambitious global climate regime is designed and implemented in the post-2015 period.[1]
- Durban reports to the Carbonn Climate Registry on mitigation and adaptation. The city tracks and reports on 27 adaptation actions and more than two dozen mitigation actions. [2]

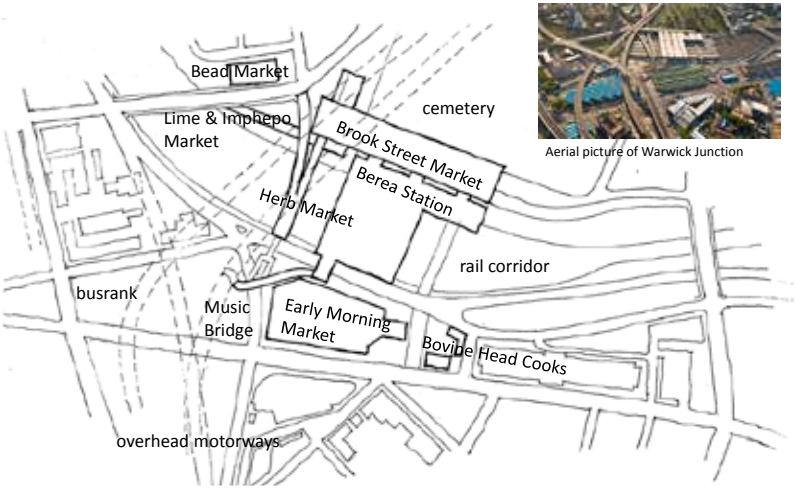
SOURCE: *ICLEI-Local Governments for Sustainability*

"

"Resilient cities means resilient communities and resilient livelihoods. Those working in the informal economy in cities all around the world provide essential services like waste management, small-scale production for formal value chains, and affordable food retailing. They do so at very little cost to their cities or to the environment. Their work is the bedrock for resilient cities and they must be included in city planning processes."

Martha (Marty) Chen,
Co-Founder and International Coordinator of WIEGO

The project also experimented with mapping of and experimentation with digital technologies to improve workplace health and safety. The two digital technologies, the Ushahidi Platform and Frontline SMS, used open-source data. The Ushahidi Platform was used to map information from multiple sources. Frontline SMS is a web-based tool, which allows for sending and receiving of bulk SMS texts. Frontline was helpful in continually reminding traders of key safety measures and concerns, and an encouraging 93 per cent of traders reported that they had found the messages useful.



Warwick junction precinct analysis in Durban, South Africa. **© UN-Habitat**

Durban, South Africa. **© Shutterstock**

While the pilot phase has finished, the Phephanathi Project committee continues to meet, and the risk management sub-committees in each market have been charged with managing the first aid stands and the fire cones. The results of the hazard mapping will be added to additional hazard and infrastructure mapping sessions that have been carried out by AeT under different projects, and will be used as a basis for approaching local government about larger scale infrastructure upgrades in Warwick Junction. Most importantly, Warwick Junction traders have acquired skills and an understanding of urban development processes to create a safer work environment and more secure urban livelihoods.

ENDNOTES

1 *Local Climate Roadmap (2007). [Online] http://www.iclei.org/index.php?id=1197*
2 *Carbonn Climate Registry (2014-2015). [Online] http://carbonn.org/data/report/commitments/?tx_datareport_pi1 per cent5Buid per cent5D=36*
3 *United Cities and Local Governments (2015). "Key Positioning of Local and Regional Governments on Local Economic Development, produced for the Third World Forum on Local Economic Development in Turin on 13-16 October 2015. [Online]http://www.uclg.org/sites/default/files/uclg_key_positioning_document_on_led_en_0.pdf*

TERMINOLOGY

City Resilience Framework - Developed by Arup with support from The Rockefeller Foundation, the City Resilience Framework (CRF) provides a lens to understand the complexity of cities and the drivers that contribute to their resilience. Evidence-based, the CRF provides common understanding of what constitutes a resilient city and a common language that enables cities to share knowledge and experiences.

City Resilience Index - is built on the CRF. Like the CRF, it is a holistic articulation of city resilience structured around 4 dimensions, 12 indicators that essentially tell us what matters most when a city faces chronic stresses or sudden shocks. The CRI also includes 58 sub-indicators that add further definition and identify the critical factors that contribute to the resilience of urban systems. The sub-indicators also integrate the 7 qualities of resilient systems that research shows are so critically important: Integrated, inclusive, flexible, redundant, reflective, resourceful, and robust. The foundation of measurement for the CRI is a set of 156 prompt questions (3 per sub-indicator) with qualitative and quantitative fields.

Chief Resilience Officer – A "CRO" is a senior level advisor to the mayor, who leads and coordinates the city's resilience building efforts on a day to day basis.

Resilience assets – The physical, economic, social, built and natural resources that contribute to a city's resilience.

Resilience Dividend - Resilience Dividend: A range of net positive benefits—from cost savings and cost avoidance to better outcomes for vulnerable populations—that result from integrated decision making. AND/OR when discrete interventions achieve multiple benefits across multiple systems as a result of applying a Resilience Lens in planning and project development and prioritizing decisions that will deliver resilience value.

Resilience Lens – An analytical framework to evaluate options and ensure city actions achieve multiple positive outcomes while mitigating negative consequences.

Resilience strategy – A tactical roadmap to build resilience in the city. The strategy articulates the city's resilience priorities and specific initiatives for short-, medium-, and long-term implementation.

Resilience value realization – a structured process for identifying and delivering the resilience value-creating opportunities present in projects. Includes initial Resilience Opportunity Framing workshop and later Resilience Value Reviews. A way to increase likelihood a project or strategy will yield a Resilience Dividend.

Risk – A function of the likelihood/probability of a shock or stress combined with the consequence of the shock or stress.

Sector – distinct parts of society, in particular private, public, civil-society.

Silo – can be a verb: to isolate systems, processes, departments, etc. from others. Or a noun, to indicate an isolated and separate entity, process, or system.

Shock – An acute natural or human-made event or phenomenon threatening major loss of life, damage to assets and a city's ability to function and provide basic services, particularly for poor or vulnerable populations.

Nairobi, Kenya.
© Shutterstock

QUALITIES OF RESILIENCE

Stress – A chronic (ongoing or cyclical) natural or human-made event or phenomenon that renders the city less able to function and provide basic services, particularly for poor or vulnerable populations.

Urban Resilience – The capacity of individuals, communities, institutions, businesses and systems within a city to survive, adapt and thrive no matter what kinds of chronic stresses or acute shocks they encounter.

Flexible - Flexibility implies that systems can change, evolve and adapt in response to changing circumstances. This may favor decentralized and modular approaches to infrastructure or ecosystem management. Flexibility can be achieved through the introduction of new knowledge and technologies, as needed. It also means considering and incorporating indigenous or traditional knowledge and practices in new ways.

Inclusive - Inclusion emphasizes the need for broad consultation and engagement of communities, including the most vulnerable groups. Addressing the shocks or stresses faced by one sector, location, or community in isolation of others is an anathema to the notion of resilience. An inclusive approach contributes to a sense of shared ownership or a joint vision to build city resilience.

After recent heavy rains, river Cadjavica went out of stream, causing catastrophic floods and mud slides, wich destroyed town of Krupanj in Macva district in central Serbia. **© Dusan Milenkovic/Shutterstock**

Integrated - Integration and alignment between city systems promotes consistency in decision-making and ensures that all investments are mutually supportive to a common outcome. Integration is evident within and between resilient systems, and across different scales of their operation. Exchange of information between systems enables them to function collectively and respond rapidly through shorter feedback loops throughout the city.

Redundant - Redundancy refers to spare capacity purposely created within systems so that they can accommodate disruption, extreme pressures or surges in demand. It includes diversity: the presence of multiple ways to achieve a given need or fulfil a particular function. Examples include distributed infrastructure networks and resource reserves. Redundancies should be intentional, cost-effective and prioritized at a city-wide scale, and should not be an externality of inefficient design.

Reflective - Reflective systems are accepting of the inherent and ever-increasing uncertainty and change in today's world. They have mechanisms to continuously evolve, and will modify standards or norms based on emerging evidence, rather than seeking permanent solutions based on the status quo. As a result, people and institutions examine and systematically learn from their past experiences, and leverage this learning to inform future decision-making.

Resourceful - Resourcefulness implies that people and institutions are able to rapidly find different ways to achieve their goals or meet their needs during a shock or when under stress. This may include investing in capacity to anticipate future conditions, set priorities, and respond, for example, by mobilizing and coordinating wider human, financial and physical resources. Resourcefulness is instrumental to a city's ability to restore functionality of critical systems, potentially under severely constrained conditions.

Robust - Robust systems include well-conceived, constructed and managed physical assets, so that they can withstand the impacts of hazard events without significant damage or loss of function. Robust design anticipates potential failures in systems, making provision to ensure failure is predictable, safe, and not disproportionate to the cause. Over-reliance on a single asset, cascading failure and design thresholds that might lead to catastrophic collapse if exceeded are actively avoided.

Source: *Rockefeller Foundation, 100 Resilient Cities, UN-Habitat, UNISDR, 100 Resilient Cities and C40 Cities Climate Leadership Group*

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