



# The role of cities in international mitigation and local adaptation

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## Abstract

Cities are large emitters of greenhouse gasses, but are also extremely vulnerable to climate change impacts. This unique position makes cities networks relevant in international discussions on mitigation, where they have over the past few months effectively created a new initiative to cut emissions, along with a credible emissions accounting and reporting protocol, a data repository, and a portal to share progress. At the same time that cities groups are advocating mitigation at the international level, groups within cities are proposing innovative adaptation ideas to address local level climate change impacts, including creative solutions to adapt the urban landscape to sea level rise.

## 1. Introduction

Cities are increasingly finding their way to the front and center of the climate change movement. Because they are significant contributors of greenhouse gas (GHG) emissions, yet also particularly vulnerable to climate change impacts, cities are taking an integrated approach to address climate change that combines mitigation and adaptation with urban development. The unique position of cities is prompting them to demonstrate their critical role in addressing climate change both at the international level from the top down and at the local level from the bottom up. The progressiveness of cities is seen both at the global scale and the local scale. Participation in the discourse on emissions reductions is evidenced by continued presence of cities networks at international meetings and conferences, such as the United Nations Framework Convention on Climate Change (UNFCCC) twentieth session of the Conference of the Parties (COP20) in Lima in December. Innovative adaptation ideas, on the other hand, are born from within cities themselves in response to particular climate impact risks, as exemplified by Boston's new report on sea level rise, *The Urban Implications on Living with Water*, released in September. While mitigation requires an international platform to be most effective, inventive adaptation ideas tend to come from local cases. As a comprehensive response to climate change requires addressing both the causes and effects, cities are involved on both fronts. Cities have been actively involved in mitigation and adaptation, and have made several interesting contributions over the past months.

## 2. Rational for cities to mitigate

Mitigation at the urban level is necessary to address climate change, as cities are currently responsible for 70% of global GHG emissions, despite occupying only 2% of the land area<sup>1</sup>. Moreover, cities are projected to grow in terms of both population and land area. In 2014, 54% of the global population lived in urban areas, and by 2050 it is projected that this number will increase to 66%<sup>2</sup>, reaching 6.3 billion<sup>3</sup>. Consequently urban land cover is projected to expand by 56 to 310% between 2000 and 2030<sup>4</sup>. This presents both challenges and opportunities for GHG mitigation. Rapid and expansive growth means that most of the infrastructure necessary to support urban areas is not yet built, and for this reason the Intergovernmental Panel on Climate Change's (IPCC) fifth assessment report (AR5) notes that the greatest potential for mitigating GHG emissions may lie in rapidly developing cities in industrializing countries<sup>5</sup>. Enhanced local level action during this pivotal period when the urban demand for housing, infrastructure, energy, natural resources, land, and other urban services is rising can have a significant impact at the global scale. Even developed cities have the opportunity to rethink urban design, enhance resilience, and build in sustainability considerations.

Mitigation is a global effort requiring broad changes of behavior and technological advancements. Cities have significant control over many drivers of GHG emissions including transport, energy, and infrastructure, making changes in these sectors practical at the local level. Municipal authorities are important actors in addressing mitigation for two primary reasons: they have jurisdiction over key processes that shape emissions, and municipal governments provide a key interface for engagement with private-sector and civil society stakeholders that also have a large role in addressing climate change at the urban level.<sup>6</sup> Because of their significant contribution to global GHG emissions and ability to address the sources of the emissions at the local level, cities are very relevant in discussions on mitigation, as evidenced by the regular presence of cities networks at international climate conferences. Cities have joined together in several different networks to promote their agenda at the international stage at which mitigation is discussed.

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<sup>1</sup> UN-Habitat. 2011. *Cities and Climate Change: Global Report on Human Settlements*. Nairobi: United Nations Human Settlements Programme.

<sup>2</sup> United Nations and Department of Economic and Social Affairs. 2014. *World Urbanization Prospects, the 2014 Revision: Highlights*. United Nations.

<sup>3</sup> Van Staden, Rian. 2014. *Climate Change: Implications for Cities, Key Findings from the Intergovernmental Panel on Climate Change Fifth Assessment Report*. ICLEI and University of Cambridge.

<sup>4</sup> Christ, Renate. 2014. *ADP Technical Expert Meeting: Urban Environment*. Bonn: IPCC.

<sup>5</sup> Van Staden, Rian. 2014. *Climate Change: Implications for Cities, Key Findings from the Intergovernmental Panel on Climate Change Fifth Assessment Report*. ICLEI and University of Cambridge.

<sup>6</sup> United Nations and Department of Economic and Social Affairs. 2014. *World Urbanization Prospects, the 2014 Revision: Highlights*. United Nations.

Early this year, additional momentum for mitigation by cities was gained after United Nations Secretary-General Ban Ki-moon announced the appointment of Michael Bloomberg, former mayor of New York City and President of the Board of the C40 Climate Leadership Group, as his Special Envoy for Cities and Climate Change in January. Bloomberg then prepared a report, *Advancing Climate Ambition: Cities as Partners in Global Climate Action*, which was launched at the Climate Summit in September, on mitigation in partnership with C40 and the Stockholm Environment Institute, with findings underlining the importance of including cities' climate efforts as nations set GHG reduction targets to prevent the world's temperature from rising more than 2 degrees Celsius above pre-industrial levels, as part of the UNFCCC climate negotiations in Paris in 2015. Key findings of the report show that cities have an emissions reduction potential of up to two-thirds the impact of recent national policies and actions. Urban actions could decrease global GHG emissions by 3.7 GtCO<sub>2</sub>e below what national actions are currently on track to achieve in 2030, and by 8.0 GtCO<sub>2</sub>e in 2050<sup>7</sup>. The report proposed that these mitigation targets could be met because of the strong influence mayors have over key policies that influence emissions, such as building energy standards, urban planning, and public transportation.

### 3. Cities advance the mitigation agenda

A particularly important contribution of city networks C40 Cities Climate Leadership Group (C40) and ICLEI - Local Governments for Sustainability (ICLEI), together with World Resources Institute (WRI), is the new Global Protocol for Community-Scale Greenhouse Gas Emission Inventories (GPC) for cities to measure and report emissions at the UNFCCC COP20 in Lima. The GPC is the first widely endorsed standard for cities to measure and report their GHG emissions. The GPC was developed by WRI, C40, and ICLEI, and uses a robust and clear framework to establish credible emissions accounting and reporting practices. By helping cities to establish a baseline, set credible reduction targets, and track performance, the GPC provides a consistent and transparent way for cities to manage GHG emissions. Using the GPC will furthermore help cities strengthen the vertical integration of data reporting to other levels of government, potentially improving access to local and international climate financing. The GPC launch, hosted by the City of Lima, gathered together mayors and representatives from many cities, as well as experts from the WRI, C40, ICLEI, the World Bank, and UN-Habitat, at the largest gathering of cities following the Climate Summit in New York in September 2014.

Cities came together to create new a new initiative – The Compact of Mayors, to scale up climate resilience efforts, energy efficiency programs, and resilient financing mechanisms at the Climate Summit in New York City in September. The Compact of Mayors, launched by C40 Cities, ICLEI, and the United Cities and Local Governments (UCLG), includes over two thousands cities in the biggest cooperative effort among global city networks for cities to cut their emissions, report their progress, and prepare for the impacts of climate change. Under the compact, city networks invite members to report their mitigation and adaptation commitments, emissions inventories, and actions. The Compact of Mayors is the greatest effort to drive aggressive climate actions in cities through public reporting of cities' GHG data. A new platform for city climate data, the carbonn Climate Registry (cCR), was designated as the central repository of the Compact of Mayors. The aim of the cCR reporting platform is to enhance transparency, accountability, and credibility of climate action of local and subnational governments. Two other city based initiatives launched at the Climate Summit include the City Climate Finance Partnership, to stimulate investments in low-carbon and climate-resistant infrastructure in cities in low and middle-income countries, and the City Creditworthiness Partnership, to strengthen creditworthiness and attract investors by improving financial management.

The introduction of GPC in Lima highlights the Compact of Mayors, which requires that cities set climate targets and report on progress using a standard GHG measurement system – the newly launched GPC. The GPC's standardized system for measuring and reporting emissions is an important component of the Compact, as it will help cities see what climate strategies are working, better focus their resources, and hold themselves accountable for results. In this way, the more

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<sup>7</sup> UN Secretary General's Special Envoy for Cities and Climate Change and C40 Cities. 2014. *Advancing Climate Ambition: Cities as Partners in Global Climate Action*. C40 Cities.

cities that join the Compact of Mayors and adopt the GPC, the greater impact will be. The NAZCA portal, also launched at Lima, is an online platform that will show the strategic actions that cities, companies, regions, and investors are taking to address climate change by displaying climate action data, much of which has been supplied by the cCR.

In just the past few months, cities groups have effectively created a new initiative to cut emissions, along with a credible emissions accounting and reporting protocol, a data repository, and a portal to share progress.

#### **4. Adapting the urban landscape**

Cities are not only active on the mitigation front. At the same time that cities groups are advocating mitigation at the international level, cities or agencies within cities are proposing innovative projects to address climate change impacts. The rationale for adaptation is simple: urban population is increasing and cities are growing, thereby increasing the scale of potential climate change impacts. For this reason, adaptation is necessary to protect vulnerable social, economic, and environmental systems from observed or projected climate impacts. Since the scale of effects is different than those of mitigation, adaptation requires a bottom up solution. The measures needed to help cities cope with climate change vary considerably depending on political, cultural, historical, and climatic conditions. Adaptation takes place at the local scale, so actions are based on specific needs of the effected area.

Creative ideas are being proposed to address climate impacts at the local level. Cities are exploring resilient design solutions for development to protect assets and communities from risks associated with sea level rise and climate change. Most of the world's cities are located along the coast, making coastal flooding from sea level rise and storms a particularly relevant climate impact. Due to this growing threat, cities are putting forth state-of-the-art ideas to adapt the urban landscape in order to cope with sea level rise and storm surge. This type of land use change looks to the long term, not only addressing climate change but also building resiliency and limiting disaster risk, and integrates these concepts into the urban landscape.

In the case of adapting the urban landscape to sea level rise and storm surge, forward-thinking ideas that take a step beyond the traditional methods of protect, accommodate, and retreat are being realized. Recent reports, projects, and competitions call attention to the need for creative ideas for adapting to climate change. In *The Urban Implications of Living with Water*<sup>8</sup>, a report released by the Urban Land Institute Boston/New England in September 2014 on adapting Boston to sea level rise, one of the proposed adaptations is to convert streets in the historic Back Bay area to a series of canals. Without changes to the current infrastructure in this area, which is situated less than four feet above today's high tide, the neighborhood will be increasingly vulnerable to flooding. The idea is to allow the water in, and focus on living with and managing the water rather than fighting to keep it out, in an effort to preserve historic buildings and minimize financial risk. The realized vision would drastically change the current landscape, which could eventually resemble Venice or Amsterdam. Although the proposal to convert the Back Bay streets to series of canals is so far only conceptual, it reflects an increased interest from the design community in resilient solutions for coastal zones.

Another project looking to draw on the design community's expertise in adapting to the increasing threat of coastal flooding is *Rebuild by Design*<sup>9</sup>, an urban design competition held in 2013 that called for innovative ideas to increase resiliency in the coastal zone of New York City in the wake of 2012's Superstorm Sandy. The competition was initiated by the US Department of Housing and Urban Development, which provided a \$930 million USD award for the winning design ideas addressing structural and social vulnerabilities while protecting against coastal flooding. Beyond this funding, the winning designs still need considerable political and financial support to become realities, but the ambition and innovation of the best ideas are commended and given exposure by the *Rebuild by design* platform. The winning idea proposed to create a "Big U" around lower

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<sup>8</sup> Urban Land Institute Boston/New England and The Kresge Foundation. 2014. *The Urban Implications of Living with Water*. ULI.

<sup>9</sup> <http://www.rebuildbydesign.org/>

Manhattan to protect eight continuous miles of low-lying land comprising a dense and vulnerable urban area. The proposed system would not only shield the city against floods and storm water using a series of levees and berms, but also provide social and environmental benefits to the community. The idea combines the directive of large-scale protective infrastructure with meaningful community engagement by linking projects with varying scales of time, size, and investment, thereby allowing local neighborhoods to tailor their own sets of programs, functions, and opportunities. Small projects are intended to maintain the momentum for investment in resiliency, as seen post-Sandy, while longer-term solutions are set in motion. The Rebuild by Design competition in NYC brought together stakeholders from government agencies, philanthropic organizations, academia, urban design, and local community to build a more prepared region with ambitious, realistic, and resilient standards of development and infrastructure corresponding to communities' needs under future climate conditions.

One urban design project that has actually been realized is the Waterbuurt (water quarter) housing project, a neighborhood of floating homes that have been developed in East Amsterdam. The idea was born during a land shortage in the early '90s when existing neighborhoods were becoming too dense and the only available space was the water. City officials zoned one area of water in the IJburg district for an experimental development project, and by 2001, a design for the world's largest planned floating city was developed. The first of the pre-fabricated, floating buildings were tugged into place and inhabited in late 2009. Buildings sit atop airtight concrete tubs that float above the anchors connecting them to the sea floor. This idea to float seventy-five buildings housing about 1,000 residents aims to prove that people can live comfortably on the water. In the face of sea level rise, in a country where two-thirds of the population already live below sea level (thanks to an extensive network of dikes), the project proves that it is possible to expand the availability of urban housing while accounting for the threat of future sea level rise flooding by floating houses on the water. The architect responsible for the design of Waterbuurt has even been commissioned to build another housing development on the Thames River in London, and has been contacted regarding potential projects in Singapore and South Korea, signifying that this unconventional mode of urban design has merit.

These three projects, ranging from conceptual ideas to realized urban development, each highlight innovative design solutions in the jump from traditional flood defense techniques to more extreme landscape changes in the face of growing flood risk. Impacts of sea level rise, and climate change in general, affect communities in different ways depending on local conditions, each requiring a different set of responses, and in this way creative adaptation ideas are born from cities.

## 5. Conclusion

Cities are progressing both mitigation and adaptation programs. Mitigation is a global issue that requires more universal support, and cities networks are showing up at the table to contribute to the dialogue. As evidenced over the past several months, cities networks have come together to create a new initiative to help cities expand commitments to reduce GHGs, and have launched a new standard for cities to measure and report GHG emissions. At the same time, creative projects for adapting the urban landscape to climate change are coming from within cities. Recent projects and proposals for innovative adaptation plans are being developed at the local level, and as climate impacts are experienced at this level, it is an appropriate place to address them. Cities have a role in both mitigating and adapting, as large sources of GHG emissions, and with high concentrations of people, assets, and activities vulnerable to impacts. As response to climate change requires addressing both the causes and effects of climate change, cities are involved at both fronts. Cities have the unique ability to respond to the global issue of climate change at a local, more tangible level. They can offer more immediate and effective communication between the public and decision makers than other groups, and through their networks, make the urban agenda relevant at the international level.