



Resilient Cities Report 2017

Tracking local progress on the resilience targets of SDG 11

*BASED ON THE PROCEEDINGS OF THE 8TH GLOBAL FORUM ON URBAN RESILIENCE AND ADAPTATION
4 - 6 MAY 2017 | BONN, GERMANY*



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Resilient Cities Report 2017: Tracking local progress on the resilience targets of SDG 11

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About the Resilient Cities congress series

The Resilient Cities congress series was launched in May 2010 by ICLEI to establish the first global forum on local level climate adaptation and resilience. It is co-hosted by ICLEI - Local Governments for Sustainability and the City of Bonn. The 2017 edition was carried out with the support of the International Development Research Centre (IDRC), the German Federal Ministry for Economic Cooperation and Development (BMZ), and the Foundation for International Dialogue of the Savings Bank in Bonn, as well as Munich RE (Insurance Summit).

Based on the congress discussions, this publication summarizes key issues affecting cities, local governments and stakeholders around the world. Presentations and session descriptions from the 2017 congress, along with congress proceedings, additional publications, multi-media coverage, and updates for 2018 can be found on the Resilient Cities website: resilient-cities.iclei.org

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■ ■ ■ Introduction

Resilient Cities is the annual global forum on urban resilience and adaptation convened in Bonn, Germany. The congress series provides an international platform to share the latest knowledge, good practices, challenges, and innovations for creating more resilient cities. It also serves as an annual meeting point to track local progress on the resilience targets of Sustainable Development Goal 11 to make cities inclusive, safe, resilient, and sustainable. The congress outcomes present a snapshot of the state of urban resilience, building on discussions and developments from previous years.

The 8th edition of Resilient Cities focused on implementing integrated, sustainable, and resilient urban development plans. Key discussion points included (1) how to strengthen new and existing partnerships with relevant sectors and actors at multiple scales; (2) how to mobilize resources to accelerate local action; and (3) how to encourage holistic and inclusive approaches.

The program featured the first-ever Insuring Resilient and Sustainable Cities Summit as well as the third Urban Food Forum. The sessions addressed emerging links between urban resilience and climate-related health risks, transport systems, land degradation, forced migration, and civil unrest. Contributors also shared lessons learned on financing resilience, disaster risk reduction and adaptation planning, ecosystem-based adaptation and resource efficiency, researcher-practitioner collaboration, community based adaptation, and inclusive governance.

This report reflects the outcomes of Resilient Cities 2017 and broader developments in the field of urban resilience and climate change adaptation. The following pages highlight specific tools, case studies, and solutions from local governments and practitioners around the world. The findings build on those presented in previous Resilient Cities Reports and are cross-referenced to additional resources.

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Natural disasters and losses in 2016 and early 2017

A 'Resilient City' is prepared to absorb and recover from any shock or stress while maintaining its essential functions, structures, and identity, as well as adapting and thriving in the face of continual change. (ICLEI, 2015a)

According to the latest sigma study, 327 disaster events were recorded in 2016, of which 191 were natural catastrophes owing to earthquakes, floods, tropical storms, and wildfires (Swiss RE, 2017). In terms of human and economic losses, Asia continues to suffer the most. The costliest disaster of the year was the 7.0 earthquake that hit close to the city of Kumamoto, Japan on 16 April 2016. The earthquake and its aftershocks triggered landslides and destroyed infrastructure, causing 137 deaths and estimated damages of USD 25 - 30 billion. The deadliest earthquake of the year, however, took place on the very same day in Ecuador. A magnitude 7.8 earthquake led to 673 deaths and USD 4 billion in damages, the costliest natural disaster in Ecuador in decades (Swiss RE, 2017).

For the third consecutive year, 2016 was the warmest year on record globally and it also set the record for the lowest sea ice levels in the Arctic region since satellite monitoring began (Munich RE, 2017a). The heatwaves across India, which claimed 300 lives (April), as well as the massive floods along the Yangtze River, China, which claimed over 280 lives and caused USD 403 million in damages (June) bear testimony to the consequences of the abnormal global temperatures in 2016.

The most devastating event of 2016 in terms of human loss (and second most costly) was Hurricane Matthew, a category 5 storm in the North Atlantic which caused more than 700 deaths. While the USA weathered the storm, the Caribbean was hit hard. For Haiti, where 90% of Matthew's victims were located, this was the deadliest event to hit the island nation since the 2010 earthquake. The Hurricane triggered a payout from the Caribbean Catastrophe Risk Insurance Facility, which helped Haiti to avoid a large humanitarian crisis.

Other events caused significant human suffering and economic damages throughout 2016, such as the expansive wildfire in Canada which caused estimated damages of USD 4 billion (May- July) and the magnitude 6.2 earthquake in central Italy which claimed the lives of almost 300 people in the small towns of Amatrice, Accumoli, and Pescara del Tronto (Swiss RE, 2017).

Overall, approximately 11,000 people lost their lives or went missing due to disasters in 2016, less than half the number of victims compared to 2015. Total economic losses, however, increased to USD 175 billion in comparison to last year (USD 92 billion), of which only USD 38 billion were insured.

In the first half of 2017, thunderstorms and tornadoes in the USA have already caused an estimated damage of USD 18.5 billion (Munich RE, 2017b). In Australia, the most serious event was Cyclone Debbie, which hit the coast of Queensland at the end of March and led to damages of USD 2.7 billion. While the deadliest event in the first half of 2017, were the flash floods and landslides in Nepal, Bangladesh and India, which claimed over 200 lives in July-August.

The figures in this segment signify that natural disasters, including those exacerbated by climate change, continue to have menacing impacts for communities around the globe. In the Global South, these events can have a particularly devastating and lasting impact, setting back the development progress and compromising the wellbeing of present and future generations. This was best evidenced by the varied impacts of Hurricane Matthew in the USA -where it bore significant USD costs- and one of the poorest countries in the world, Haiti -where it led to large loss of life. The integrated approach to development and resilience enshrined in the SDGs, Sendai Framework, and Paris Agreement reflects these considerations and strives to anticipate a world where human safety, resilience, and wellbeing are part of one unified global priority. Cities and regions actively support this vision as the impact of disasters and long term stresses are often felt most directly in urban areas. Adapting an integrated approach to resilience and sustainability helps reduce avoidable losses and damages.



Kita-eighth tower collapsed during the Kumamoto earthquake. © By hyolee2



Hurricane Mathew knocked out electricity, left behind flooded areas and downed trees. © By North Charleston



Zero Zone of Portoviejo affected by the earthquake in Quito, Ecuador. © By Ejszec

Global Frameworks: Turning words into action

In October 2016, Nations adopted the [New Urban Agenda](#) (NUA) at the Habitat III conference in Quito, Ecuador. The document frames urban development for the next 20 years with a strong emphasis on inclusive, sustainable development that will “leave no one behind.” The New Urban Agenda was the last in a series of global frameworks adopted in 2015 and 2016 that included the Sendai Framework for Disaster Risk Reduction 2015-2030, the 2030 Sustainable Development Agenda and corresponding Sustainable Development Goals (SDGs), and the UNFCCC Paris Agreement. The latter officially entered into force on 4 November 2016.

The focus has now shifted from negotiation to implementation, with governments and stakeholders elaborating plans, actions, and key performance indicators for achieving global sustainability targets, the first of which are due in 2020.

“I ask you to work together. . . with the local business community and the finance industry and academia... with your national governments... [Cities] cooperation on climate change and sustainable development steers the world towards a better and brighter future for your citizens –billions of people – and for all people and the planet we share.” Patricia Espinosa

This shift was evident during the UNFCCC COP22 in November 2016, which saw the launch of the Marrakech Partnership for Global Climate Action to catalyze action amongst nations and climate stakeholders between 2017 and 2020. ICLEI facilitated the Resilience Workstream of the Global Climate Action day on Cities and Humans Settlements at COP22 in collaboration with the Moroccan Ministry of the Interior and the Fonds Mondial pour le Développement des Villes (FMDV). The discussions reinforced the following principles:

- Engage the urban resilience community in key global policy processes through regular dialogues and input from platforms including the Resilient Cities congress series;
- Increase the flow of global climate finance and other investments to urban resilience initiatives; and
- Support integrated sustainable and resilient urban and territorial development as a means to achieve Nationally Determined Contributions (NDCs).

Developments at the local level mirror, to some extent, global discussions. The concept of resilience has been gradually mainstreamed into local planning processes, with more and more cities and regions adopting resilience strategies and plans. As local governments progress to the implementation phase, there has been a move to accelerate and scale up local action by addressing knowledge gaps, standardizing approaches, mobilizing financing, and forming coalitions of key actors. Today, this coalition-building continues, with an emphasis on multi-sectoral alliances (e.g. with business, insurance industry, humanitarian sector) and outreach to actors who have been under-represented in the urban resilience discourse (e.g. health and transport sectors).

What remains is to bring the pieces together, by strengthening cooperation between and amongst sectors and governments at all levels that is underpinned by inclusive, transparent governance mechanisms.



Patricia Espinosa, Executive Secretary, UNFCCC and Co- Patron of Resilient Cities 2017.



Ashok-Alexander Shridharan, Mayor of Bonn and Co-Patron of Resilient Cities 2017.



Robert Glasser, Special Representative of the UNISDR and Co- Patron of Resilient Cities 2017.



Thomas Silberhorn, Parliamentary State Secretary to the BMZ and Co-Patron of Resilient Cities 2017.



Mayors' Lunch during Resilient Cities 2017 congress with local leaders and UN officials (see page 26).

Speakers at the Resilient Cities Opening Plenary offered the following advice to local leaders:

- Don't wait! Choices made by cities today - from procurement and projects to infrastructure and finance- can impact development pathways for decades
- Get started and integrate both horizontally and vertically along the way – a lot can happen in a generation
- Communicate. Open up dialogues on risk, resilience building, and interdependencies (social, political, economic) with civil society, national governments, municipal departments, and the private sector.

Tracking the local implementation of SDGs

Fittingly, one of the first global targets to come due in 2020 is SDG 11.b, which calls to “substantially increase the number of cities and human settlements implementing integrated policies and plans towards inclusion, resource efficiency, mitigation and adaptation to climate change, [and] resilience to disasters.”

Cities have already started to test the international ambitions and provide indications of their progress. For example, a review of 106 adaptation policies and plans reported to the carbonn Climate Registry found that nearly half could be considered fully integrated, while the rest addressed at least two of the areas mentioned by SDG 11. [The review](#) drew from a sub-sample of 242 adaptation actions reported by 132 local governments from 35 countries.

Tracking progress toward integrated sustainable and resilient urban development in line with SDG 11 provided a frame for discussions at Resilient Cities 2017. Several cities shared how they are directly linking local policies to SDG 11, highlighting barriers and success factors.

The main obstacle to local implementation is lack of funding and capacity. Multiple public and private sources are required to deliver the large infrastructure financing essential for sustainable, low-carbon development and climate resilience in cities. In fast-growing and resource-constrained cities in the Global South, which face a [multitude of pressures](#) including informality and poverty, this is no small feat. Resilience building is not always a priority. One approach is harnessing existing structures within informal settlements. For example, [Lusaka, Zambia](#) is assessing informality and upgrading slums in situ while [Bulawayo, Zimbabwe](#) is engaging residents in citywide sustainability initiatives, such as waste collection that advances the City's flood protection strategy.

Often the problem is lack of knowledge on important aspects of sustainability, such as urbanization and climate change and how it affects communities. This is the case in [Lilongwe](#) and [Blantyre, Malawi](#), where local academia is working with the public sector to address the knowledge gap. It is critical to strike valuable partnerships and link policy, research and action in ways that reflect the local realities.

“Collaboration between the local government council and research institutions is one of the most practical ways of achieving SDG 11.” Lessah Mandoloma, Lecturer, Natural Resources Management, Lilongwe University of Agriculture and Natural Resources, Lilongwe, Malawi

Last, the development of resilience-related standards, such as the ISO/NP 37123 Sustainable Development in Communities – Indicators for Resilient Cities, could bring cities and stakeholders together to fulfill the global goals. For example, the participation of [Taipei City Government, Chinese Taipei](#) in the ISO37120 program helped increase the City's ability to leverage funding for climate resilience and accelerate bottom-up implementation of the SDGs.



Lusaka, Missisi slums. © By Krzysztof Błażyca



Taipei City Hall and 101 Tower. © By CEphoto, Uwe Aranas

Key developments in urban resilience

The following section summarizes key developments of urban resilience globally by subtheme based on the outcomes of the Resilient Cities 2017 congress (see page 25). This year, the congress addressed a wider range of sectors and topics including transportation systems, insurance, health, civil unrest, land degradation, and forced migration to form a comprehensive resilience discourse. Additional themes included adaptation planning and governance, financing resilience, disaster risk reduction, ecosystem-based adaptation, strategic partnerships, and research-practitioner collaboration. Findings are cross-referenced to additional information and online resources.

Insuring resilient and sustainable cities

Risk transfer solutions at the local government level are currently perceived as [a largely untapped opportunity](#). The Insuring Resilient and Sustainable Cities Summit, organized in cooperation with UNEP PSI and Munich RE, brought relevant actors together to bridge the gaps of understanding and promote active coalitions to support urban resilience. The first-ever Summit initiated a partnership between UN Environment's Principles for Sustainable Insurance (PSI) Initiative and ICLEI who joined forces in December 2016 to forge the largest collaboration between the insurance industry and local governments in order to advance the global agenda of building sustainable and resilient cities. The Summit concluded with a set of ambitious goals hailed as the "[Bonn Ambition](#)" (ICLEI, 2017b).

Understanding the insurance industry's role in building resilient and sustainable cities

The Summit introduced [the role of the insurance industry](#) as risk managers, risk carriers, and investors in resilient and sustainable infrastructure:

As **risk managers**, insurers possess state-of-the-art catastrophe risk models, data, and analytics. Disaster risk models construct a "synthetic" history of potential disasters for a specific location based on historical events and probability. This is useful to define the technical price of specific risks and guide rational investments in protection mechanisms. The value of disaster risk reduction (DRR) – e.g. costs saved – could also be financially measured and factored into future planning. According to Risk Management Solutions, the largest catastrophe risk modeling company, only a handful of cities apply sophisticated risk modeling. In most cases, cities end up paying for both the damages and disaster risk reduction measures in the aftermath of a disaster.



Astrid Zwick, Head, G7 InsuResilience Initiative.

As **risk carriers**, the insurance industry could provide necessary funds to alleviate the impact of disasters and supply municipal coffers in times of need.

Traditional insurance options coexist with parametric or index-based insurance solutions – whereby payouts are not contingent to proof of loss, but rather to a predetermined threshold, such as wind speed or amount of rainwater mm/day. Such parametric schemes allow cities to cash-out their policies immediately after a disaster and support rebuilding.

"There has never been a better understanding of natural catastrophe risk on a global level. There are solutions for a lot of regions and natural catastrophe exposures. So we need to bridge the gap between solution providers and risk owners." Daniel Stadtmüller, Senior Manager Origination, Capital Partners, Munich RE Group

As managers of more than USD 30 trillion worth of global assets (Swope, 2017), insurers are also **major institutional investors**. Their investments in climate-proof infrastructure could shape the future of urban areas. This role is particularly important for resilience building since insurance companies have a direct interest in reducing risk in cities in order to get a return on their investment. For example, in April 2017 AXA Investment Managers announced a plan to divest from companies that derive more than 50% of their revenues from coal-related activities due to climate change considerations (AXA, 2017). This follows a trend of insurance companies phasing out coal investments.

"There is no business case behind coal in a 1.5 degrees world." Verena Treber, Project Manager, Allianz Climate Solutions GmbH, Munich, Germany

Moving toward closer collaboration - Global South and Global North perspectives

The availability of loss and damage data are crucial for resilience planning. However, usually insurance companies rather than municipalities have access to such data.

"If your basement floods, you don't call the municipality — you call the insurance company." Guro Sørnes Kjerschow, Special Advisor Climate Change Adaptation, City of Oslo, Norway

The City of Oslo, Norway has collaborated with Finance Norway as part of the government-backed project "Cities of the Future" (Mikkola *et al.*, 2016). Finance Norway shared insurance claim data to inform the city's efforts vis-à-vis flood risk prevention. The collaboration produced a GIS stormwater flood risk map and an action plan that fed into the municipal stormwater management plan. The project illustrated how partnerships based on trust-building and

mutual benefit can improve risk management in urban areas.

While Global North governments are familiar with insurance associations, in the Global South, insurance is commonly considered a luxury. This was the perspective of Dar es Salaam, Tanzania prior to 2016, when the city hosted the City-Innovation Platform (CIP) pilot workshop. The city learned how insurance solutions could support their resilience and flood risk reduction efforts, while the insurance industry learned about issues such as informality that impede urban sustainability and resilience efforts. Munich RE – the largest reinsurance company in the world – reflected on the importance of mutual learning workshops to help (re)insurers design more appropriate solutions tailored to the needs of cities in the Global South (ICLEI Global, 2017).

Key takeaways from the Summit

1) Engage the insurance industry early and often

Cities typically approach companies to insure existing infrastructure, in which case, insurers assess and price the risk of such protection. The “price tag” of the risk is the insurance premium. This is often why cities find insuring existing assets to be an expensive endeavor. To reduce the price tag, insurance partners should be approached from the inception of resilience strategies to lend their expertise and investments. The Advancing Climate Risk Insurance Plus (ACRIplus) program is developing a holistic framework for disaster risk management (DRM) applicable for cities (MCII, 2017). New insurance solutions linked to all phases of the DRM cycle are being developed in collaboration with local authorities and the private sector to fit individual urban contexts.

2) Mind the “protection gap” to insure vulnerable populations

The difference between insured and total losses, termed the “protection gap”, continues to grow ([121 billion USD in 2016](#)). This trend reflects that risk awareness and insurance penetration in vulnerable areas are low, while at the same time, natural disasters are on the rise. Innovative schemes and tools could help close the gap. At COP21, G7 members launched InsuResilience, an initiative that aims to increase access to insurance coverage against the impacts of climate change for up to 400 million people in developing countries by 2020 (BMZ, 2016). The initiative has USD 550 million in pledges and is expected to support communities by designing locally appropriate climate insurance solutions and developing markets in extremely climate-vulnerable regions. To achieve this goal, active coalitions are needed between government leaders at all levels, development banks, and the insurance industry.

3) Wanted: Flexible investment mechanisms to fund small scale projects

The insurance industry continues to prefer projects which are large-scale and long-term. For example, Allianz Global Investors favor 10-20 year projects starting from EUR 50 million since these have a sound return on investment and provide the company with continuous liquidity to meet obligations to their customers. Such “safe” projects are hard to come by at the municipality level – more flexibility is needed. Resilience bonds could be one promising solution.

4) Empower cities to be “insurance literate”

There is a substantial “language” barrier between the insurance sector and local policy makers which can lead to alienation and distrust. It is important for elected officials to achieve a degree of financial literacy in order to understand the purpose of insurance, its key aspects, and terminology. Ideally, cities need to be equipped with a resilience expert responsible for managing risk data and liaising with the insurance sector when appropriate.

The way forward – the “Bonn Ambition”

The Summit concluded with a set of ambitious goals including:

- The development of “Insurance Development Goals for Cities”
- The co-creation of city-level sustainable insurance roadmaps with insurance and city partners
- The convening of insurance industry CEOs and mayors at the 2018 ICLEI World Congress to continue the dialogue and enhance understanding between the two stakeholders.



Butch Bacani, Program Leader, UNEP PSI and Youssef Nassef, Director, Adaptation Programme, UNFCCC.

Financing resilience

Resilience investments are not only for the insurance sector. There are great opportunities for international investors and funders to enable local, transformative climate actions around the globe. Meanwhile, flows of global climate finance must be increased by 2020 in particular for investment planning and project preparation. These powerful messages were shared at the UNFCCC COP22 during the Global Climate Action Day on Cities and Human Settlements, hosted by the Climate Champions from Morocco and France (see page 5).

"The integration of the climate dimension in the practices, cultures, engineering, investment decisions, and distribution channels, by the players in the public and private finance ecosystem, global and local, proves to be a base rock priority for the transformation of our societies and the implementation of the Paris Agreement."
Marrakech Roadmap for Action

Cities and particularly those from developing countries, currently lack sufficient funding and revenue sources to address climate change challenges within the context of rapid urbanization. Moreover, local governments demonstrate deficient capacity to mobilize, secure, and manage the financial resources needed to meet pressing urban infrastructure investment needs for climate resilient and sustainable urban development. This is further aggravated by the absence of multi-level governance mechanisms that facilitate or enable access to long-term financing sources for subnational governments (ICLEI, 2015b).

"There is a great need for accessing finance for low-carbon resilient infrastructure for cities" Stelios Grafakos, Lead Climate Change and Sustainability specialist, Institute for Housing and Urban Development Studies, Erasmus University, Rotterdam

The debate around constraints faced by local and regional governments in accessing global finance continues to focus on capacity building. There is need to transfer knowledge and capacity to (1) cities - for identifying investment needs; designing, planning, funding, and implementing resilient infrastructure projects in a sustainable way; and improving their revenue collection systems (2) national governments - for creating an enabling regulatory environment with more autonomy for local governments to systematically leverage private sector engagement from the investment phase, to project preparation, to project implementation; and finally (3) international financing institutions - for increasing the availability and accessibility of financial resources to subnational governments for climate change adaptation.



Leny Mary Goes Toniolo, Curitiba Municipality, Brazil and Bruno Schwambach, Recife Municipality, Brazil presented TAP projects "Sustainable Village Project" and "Capibaribe Park".

"Public finance is not enough. We need to find ways that capital could be deployed for the benefit of cities." Butch Bacani, Program Leader, UN Environment's Principles for Sustainable Insurance (PSI) Initiative, Geneva, Switzerland

The actual role of international financing institutions in supporting or, conversely, crowding out domestic financing institutions as well as the emphasis given for segregating and labelling projects into "bankable" versus "non-bankable" might be diverting attention from urgent development projects at the local level. Even before these projects are investor-ready, local governments must spend considerable time, money, and capacity on project preparation.

The Cities Climate Finance Leadership Alliance's (CCFLA), a partnership initiative to accelerate access to climate finance, is mandated to address this issue. Since overall readiness and upstream phases of project preparation are crucial to feed project pipelines such as the Transformative Actions Program (TAP), the CCFLA lobbies national governments, funders, donors, and investors to engage proactively in all project phases. Acknowledging the need to join efforts among CCFLA members working on project preparation, the Project Preparation Facility (PPF) working group was established for empowering local governments and building capacity to scale up planning, project preparation, and financing of their projects .

"The focus is not only on the financial aspect of the Project Preparation Facility - we envision the PPF mechanism as a long-term instrument which reinforces and empowers cities." Charlotte Boulanger, Climate Finance Program Officer, FMDV, Co-coordinator of the CCFLA Secretariat, Paris, France

Resilient city-region food systems

For the third year, Resilient Cities hosted an Urban Food Forum. Organized in cooperation with RUAF Foundation with technical support from the Food and Agriculture Organization of the United Nations (FAO), the forum provided a platform to discuss sustainable and resilient food system strategies, city-region food system assessment, and cooperation mechanisms.

Resilient city-region food systems

Just as the global food system impacts climate, climate variability poses severe risks to city-region food systems (WFP, 2017). Multifaceted and complex threats including floods, droughts, heatwaves, rainfall variations, soil erosion, and loss of arable land trigger longstanding water and food shortages, land degradation, food rising prices, hunger, malnutrition, conflict, and forced migration. The incorporation of city-region food systems into climate action plans can strengthen synergies between different sectors (e.g. agriculture, transport, waste, and health), institutions, and stakeholders. Such synergies promote vertical and horizontal integration while offering broad solutions to challenges associated with climate change.

The New Urban Agenda emphasizes the need to ‘strengthen food system planning’ to operationalize linkages between SDG 2 (food security, nutrition and sustainable agriculture), SDG 11 (inclusive, safe, resilient and sustainable cities), and SDG 12 (sustainable production and consumption) among others.

The [integrated food strategy of the Municipality of Ede](#), the Netherlands is one good practice example that addresses health-related food issues, fosters links between urban and rural areas, and boosts food education for children and youth. Ede is working closely with businesses in the “Food Valley” region, known for its high concentration of food companies and research institutes, to stimulate innovative food research and develop applicable policy instruments. Future collaboration will be focused on three thematic clusters: governance, economic and ecological innovation; regional food systems and fair food chains; and health, education and social inclusion.



Michael Maks Davis, Senior Lecturer and Environmental Expert, Pontifical Catholic University of Ecuador, explains the program AGRUPAR during the Quito Reality Check Workshop.

“Food is not just a local issue, and to become more sustainable we need to look beyond our own boundaries.” Leon Meijer, Alderman, Food Valley Region, Municipality of Ede, the Netherlands

In Quito, Ecuador, an analysis of current food dynamics revealed low food resilience. The Municipality initiated a city-region approach based on six pillars: management of food resources for the future, sensitization and food safety, urban-rural linkages, organic waste management, inclusive food economy, and food planning. Inter-institutional and multi-disciplinary engagement promotes the integration of food strategies within municipal programs while supporting local agricultural production in adapting to climate change and disaster risks.

For example, the participatory urban agriculture program [AGRUPAR](#) provide technical capacity for small farmers. By implementing organic gardens across the city in a micro-entrepreneur approach, AGRUPAR aims to increase food security, enhance local economies, and promote social inclusion of women and vulnerable groups. The program has provided technical training on agricultural production, entrepreneurship, and commercialization to almost 20,000 people and has reached over 400,000 citizens. A solidarity network amplifies access to shorter market channels and ensures fair revenues to all actors in the value chain. Financing urban agriculture remains a challenge, and Quito is seeking a collaborative model to better integrate the private sector and other stakeholders.

“I invite all local governments around the world to identify and reflect on their current food system to move them towards sustainability and resilience to face the challenge of feeding the growing urban population worldwide.”
Mauricio Rodas, Mayor of Quito, Ecuador

Towards territorial governance of city-region food systems in Medellin

A territorial (urban, peri-urban, regional) approach is increasingly recognized as a critical framework for food systems. When assessing how sustainable and resilient food systems contribute to food security and overarching global sustainable development frameworks it is imperative to consider the city-region food system as a whole (UN, 2017; MUFPP, 2015).

In Medellin, Colombia, local authorities are assessing the strengths and weaknesses of the current city-region food system. In the process, they are identifying potential opportunities for building resilience and ensuring food security not only for the city but for the entire Antioquia region.

The assessment is a continuation of Medellin's pioneering urban food policies. In 2009, Medellin became the first city in Colombia to establish a special municipal department dedicated to Food and Nutrition Security. The move was an important step toward institutionalizing the issue of food security and embedding city-region food system considerations into plans, programs and policies aimed at strengthening rural-urban linkages. A taskforce called "[Alianza para el Buen Vivir](#)" was also created to generate political, administrative, and economic synergies essential to the implementation of coherent regional actions. The taskforce works to enhance agricultural production and improve food supply systems, tackling especially food loss and waste management.



Guido Santini, Food for the Cities Coordinator, UN-FAO; Alexandra Rodríguez Dueñas, Urban Agriculture Program, Metropolitan Agency for Economic Promotion CONQUITO; and Pay Drechsel, International Water Management Institute.

The way forward: Resources and lessons for resilient city-region food systems

There are concrete policy and program opportunities for addressing contemporary challenges of global food systems and operationalizing enhanced rural-urban linkages through sustainable and inclusive development, environmental and natural resources management, and sustainable agriculture production, distribution, marketing, and consumption (ZHCWG, 2015). Key recommendations included:

- Investing in local food production and innovative production strategies can advance agricultural efficiency, thereby increasing sustainable land management, and reducing waste through added-value products increasing the climate resilience of food systems while decreasing related emissions (FAO, 2016).
- Improved rural infrastructure as well as technical and financial assistance can increase smallholder farmers' access to local urban markets. Shorter supply chains contribute to better nutrition, health, and livelihoods for both rural and urban populations.
- Urban food security requires a broad multi-sector approach to strengthen the efficiency of local food production and promote urban-rural linkages at a regional scale that consider human health, social wellbeing, and the environment (UN Environment, 2017).

Resources available to support local governments with resilient city-region food systems include:

- The City Region Food Systems (CRFS) framework - developed by FAO and RUAF Foundation with step by step guidance on how to plan city-region food systems following a rapid, in-depth assessment. This helps cities map challenges, opportunities, and innovations across the food supply chain following a participatory approach with policy makers and multi-sectoral representatives from civil society, research, industry, government and, of course, food production (FAO, 2017).
- The ICLEI-RUAF CITYFOOD network – a network for local and regional governments to develop a strategic approach to their city-region food systems combining networking with training, policy guidance and technical expertise (ICLEI, 2017c).

"Urban food systems need to be strengthened by linking cities closer together and boosting their cooperation regionally and nationally." Guido Santini, Program Coordinator, Food for the Cities, Food and Agriculture Organization FAO, Rome, Italy



Urban Food Forum during Resilient Cities 2017.

City-to-city and multi-stakeholder partnerships

City-to-city collaborations allow individual cities and networks to learn from each other, and co-produce innovative approaches to building urban resilience. For example, [Copenhagen, Denmark has partnered with New York City, USA](#) to exchange knowledge on climate change adaptation. New York City is sharing its significant post-hurricane Sandy experience with disaster recovery and risk assessment, while Copenhagen is sharing its advanced approach to cloudburst management. Together, the cities are considering new storm surge proofing strategies. Sister cities [La Paz, Bolivia and Bonn, Germany](#) have been exchanging on cultural, environmental, and disaster-related issues since 1997. Currently, the cities' partnership is focused on integrated water and waste management and eco-efficiency.



Michael Mutter (London), Weena Gera (Cebu) and Florian Rhiza Nery (Makati) discussing strategic partnerships for urban resilience.

Public-Private-People Partnerships (PPPPs) bring innovative solutions for inclusive resilience at the city level and promote collective ownership of outcomes (see box below). Each strategic partner in such constellations has something unique to offer. In the [Philippines, a dedicated nation-wide partnership](#) is focused on safeguarding the business continuity of Small and Medium Enterprises (SMEs) by helping them efficiently respond to and recover from disasters. In contrast to large corporations, SMEs typically lack business continuity or disaster contingency plans, although they are highly vulnerable to the impacts of such events and their survival is often crucial for the economic development of cities in the Global South.

Lessons learned: (1) Building trust among partners requires time to understand shared problems and overcome differences in culture and terminology. (2) All approaches - bilateral or network; multi-stakeholder or thematic; north-north, north-south, south-south - can succeed if they facilitate a reliable long-term collaboration. (3) Disasters can spur collaborations, as there is an obvious common interest to reduce risk and costs. (4) Partnerships, especially North-South, resemble less the "donor-recipient" model, with all parties contributing resources to achieve mutual benefits. (5) City-to-city partnerships can open access to wider city networks and global stakeholders, toward SDG17.

Hand-in-hand collaboration and innovation in the Nordic Region

In order to stimulate new ideas and partnerships across borders and disciplines, Nordic Innovation launched the [Nordic Built Cities Challenge](#) in March 2015. The Challenge consisted of six local competitions to design solutions for challenges connected to a specific urban space. Three of the finalists presented at Resilient Cities 2017:

- The "Eyes of Runavík"- Traditional knowledge for smart building (Runavík Municipality, Faroe Islands). [This project](#) features small residential housing blocks on steep mountainous terrain in circular, insulating architectural formations (resembling eyes). Modern technology and design creates an urban area that is in harmony with the natural landscape and adapted for traditional productive activities, such as urban farming.
- "It takes a block" - Creating a livable, climate-smart and affordable environment (Malmö, Sweden). [This project](#) repurposes a large unused urban space (Sege Park) to flexible living space for various lifestyles and promotes community-building with collective endeavors, such as urban farming and bicycle sharing. The project optimizes resource efficiency (reducing CO² emissions) and public-private space use while providing affordable housing.

"We need to systematically learn from the past, learn by doing, learn by collaborating, learn by observing to take the next step in building sustainable cities." Oscar Pelin, Project Manager, City of Malmö, Sweden



Eva Christensen (Copenhagen), Oscar Pelin (Malmö) and Sigrid J. Dalsgaard (Runavik).

- "Soul of Nørrebro" - Applying climate adaptation as a lever for holistic solutions for the community (Copenhagen, Denmark). [The winning project](#) of the Challenge, concentrates on cultural and climate synergy by developing multifunctional facilities in three dense urban areas: The Hans Tavsens Park, which could accommodate 18,000 m³ of rainwater; the Blågård School area, which could yield multiple benefits for community building and environmental sustainability; and the Korsgade street, which could become a natural rainwater pathway and at the same time, a safe environment in terms of crime and traffic. The project engages all relevant community stakeholders, including the local church and school.

Inclusive and resilient urban development: Questions of good governance

The most important partnership for a resilient city is the one between the local government and vulnerable communities. Informal settlements and marginalized neighborhoods have been handling the impacts of climate instability for decades. They have accumulated vast resources and knowledge regarding local solutions for adapting to and coping with such variabilities while reducing risks (IIED, 2016). These communities are often disproportionately affected by climate change due to several factors that contribute to their low adaptive capacity, such as, location in risk areas, socio-economic characteristics and deprivation of risk-reducing infrastructure.

Community-based adaptation may decrease the correlation between poverty and low levels of climate resilience by empowering rural and urban communities to share and apply their knowledge while influencing inclusive governance practices that integrate these voices and ensure they are effectively reflected in sustainable outcomes.

"People in risk prone areas often have experiences to deal with change and disasters, this knowledge is a positive characteristic. We need to build on these positive characteristics and strengthen them, rather than ignore them!" David Dodman, Director, Human Settlements Group, International Institute for Environment and Development (IIED), London, UK



Networking meeting during Resilient Cities 2017.

Good practice examples of inclusive resilience building

The [Pro-Poor Planning of Climate Resilience in Marginalized Neighborhoods](#) project combines elements from two UN-Habitat programs - the Cities and Climate Change Initiative and the [Participatory Slum Upgrading Program](#) - for engaging communities in resilience building to better address their particular needs. The project integrates pro-poor climate resilience planning into city-wide efforts by conducting risk analysis, resilience planning, and capacity development in several pilot cities.

The [Urban Community Resilience Assessment \(UCRA\)](#) developed by the World Resources Institute aims to increase understanding of communities' needs, resources, and capabilities in order to reduce their vulnerabilities and enhance their adaptive capacity. By incorporating individual and community capacities (social cohesion, familiarity with local climate risks, early warning systems, and disaster readiness) into broader urban resilience evaluations, it provides a snapshot of preparedness behaviors, risk perception, and the strength of local networks. The implementation of UCRA participatory and gender-responsive methods in Rio de Janeiro, Brazil; Surat, India; and Semarang, Indonesia) demonstrates that community engagement in local evidence-based resilience planning is crucial for identifying context-specific adaptation actions. This has been the case in Gorakhpur, where the [Gorakhpur Environmental Action Group \(GEAG\)](#), an NGO within the Asian Cities Climate Change Resilience Network (ACCCRN), undertakes several activities in Eastern India with a people-centered approach.



Andrew Mua, Mayor, Honiara City Council.

The municipality of [Guiuan, Philippines](#), which suffered almost 100% damage to infrastructure from Typhoon Haiyan in 2013, is breaking the disaster cycle through resilient post-disaster recovery. During the recovery phase, the municipality has engaged the community in resilience planning to respond to climate and environmental risks in alignment with development planning.

The [Altos de la Estancia](#) project in Bogotá, Colombia applied innovative local and low-cost solutions to transform a flood and landslide prone area into an urban park. The park provides open and recreational space for neighboring communities while increasing stormwater retention, improving drainage, promoting soil restoration, and reducing disaster risk. A participatory resettlement program supported 3,000 families

during the moving and the post-resettlement period ensuring that existing social networks as well as livelihoods were preserved. Positive spatial transformations, such as the Colombian case shows, can only be sustainable in the long term if trust is built between local authorities and the affected vulnerable communities.

"The success is not the product; the success is the actual process of resilience building that is continuous and dynamic." Shiraz Wajih, President, Gorakhpur Environmental Action Group (GEAG), Gorakhpur, India

Forced migration and displacement in urban areas

A hyper-vulnerable group that has reached record numbers worldwide is forced migrants. With 60% of the world refugees and 80% of Internally Displaced Persons (IDPs) living in urban areas rather than refugee camps (UNHCR, 2017), significant challenges and opportunities arise for these groups and the cities that host them.

Forced migrants are better able to integrate into the society and economy in urban areas and start building a future. However, they are usually confronted with the same challenges as the local poor, which are amplified by obstacles related to their legal status and language skills. They are often denied access to education and health care and are exposed to discrimination and intimidation.



Maha Shihadeh, P.R. Director, Ramallah Municipality, State of Palestine and Asma Barkati, Architect and Focal Point for MC2CM Project, Greater Amman, Jordan.

Integrating disparate groups and creating a cohesive society is a complicated matter. Host cities – especially ones already burdened with preexisting development problems – often struggle to provide basic services to newcomers and support their integration. This is an opportunity missed. A recent study shows the influx of forced migrants in Europe is likely to increase economic growth in the short-term – reflecting the expansion in labor supply – and lead to a larger economic boost for the receiving countries in the long-term provided that new populations are well integrated into the EU job market (IMF, 2016). Displaced people are generally highly-educated with marketable skills. Having experienced disaster and/or conflict, they are familiar with rebuilding livelihoods and overcoming adversities. As such, they are valuable assets to local urban resilience efforts.

“Refugees may leave their property behind, but they take their knowledge with them, wherever they go!” Robert Hakiza, Executive Director, Young African Refugees for Integral Development (YARID), Kampala, Uganda

In [Tacloban, Philippines](#) hundreds were displaced from the risk-prone coastal areas in the wake of Typhoon Haiyan in 2013. Unfortunately, they were not included in the development of community relocation plans because several humanitarian agencies and national government initiatives failed to effectively coordinate with the local authorities. This lack of coordination duplicated efforts and created confusion as to where the displaced families should go.

In Amman, Jordan, a rapid increase in the refugee population in the past 5 years has led local authorities to strengthen their capacities to manage waste, transport, and energy in order to accommodate the new arrivals. The City planned for creating new employment opportunities and focused on enhancing social cohesion. Future massive population movements were considered in urban planning in the newly developed Amman City Resilience Strategy, which aimed at building long-term resilience that benefits all city residents, native or displaced (100RC, 2017).

[Ramallah, State of Palestine](#) has unique experience in building resilience despite protracted urban displacement. Displaced people constitute a considerable part of the local population and have become an integral part of the city's history and future. Integrating refugees into the city systems was seen as an investment to prevent negative long-term impacts, such as social unrest. Nowadays, Ramallah is focused on promoting inclusive working environments and creating public spaces that enable interaction of various cultures.

During 2015, the three largest [Swedish cities](#) – Stockholm, Gothenburg, and Malmö – met regularly to exchange good practices from the unprecedented reception of refugees and asylum seekers in the country. To overcome limited housing, for example, the cities collaborated with civil society organizations to provide alternative accommodation solutions in private homes. By working closely with key stakeholders, such as NGOs, public and private sector, citizens and refugees, sustainable solutions were designed to integrate the newcomers as quickly as possible.

Supporting refugees' self-reliance in Kampala, Uganda

Uganda hosts the largest number of refugees in Africa and its open-door refugee policy provides newcomers freedom of movement while also encouraging and promoting the right to work. However, refugees still face major difficulties in their new home. The [Young African Refugees for Integral Development \(YARID\)](#), a refugee-led organization based in Kampala, supports these groups to address social issues like ethnic conflict, unemployment, access to public health, and education through avenues like sports, English classes, and vocational skills training. YARID also organizes innovation hubs and women empowerment centers focused on promoting innovation and financial independence. There are currently several Small and Medium Enterprises (SMEs) owned by refugees – mostly women – in Kampala. By collaborating with grassroots refugee organizations, local governments can further empower these communities to integrate into local job markets and society.

Ecosystem-based adaptation and resource efficient communities

In addition to working with vulnerable populations through community based adaptation, it is also important to work with the local environment through ecosystem-based adaptation. Both national and subnational governments are increasingly implementing nature based solutions due to their potential to safeguard biodiversity, increase the attractiveness and quality of life in urban areas, and reduce cities vulnerabilities to numerous shocks and impacts caused by climate variability (ICLEI, 2017d) .

According to a recent study by IIED and IUCN (2016), 109 of 162 national climate action plans (Intended Nationally Determined Contributions - INDCs) incorporate ecosystems in their vision for adapting to climate change.

At the local level, Guimarães, Portugal is one of 26 municipalities that have recently developed a [Municipal Strategy for Adapting to Climate Change](#) as part of the ClimAdaPT local project run by the Portuguese Environment Agency. Guimarães carried out a vulnerability assessment study and identified extreme precipitation and consequent floods as a primary risk threatening 2,000 inhabitants and the city center, a UNESCO World Heritage site, especially along the Ave and Couros rivers. Investments were driven to restore the river areas promoting positive impacts on social, environmental, and economic aspects. Grey solutions including the construction of three retention basins and improvements to stormwater infrastructure were combined with landscape requalification in the form of a green-blue corridor for public use along the riverbeds. The corridor conserves the ecosystem and biodiversity in alignment with the sustainable vision for improving quality of life in the city.

“A narrow conceptualization of resource efficiency runs the risk of resulting in a “minimizing damage” approach. Pairing resource efficiency and resilience helps us retain a broader focus on improving the sustainability of the urban system as a whole.” Blake Robinson, Program Coordinator, Sustainability Institute, Cape Town, South Africa

In another example, [Kaohsiung City](#) has implemented adaptation measures to flood prone areas by combining investments in low impact development together with multifunctional and eco-friendly water retention parks, recreational areas that revitalize vacant land. The city also promotes water efficiency by requiring water harvesting systems to be installed in existing and new buildings and by training local fishing communities on the use of flood water for fish farming.

As explored by the UN Environment report “Resilience and Resource Efficiency in Cities” launched at Resilient Cities, such resource efficiency measures can help cities minimize resource extraction, consumption, and disposal while also increasing resilience (UN Environment, 2017) .

Strengthening the complementary aspects between resilience and resource efficiency through integrated and responsive urban planning and governance can have significant influence on cities preparedness for climate change and associated social, economic, and environmental challenges. At the same time, as each agenda mutually reinforces the other, they are crucial for meeting broader sustainability objectives associated with a range of global commitments: the New Urban Agenda, Paris Agreement, Sendai Framework, and SDGs.

Tradeoffs will exist however (Colenbrander and Gil, 2017). For example, [energy storage systems](#) in interconnected micro grids are inefficient in fair weather, but can minimize blackouts in the event of a storm.

“We must break the link between high levels of resource use and high quality of life.” David Dodman, Director: Human Settlements Group, International Institute for Environment and Development (IIED), London, UK



Barbara Emanuel, Manager, Toronto Food Strategy, Canada and Blake Robinson, Programme Coordinator, Sustainability Institute, Cape Town, South Africa.



Session Integrating ecosystem-based adaptation and ecosystem services into urban management strategies.

Reality Check Revisited! Copenhagen, Denmark

Transformative cloudburst management: Reducing risk and generating added social value

With a population of over 783,000, Copenhagen is the most populated city in Denmark and by 2025 it is expected to grow by 20%, which would necessitate additional housing, as well as cultural and educational space.

The City first developed a [Climate Change Adaptation Plan](#) in 2011 following a wakeup call in the form of a [severe cloudburst](#) (150 mm of torrential rain in 2 hours) which caused damages of over USD 1 billion (Swiss RE, 2012). Copenhagen's [Cloudburst Management Plan](#) was first presented at [Resilient Cities 2012](#). Five years later, the City returned to discuss progress on its implementation.

Cloudburst management plan and implementation

The twofold objective of Copenhagen's Cloudburst Management Plan and 300 associated projects is to reduce disaster risk and generate social value. The stormwater protection measures combine green and gray infrastructure, smartly exploiting the topography and tunnels to divert water from high risk to low risk areas (e.g. the harbor, lakes). [The Sankt Annae Square](#), one of Copenhagen's first cloudburst streets, is an example of how an area can serve as a large stormwater retention basin while providing space for recreation and safe transportation. By managing rainwater also on the surface and not only through traditional drainage, the City saves money while providing green, multifunctional spaces. The Plan's cost-efficiency and socio-economic benefits ultimately helped it to win City Council and national government approval.

The unanimous, speedy approval reflects the City's commitment to adaptation measures. The City even successfully advocated for changing Danish regulations to reallocate funds earmarked for rainwater protection drainage works to the 300 cloudburst management projects.

Copenhagen initiated "no regrets" activities as well as demonstration projects in the [Climate Resilient Neighborhood](#) in 2014 and 2015. After the [official approval of the Plan in 2016](#), the city was divided in seven water catchment areas where the 300 projects will be rolled out over a 20 year timespan. [Detailed master-plans](#) for each of the catchment areas were prepared and presented at open dialogues with citizens and city departments.

Projects co-created with the citizens, private sector, and insurance partners

The design and implementation of the cloudburst projects are steered by stakeholder groups. Apart from ensuring ownership of results and reaching consensus on controversial aspects such as tax payer funding, community participation helps avoid failures. When the City suggested activities to build the social identity [in Nørrebro](#) (see page 12), citizens openly stated: "We have all the identity we need!" The City instead focused on citizens' priorities like creating safe, green, and livable spaces.

After 2011, the insurance industry saw a steep rise in payouts and claims in cloudburst-related damages. As a result, insurance coverage for similar assets became expensive from one year to another. Copenhagen has since worked closely with insurers and private sector partners on comprehensive climate risk management strategies and affordable insurance coverage. By working together, the City was able to pool resources and expertise (e.g. in risk modelling and asset pricing) to disaster-proof existing infrastructure and design projects that would further reduce the risk from weather events.

In 2016, Copenhagen initiated a [Storm Surge Plan](#). [With the support of COWI](#), a consulting agency that ran several flood simulations and risk assessments, the City established an overview of flood-related risks from rainwater and storm surge.

Challenges identified

1. Financing constraints: Raising taxes and redirecting earmarked gray infrastructure funds have been filling the gap, however, keeping taxes low while implementing high-quality projects could compromise future economic development. The storm surge plan will likely also require national legislation changes and innovative public-private partnerships to avoid



Copenhagen, harbour kayak. © By Pixabay

exhausting tax payers. In addition, although several insurance schemes protect assets from flooding, there is currently no coverage strictly for storm surge damages.

2. Time constraints: Close collaboration between diverse groups with different priorities, visions, and professional “languages” sets a slower pace, as deliberations and compromise must precede action.

Solutions identified and being pursued

- Continue transparent and inclusive political processes that build trust through public and multi-stakeholder dialogues that create ownership and efficient decision-making for effective project implementation;
- Identify and communicate multiple co-benefits of adaptation initiatives and combine projects to enhance financing opportunities;
- Make a clear business case by including the private sector from the onset in project design;
- After the operationalization of the first-generation of projects, re-assess their efficacy, remind stakeholders that storms remain a dynamic challenge, and connect cloudburst management components to emerging city projects.



Reality Check Workshop Copenhagen, Denmark.

Safeguarding cities: Effective water and disaster risk management

The combination of urban growth and climate change particularly intensifies water-related risks associated with shortages or excess (droughts or floods), and strains water resources, widening the gap between supply and demand. Integrated water management and disaster resilience approaches are therefore increasingly important to promote sustainable practices in order to avert water crises and safeguard the just distribution and usage of water and sanitation services.

Innovative strategies for water management in fast-growing developing cities

According to research conducted by IDRC, the fast-growing, small and medium urban areas in the Global South are particularly affected by water-related disasters and/or water insecurity (IDRC, 2017a).

[Dhulikhel and Dharan, Nepal](#) provide two such examples. In Dhulikhel, only 48% of the population has access to piped water, while in Dharan supply is largely dependent on the rainy season and untreated sources. Tension often arises between different user groups including upstream and downstream communities. Most vulnerable in these traditional societies are women, who are responsible for the household and children. In order to address these challenges, projects like the Climate Adaptive Water Management Plans for Cities in South Asia brings key stakeholders together, including women, to plan integrated water management strategies (IDRC, 2017b).



Innovative strategies for water management in fast-growing cities, examples from Kathmandu, New Delhi, Medellin and Belo Horizonte.

Rainwater harvesting, desalinization, and artificial groundwater recharge are [some promising measures](#) that could be applied to reduce vulnerability to water-related risks. In combination with proper watershed conservation and water governance, these measures could make a difference in arid and semi-arid environments in the decades to come. At the same time, there is need to transform people’s “wasteful” habits, such as car-washing with potable water, into sustainable practices, such as using graywater or untreated water for household purposes.

Lessons from cities

From [Bologna, Italy](#) to [Tanjung Pinang, Indonesia](#) and Copenhagen, Denmark (see page 16) to [Cartagena, Colombia](#), cities of different size populations and economies are determined to combat water-related climate change impacts through innovative technological tools and robust resilience plans.

[Oslo, Norway](#) aims to manage stormwater in situ and convert it into a resource for the surrounding environment. The City applies [green infrastructure measures](#) including waterway restoration, green roofs, and rain gardens to retain runoff.

"A better adapted city is a more livable city. It doesn't matter if it is one or the other argument that comes first."
Daniel Rees, Special Political Advisor to Vice Mayor, Department of Environment and Transport, City of Oslo, Norway.

The [City of Banda Aceh](#), Indonesia is still partially recovering from the deadly Indian Ocean tsunami in 2004 and considers applying Integrated Coastal Zone Management (ICZM), with the support of all relevant stakeholders in the coastal area (including private sector) to protect itself from future tsunami events.

Common lessons shared by cities:

- Well-functioning multi-stakeholder platforms facilitate common agenda setting and action. Gender mainstreaming is particularly important in the design of water management strategies, as women are most affected and most influential for change.
- There is need for improved governance, financial instruments, scientific tools, and policy-oriented research outputs for proper water management.
- Disaster recovery offers urban planners and officials opportunities to build-back-better.



Session on Urban response to climate change and stormwater management in Oslo.

Reality Check: Greater Accra Metropolitan Area, Ghana

Integrated flood management makes for a resilient metropolis

With a population of over 4.4 million inhabitants and a growth rate of 3.9%, the [Greater Accra Metropolitan Area \(GAMA\)](#) comprises one of Ghana's most populated areas. Due to high rural-urban migration and the proliferation of informal settlements, the GAMA has expanded to cover 3,245 sq. km and 225 km of coastline, encompassing the Accra Metropolitan Area capital district and beyond.

The GAMA is prone to coastal and surface inundation, as well as related water and vector-borne disease epidemics. Rapid urbanization combined with poor spatial, water and sanitation, and solid waste management compound this vulnerability, resulting in high annual flood risk.



Flood in Accra. © By Stig Nygaard

In June 2015, heavy rainfall and flooding triggered a catastrophic fire outbreak. Emergency services were unable to respond effectively to the combined flood and fire disaster, which claimed the lives of over 200 people and caused damages of USD 55 million (World Bank, 2017a). The disaster brought the necessity for resilience building and integrated solutions to the forefront.

Demographic and climate-induced flood risks

The reasons for Accra's sustained flood risk are both structural and non-structural. They include poor drainage systems with

limited capacity to absorb stormwater due to narrow culverts or the collection of solid waste in drains and the prevalence of impermeable surfaces. During flood events, lack of safe and sufficient sanitation facilities increase exposure to water-borne diseases, such as cholera. Outbreaks are reported each year, with the urban poor being particularly affected owing to their location and limited access to health services. [Weak spatial planning and control](#) is an additional stressor, as local officials struggle to thwart the expansion of informal settlements in flood-prone areas or waterways. Population growth is only expected to aggravate the precarious situation.



Doris Nana Efua Tettey, Town & Country Planning Department of Greater Accra Region, Land Use & Spatial Planning Authority.

Against the backdrop of the deadly 2015 flood, the GAMA collaborated with the World Bank to apply the [City Strength Diagnostic tool](#), which helped assess the cost of the disaster and quickly evolved into a resilience building framework for the metropolis. The City Strength Diagnostic catalyzed further collaboration with the private sector, research, and academia and created opportunities for engagement of key community stakeholders in resilience building efforts.

The Regional Institute for Population Studies (RIPS) of the University of Ghana with support from the International Development Research Centre (IDRC) is currently undertaking a three-year research project aimed at addressing socio-demographic change and climate-induced flood risks. This collaboration is expected to strengthen policy-relevant research to support local leaders' decision-making, improve flood management through an integrated smart flood management framework, and enhance inclusive and sustainable urban governance. The project has been designed to ultimately support Ghana's Nationally Determined Contributions (NDCs) and the national Medium Term Development Planning (RIPS, 2017).

Gaps and challenges ahead

Each GAMA district is currently managed as a separate administrative and planning entity (Arup, 2016). This impedes efficient spatial planning and resilient development at the metro-level.

"We need to use water as an opportunity for development, rather than an obstacle; to see floods as opportunity to do better city planning." Benjamin Delali Dovie, Senior Research Fellow / Lecturer, University of Ghana, Legon Ghana

Another key challenge is [lack of coordination among the various international organizations and partners](#) involved in resilience building in the GAMA. In designing and implementing their programs, organizations duplicate efforts and overwhelm city plans with requests. Since 2015, there has been an abundance of resilience methodologies and tools made available to the GAMA officials. What is still lacking is a coordinated, integrated approach and capacity for local officials to start implementing these tools.

Solutions underway

- Improve land use planning and develop an up-to-date GAMA Strategic Plan that addresses and anticipates demographic changes;
- Integrate urban flood and coastal zone management;
- Advance disaster preparedness and response and craft a Climate Risk Management approach;
- Enhance resilience in vulnerable communities and restrict settlements on waterways and other flood-risk areas;
- Address the amplifying factors of flooding, such as poor drainage and solid waste management systems;
- Improve sanitation facilities across the GAMA and raise public awareness to reduce cholera outbreaks;
- Advocate for a GAMA planning authority with a metropolitan mandate to undertake social, economic, and environmental challenges.

Climate resilient urban health systems

Climate Change and Health

Climate change is expected to exacerbate existing health problems, by disrupting water and food supplies for example, while creating new challenges including increased exposure to disease vectors, water borne diseases, undernutrition, and air pollution (IPCC, 2014). The World Health Organization (WHO, 2014) estimates it will cause approximately 250,000 additional deaths per year between 2030 and 2050 mainly due to diarrhea, malaria, childhood undernutrition, and heat exposure of elderly populations.



Ambulatory Medical Care (UBS / AMA) of Vila Nova Jaguaré, São Paulo, SP, Brazil. © By Dornicke

[Health care](#) represents a large proportion of urban economies, workforces, and even carbon emissions, yet less than 1.5% of international adaptation finance is allocated towards health (WHO, 2015). According to the World Bank, (2017b), climate-smart healthcare has the potential to yield significant health and economic co-benefits while ensuring access to clean and independent energy, safe water, clean transport, and clean waste disposal mechanisms.

The linkages between health and climate change are complex, necessitating a broad approach which considers a combination of social and economic aspects, biodiversity loss, and ecosystem disruption among other drivers of global environmental change that can amplify the adverse health impacts of climate change (UNFCCC, 2017).

“The UN and partners need to continuously strengthen their actions to support governments to build climate resilience including measures to protect human health and to develop resilient health systems.”

Rojina Manandhar, Programme Officer, Adaptation Programme, UNFCCC, Bonn, Germany

Hospitals and health systems: Central to resilience strategies

Health systems that are climate resilient are also better able to cope during disasters that result in an influx of patients and disrupt crucial sanitation, power, and water systems. Health Care Without Harm (HCWH) is an international coalition aimed at transforming the health care sector through sustainable waste management, green building, the substitution of hazardous chemicals with safer alternatives, and working with health practitioners to advocate for safe and environmentally healthy practices, processes, and products.

Resilient waste management in Gazipur, Bangladesh

Gazipur, with a population of 2.1 million, is located north of Dhaka and currently is the most dominant industrial area in Bangladesh. Rapid urbanization has outpaced infrastructure services, including for waste management. Textile factories, hospitals, and residents dump large volumes of toxic and infectious waste indiscriminately in illegally dump sites. Waste frequently clogs open drains, contributing to urban inundation, as well as overflowing pit latrines and septic tank systems after heavy rain. As a result, Gazipur faces elevated risks from water-sanitation related diseases, especially amongst the most vulnerable residents.



Gazipur Bandar, Bazaar. © By meemramio

Recognizing the need for comprehensive action, [Gazipur City Corporation](#) with the Cities Development Initiative for Asia (CDIA) has undertaken a pre-feasibility and preliminary engineering study to develop a 20 year roadmap for investments through integrated development projects in drainage and flood control, solid waste management, sanitation, and water supply in order to improve public health.

The Paulista Association for Medicine Development (SPDM) in São Paulo State, Brazil, a member of HCWH, is one of the largest Brazilian philanthropic health organizations, with around 20,000 employees and 13 hospitals. During the severe droughts between 2014 and 2016, SPDM took action to reduce water consumption, prevent leaks, implement rain harvesting systems, and raise awareness among employees and patients. During longstanding water cut offs, SPDM implemented a [contingency plan](#) that included monitoring water consumption (m³/month), measuring water storage capacity, monitoring hydraulic connections maintenance, and implementing water storage for reuse. These measures ensured a resilient health system without compromising patients' safety.

Informing integrated action on health and sustainability

A population's exposure to environmental hazards is influenced by the design, operation, and governance of their city, for example, land use plans, food supply chains, zoning, and distribution of investments. Identifying unhealthy behaviors is difficult, however, due to the limited empirical evidence and standardized city-level data on health and climate change. The [Sustainable Healthy Urban Environments \(SHUE\)](#) project funded by the Wellcome Trust's "Sustaining Health" initiative and managed by the London School of Hygiene & Tropical Medicine (LSHTM) in partnership with the University College London (UCL) aims to provide a shared information resource for cities (Milner et al., 2017). Through comparative analyses combined with health modelling, the open source database will provide tools to assess how different sustainable urban development policies may contribute to human health, including those advocated by global frameworks.

To monitor national and subnational progress toward these frameworks, a new international and multidisciplinary researcher-practitioner collaboration "[Lancet Countdown: Tracking Progress on Health and Climate Change](#)" is under development. The initiative aims to track the health impacts of climate hazards, health resilience and adaptation, health co-benefits of climate change mitigation, economics and finance, and political and broader engagement.

Research for resilience: New tools, methods, and directions

With the wealth of information available, access to accurate and policy-relevant data, as well as capacity to absorb this information and translate it into action is challenging – especially for local governments with limited resources. To counter this, some public-private initiatives have coupled open data with user-friendly interfaces to support knowledge management in place of information overload.

This is the case with the [City of Edmonton](#), Canada's Open City Initiative. Edmonton's extensive Open Data Catalogue provides freely available, easy to access, and user-friendly data. The City plans to utilize the Catalogue as it develops its Climate Change Adaptation and Resilience Strategy. For example, Edmonton has already implemented an interactive, [open-source map database of trees](#), which connects people with nature and helps them visualize the effects of climate change from year to year.

While open data is useful to enhance transparency, it also has drawbacks to overcome. Collaborative methods such as crowdsourcing can promote citizen participation and real time data collection – useful for hazards like

[flooding](#). However, city administrators have limited capacity to check the accuracy of such data, especially during a disaster. Data platforms can also have a limited reach, especially in the Global South. This can be addressed with easily-accessible websites, apps, and mechanisms tailored for people from different backgrounds and vulnerabilities. In this regard, it is also critical to develop a practical and agile approach to managing urban resilience through open data and to involve multiple stakeholders with varied capacities and expertise. The government can foster an environment of innovation, civil society can connect people and bring up new initiatives, and the [private sector](#) can provide the technology to embody "open resilience". Finally, researchers must also help policy-makers stay abreast of emerging climate change data and research developments (see box on page 22).



Memorandum of Understanding (MoU) between Urban Climate Change Research Network (UCCRN) and ICLEI during Resilient Cities 2017.

Is there a link between resilience and violence?

While research on climate change and urban violence are independently strong, few research efforts have been made to understand the linkages between them. The scarce literature on the subject suggests a complex, but potential link worthy of further investigation. [A study on urban violence in Pakistan](#) led by the Institute for Business Administration with support from the International Development Research Center (IDRC) (Anwar *et al.*, 2016) showed that domestic violence in Islamabad spiked during annual floods, as normal life was disrupted by disaster.

"Climate change and peace building approaches do not usually take into account the city's dynamics. We do not need to re-invent the wheel, there are many worthy tools out there, but they need to be contextualized to the city level." Janani Vivekananda, Senior Advisor, Climate Change and Peacebuilding, Adelphi, Berlin, Germany

In Colombia, illegal mining and cocaine production cause significant environmental consequences and exacerbate vulnerability to natural hazards. The problem of cocaine production and drug violence are often examined from the sociological, economic, political, health, and development point of view, but the environmental aspect remains largely ignored.

"How can vulnerability to climate change be aggravated by violence? One month ago [April 2017] the floods and landslides that killed over four hundred people [in Colombia] originated in the elevated deforested lands used for cocaine crops. 30% of deforestation in the rainforest part of the Andes is due to cocaine crops." Juan Darío Restrepo Ángel, Professor, Department of Earth Sciences, School of Sciences, EAFIT University, Medellín, Colombia



Janani Vivekananda during the session *Violence and climate change in cities: Links, questions, new directions.*

Addressing the challenges of land degradation

Land degradation directly affects an estimated 1.5 billion people globally, compounding food and water insecurity, poverty, and climate change vulnerability in urban and rural areas (UNCCD, 2013). The UN Convention to Combat Desertification (UNCCD) provide a conceptual framework and leads the global effort towards halting and reversing land degradation, which is also a target under SDG 15.

Achieving land degradation neutrality requires fundamental changes to urban design, planning, and lifestyles, and a re-imagination of the relationship between urban and rural areas. Local and regional governments can contribute by:

- integrating sustainable land management (SLM) practices into planning;
- implementing compact city planning and smart growth principles;
- deploying landscape-level approaches with an aim toward improving biodiversity conservation, food production and security, poverty, and coping with natural disasters; and
- strengthening rural-urban linkages, which can safeguard livelihoods and increase employment in rural areas while reducing pressure on urban areas and the likelihood of land-intensive, sprawling development patterns.

[Konya Metropolitan Municipality](#) in Turkey's Central Anatolia region has developed a strategy with provincial branches of ministries, NGOs, universities and the private sector to decrease soil erosion and reverse land degradation. Konya faces chronic droughts and erosion due to climate change and intensive land use patterns. Through increased cooperation and information exchange, Konya managed to implement pilot projects for restoring deforested and degraded areas through erosion control, crop rotation and micro-irrigation, controlled grazing, and investment in sustainable water and waste-water management.



Marcos Monteiro; Ronan Dantec; Hindou Oumarou Ibrahim, AFPAT; Selim Yücel Güleş, Konya Metropolitan Municipality; Yunus Arikan, ICLEI.

Mainstreaming resilient transport policies

Raising the profile of resilience in the transportation sector

Reliable transportation systems are essential for urban communities' economy and wellbeing. As these systems increase in size and complexity, so too do the risks of a disruption to the flow of goods, services, and people. Local authorities must continuously adapt, expand, and reinforce transport systems to overcome such risks (ARUP, 2014).

According to SLoCaT, the multi-stakeholder Partnership on Sustainable, Low Carbon Transport, mitigation actions generally receive more attention and financing than adaptation actions in the transport sector. One reason may be that national commitments to global climate agreements are not being properly translated into local mandates. As a consequence, the focus remains on immediate needs such as air pollution, road safety, and traffic congestion instead of longer term investments in integrated adaptation and mitigation measures. To shift this pattern, resilient transport policies must advance concurrently through several levels of government, at multiple timescales in cooperation with public and private stakeholders (Schwartz, 2016). Climate finance can also be leveraged to shift investments towards low carbon and resilient transport systems.



Md. Hamidul Hoque.

To support these goals, the Declaration on Accelerated Action on Adaptation in Transport was released at UNFCCC COP22 (PPMC, 2016).

“Building resilience is a collective business. We must build durable bridges between and within communities, sectors, countries and regions.”
Md. Hamidul Hoque, Deputy Project Director, City Region Development Project, Local Government Engineering Department (LGED) Dhaka, Bangladesh

Reality Check Workshop: Quito, Ecuador

Transforming into a resilient city by addressing urban mobility

Quito, the second highest capital city in the world and second largest city in Ecuador is home to over [2.4 million people](#) in its metropolitan area. Climate change is one of the City's most pressing social, environmental, and economic challenges. Due to its location, the capital is exposed to various geological and hydro-meteorological hazards: Massive seismic movements, floods, and forest fires have tested the City in recent decades. Urban sprawl along steep slopes intensifies exposure to these risks, especially for the poor. Water insecurity is also a growing threat, especially for the agricultural sector.

[Quito's Climate Change Strategy \(2009\)](#) already contains cutting edge measures such as:

- A virtual platform for forest fire risk management within a Climate Change Information System;
- A Youth and Climate Change Program to verse younger generations in disaster preparedness; and
- A relocation program for families in risk-prone areas.

Urban mobility: Turning challenges into opportunities for resilience

In 2014, Quito set out to develop an expanded Resilience Strategy with the support of the 100 Resilient Cities program - Pioneered by the Rockefeller Foundation. The city's "DNA" was assessed to understand existing strengths and weaknesses and opportunities to enhance resilience in a holistic way. Quito's transportation system stood out as a promising vehicle for this objective.

By targeting the newly expanded public transport system, Quito aims to guide the development of areas built around the metro and Bus Rapid Transit lines in a sustainable, resilient way. The transportation strategy thus becomes part of the city's resilience arsenal. To leverage these benefits, Quito has developed the [Eco-efficiency tool](#), which enables informed decision-making regarding urban sprawl and disaster risk reduction (earthquake and flooding) for new real estate projects.

“If we don't link transportation to urban growth and if we don't start making affordable and accessible places to settle, we are not supporting our transportation system.” David Jacome Polit, Chief Resilience Officer, 100 Resilient Cities, Quito, Ecuador

Further solutions identified for inclusive, resilient growth

- Leverage urban mobility solutions to foster water and energy efficiency and landscape design projects that improve resilience;
- Assess the potential impacts and conflicts from gentrification processes;
- Enable communities to self-organize and engage in transport and urban agriculture projects;
- Increase funding opportunities for urban agriculture projects across municipal departments by communicating co-benefits for health, social inclusion, and resilience (see page 10);
- Diversify and improve the present service economy to increase social equality; and
- Carry out policies in an integrated manner and work through inter-institutional and cross-departmental commissions.



Reality Check Workshop: Quito, Ecuador.

■ ■ ■ Outlook for 2018

As the previous pages have shown, local governments around the world have already begun to pursue integrated urban development that is sustainable, resilient, and inclusive. Not in response to global frameworks per se, but because it is practical. Multi-purpose solutions allow local governments to address the needs of several stakeholders and urban systems simultaneously with fewer resources. By leveraging co-benefits, they encourage innovation and yield greater social, environmental, and economic returns.

Policy and legal frameworks are helpful, however, to break down silos and facilitate multi-sector, multi-stakeholder thinking. The global frameworks inspire both collaborative action and friendly competition toward a future where everyone wins.

As mentioned earlier, what remains is to strengthen cooperation between and amongst sectors and governments at all levels that is underpinned by inclusive, transparent, governance mechanisms. Key principles to guide this process include:

- Create regular resilience dialogues between different levels of government (e.g. on NDC implementation), public and private sector actors (e.g. insurance and city roundtables), leaders from different sectors (e.g. health and transport), and with community members;
- Local context is king – implementation of global goals should be bottom-up and needs-based;
- Give preference to integrated actions that yield cross-cutting co-benefits;
- Make the business case by showing the economic value of local resilience plans and projects;
- Resilience planning is often experimental – flexible policy and investment mechanisms as well as knowledge sharing between governments and partners on successes and failures can accelerate effective action;
- Turn disasters into opportunities to raise awareness and motivate stakeholder engagement in resilience planning;
- Leave time for trust-building – holistic approaches depend on the support and ownership of multiple stakeholders; cultivating this takes time;
- Information is not knowledge. Support is needed to curate and manage the wealth of tools and data available to guide local decision making and future scenario planning;
- Plan for the unexpected – inclusive, good governance practices can foster institutions and societies that are more resilient to unexpected shocks and stresses; and
- Report progress locally and globally – including successes, failures, barriers, and gaps.

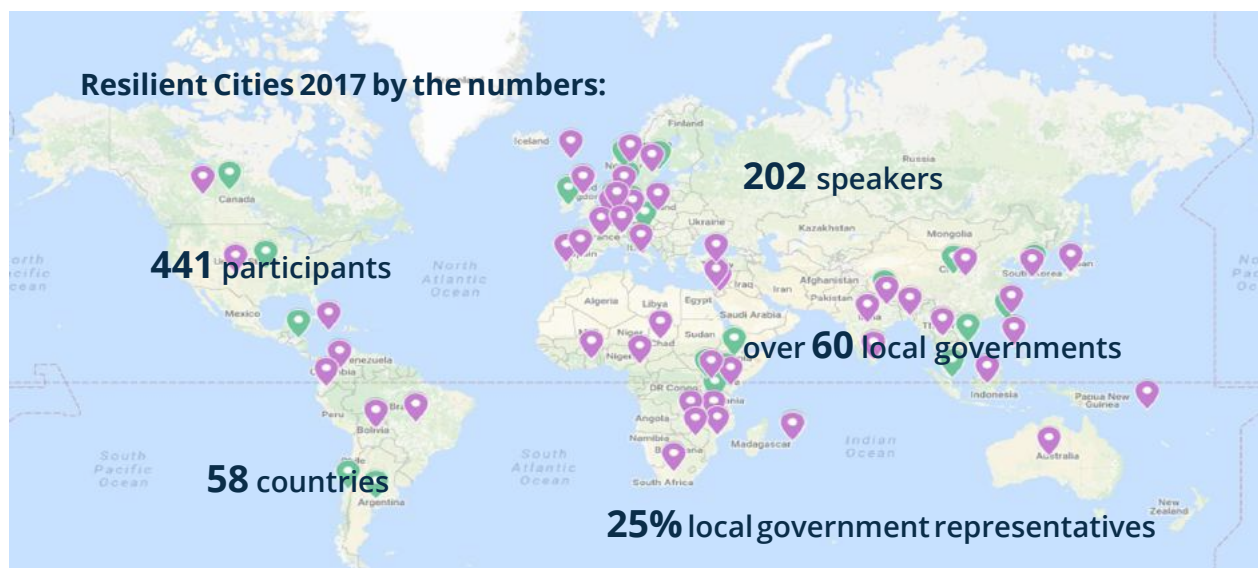
Resilient Cities 2018 will continue to explore solutions for integrated resilience planning and multi-sector alliances that advance local progress toward global goals. In particular, the congress will seek to highlight practical methods for advancing urban resilience through local private sector engagement, resource efficiency and circular economies, as well as activities that strengthen social cohesion.

Resilient Cities 2017 congress at a glance

About the congress

The Resilient Cities congress is a global platform that allows practitioners and experts to share local advancements toward adopting and implementing integrated, sustainable, and resilient urban development plans, including progress toward the resilience targets of SDG 11. Since 2010, representatives from over 250 local governments have attended the congress, which has served as an opportunity to exchange best practices and innovations, build partnerships, and connect with international resilience stakeholders.

For the eighth consecutive year, ICLEI and the City of Bonn co-hosted the Resilient Cities congress at the Gustav-Stresemann-Institut in Bonn, Germany. On 4 – 6 May, Resilient Cities 2017 brought together over 440 participants from 58 countries and 64 local governments (representing 25% of the total participants), as well as representatives from international and non-governmental organizations, the public and private sector, research institutions and academia. Reflecting a shift from planning to integrated implementation, the congress program featured local case studies and projects showcasing good practices and lessons learned; training workshops with policymakers and practitioners; interactive sharing of relevant tools, research, and resources; and consultation with national and international partners on new initiatives and directions.



Congress composition

- 41 thematic sessions including panels, presentations, workshops, and other interactive formats;
- 2 plenary sessions: the Opening Plenary on “Toward integrated planning for resilient and sustainable urban development”, and the Summary and Outlook Plenary “Tipping points: Planning for irreversible loss and damage”;
- 1 Insuring Resilient and Sustainable Cities Summit;
- 1 Urban Food Forum;
- 3 Reality Check Workshops featuring the cities of Accra in Ghana, Copenhagen in Denmark and Quito in Ecuador;
- 2 City-in-Focus sessions featuring Nordic cities’ innovations and Oslo’s stormwater management;
- 12 posters presented during two dedicated sessions;
- 12 exhibitors present throughout the three days; and
- Special elements, including an Opening Reception hosted by the City of Bonn, a High Level Lunch and several Co-events (see page 26).



Mayor of Bonn, Ashok Sridharan with Executive Secretary of the United Nations Convention to Combat Desertification, Monique Barbut at the Opening reception hosted by the City of Bonn on May 4th.

■ ■ ■ Congress side events and announcements

Launch of the Global 100% Renewable Energy Platform, 3 May Side event

Organized by Global 100%RE Campaign's Executive Committee in partnership with ICLEI and partners, this pivotal event gathered some of the world's most renowned experts on renewable energy to accelerate the campaign's outreach and re-affirm their commitment to making Global 100% RE a reality.

4th Open European Day (OED), 3 May Side event

For the fourth year, ICLEI and the European Environment Agency organized the Open European Day back-to-back with Resilient Cities. Around 125 participants gathered to discuss city-to-city collaboration on urban adaptation and explore solutions to real-life challenges. Themes in focus: transformation of the structures and systems by and for citizens; innovation in technology-based infrastructure and communication solutions; and co-creation of well-adapted urban environment shaped by citizens.

EPIC-N Training, 3 May Side event

The EPIC-N training was a unique opportunity for 20 collaborating pairs of individuals representing municipal governments and local universities to receive training on the Educational Partnerships for Innovation in Communities Network (EPIC-N) model. This successful community service-based model was designed to address the broad spectrum of sustainability-related information and knowledge needs of local governments and communities by matching city needs with university capacity in ways that benefit all parties. Participants of the Resilient Cities congress had the chance to join the free training as observers.

Mayors' lunch: Local governments meeting ahead of COP 23, 4 May

Organized by ICLEI and the City of Bonn, the Mayors' lunch brought together several mayors and UN high-level officials to discuss opportunities and developments in the field of disaster risk reduction and climate change adaptation in coastal cities and islands. Participants had the opportunity to exchange ideas in an informal but enriching environment. UNFCCC Executive Secretary Patricia Espinosa acknowledged ICLEI and mayors' efforts to adapt to climate change and reaffirmed its commitment to create additional opportunities of engagement for local governments at COP 23.

Catalyzing climate resilient action in human settlements through knowledge, 4 May Co-event

Organized by the Nairobi Work Programme (NWP), this co-event facilitated an open dialogue between policy makers at the national and subnational levels and knowledge providers. The session identified key knowledge challenges that hinder action on climate resilience in urban areas today and ways to bridge the knowledge-to-action gaps. Participants were invited to share good practices and lessons learned by submitting to NWP's Call for Contributions and participating in the 11th Focal Point Forum on adaptation and human settlements during UNFCCC COP 23.

Cities Climate Finance Leadership Alliance (CCFLA), 4 May Co-event

ICLEI and the Cities Climate Finance Leadership Alliance (CCFLA) Project Preparation Facility working group organized a session "Next steps to support the Marrakech Roadmap for Action", focused on the progress made by the CCFLA in its work plan to empower local governments and build capacity to scale up planning, project preparation and financing of climate change projects.

Global Centre of Excellence on Adaptation, 5 May Co-event

Organized by the Government of the Netherlands, this co-event "Anticipating the adaptation urgency" provided information on the initiation, set-up, scope, and objectives of the Global Centre of Excellence on Climate Adaptation. Participants had the opportunity to give their opinion on the role and scope of the Center and comment on its relevance for cities in general and for their work in particular.

"Food for Thought" Imagining Sustainable Lifestyles, 5 May Co-event and reception

This original evening co-event explored how cities can engage with their communities and key stakeholders to raise awareness and encourage more sustainable lifestyles. Participants gained a better understanding of what a sustainable lifestyle is; how an individual can change his/her lifestyle to become more sustainable; and how cities can engage with their communities to change their way of living. The conversation turned to the differences in the conception of a sustainable lifestyle in the Global North and South.

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