

Introduction

With the majority of the world's population living in urban areas, cities must learn to govern in a way that mitigates the causes of, and vulnerabilities to, climate change and adapts to changes that have already occurred. To achieve lasting results, cities must have consistent access to leading practices and tools, and the capacity to implement them.

ICMA builds the capacity of local governments and their partners to find innovative ways to promote and finance appropriate solutions to climate change and other urban challenges, identify vulnerabilities, and design and implement preparedness, adaptation, and mitigation plans that improve the lives of community members. Together with our partners, ICMA facilitates dialogue among different actors and levels of government, builds networks, and strengthens associations to address national and sub-national level climate change challenges.

Employing a combination of approaches, including city-to-city partnerships, direct technical assistance, knowledge management, and capacity building, ICMA provides tools that enable cities to access knowledge and prevailing practices, build trust, and create collaboration and opportunities for meaningful participation with citizens and businesses.

ICMA's flagship international program, CityLinks™, funded by the U.S. Agency for International Development, enables municipal officials in developing countries and countries on the path to decentralization to draw on the resources of their U.S. counterparts. The current five-year CityLinks program supports the emergence of resilient cities that have the capacity to address the three challenges of climate change, food security, and access to water and sanitation.

In year four of the program, CityLinks partnered with the RUAF Foundation-International Network on Urban Agriculture and Food Security to present a two-part webinar series illustrating local government responses to the interlinked sectors of climate change, food security, and water. The series explored examples from Nashik, India; Rosario, Argentina; New York City, New York; and Toronto, Canada preceded by an overview from UN Habitat and GIZ-German Development Corporation. This paper comes as a companion to this series by summarizing the presentations and discussions generated by the webinar. It concludes with some concrete recommendations to bilateral donors, sub-national governments, and support organizations to integrate the pioneering experiences of these cities in their own programs and policies.

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Urbanization, climate change, water, and food security are intrinsically linked. Urban growth (concentrated in Africa and Asia) is, in many cases, concentrated in small and medium-sized cities and towns, drastically affecting their rural and peri-urban areas. This rapid geographic expansion, with loss of density and urban expansion into agricultural land, will threaten rural livelihoods¹, food production and supplies; and increase challenges of scarcity of water and tension over use of natural resources² (UN Habitat, 2015).

A recent study based on global data on croplands and urban extents using spatial overlay analysis indicated that 60 and 35 percent of all irrigated and rain-fed croplands, respectively, fall within a distance of 20 km's of a city (Thebo et al., 2015). According to Tuts (2015), in the USA, two-thirds of the total value of agricultural production takes place in, or adjacent to, metropolitan counties. These data indicate the need to seriously consider the impacts of urban expansion and shifting land use patterns on food production.

At the same time, climate change will increase pressures on food production and security. The fifth Intergovernmental Panel on Climate Change (IPCC) report projects that in many regions there is likely to be a loss of food production and productive arable lands. Cities with a heavy reliance on food imports would be more significantly affected with regards to their urban food security (University of Cambridge

¹ Smallholder farmers produce 80% of the food consumed in developing countries (UN Habitat, 2015).

² 40% of all violent conflicts in the last 60 years have been linked to natural resources (Tuts, 2015)

and ICLEI, 2014). The urban poor will be most affected by disruptions in food supply and increasing food prices.

Similarly, with climate change, water conservation and management in cities becomes even more of a crucial issue (UNEP, 2008). In areas where climate change leads to extreme weather events and heavy rainfall, the increased flood-risk levels adds to already serious deficiencies in provision for storm drainage in many cities in developing countries as well as the reduction of open spaces where excess storm water can be stored and infiltrate (University of Cambridge and ICLEI, 2014).

Urban demand for fresh water is rising rapidly due to population growth as well as increasing supply, coverage, and overall urban economic growth. Availability of fresh water is becoming a serious problem in already water-scarce countries (especially in the Near East and North Africa, South Africa, Pakistan, and large parts of India and China) and in densely populated areas. A growing competition between industrial, energy, agricultural, and domestic uses of water can be observed. At the same time, water demand for food production is increasing due to rising populations and changes in urban food consumption patterns as urban dwellers move towards richer and more varied diets (from tubers to rice; from cereals to meat, fish and high-value crops) that require more water to be produced (UN Water, 2007).

In order to ensure more sustainable urban development, cities and metropolitan regions need to respond to the *triple* challenge of ensuring adequate access to sufficient water, energy, and food for their population; sustaining local economic development and

sustainably managing their resources, while at the same time addressing the challenges of climate change mitigation and adaptation. This requires an integrated development and planning approach that connects urban food security, water and sanitation, and climate change strategies with programs and stakeholders across urban and rural areas, and enhances more efficient and coordinated strategies needed to contend with increasing public sector fiscal constraint. Operationalizing such integrated and coordinated approaches calls for institutional and behavioral changes, new incentives, sustainable territorial planning at city region level, working at different scales and stronger attention for urban food systems.

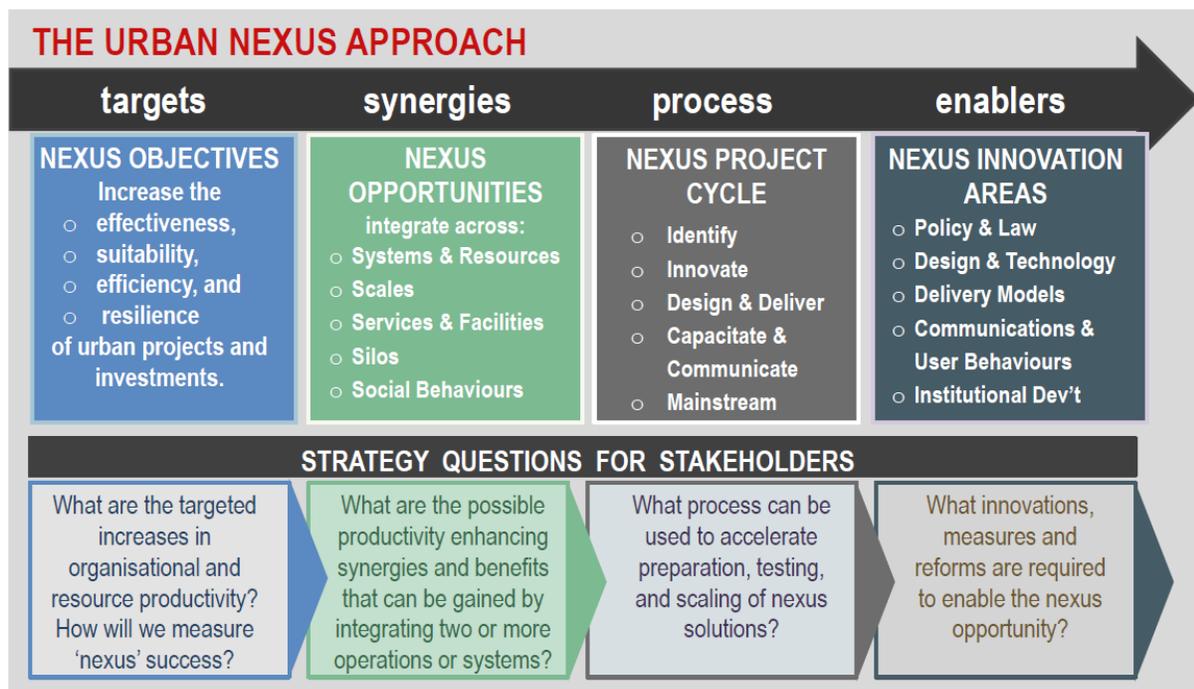
The Urban Nexus Approach

In 2014, GIZ and ICLEI coined the term *Urban Nexus* to describe a more responsive, coordinated, and efficient approach towards the cooperation among and integration of

different sectoral policy, practice, and planning strategies, such as those around water, food security, and climate change.

An Urban Nexus approach should help change the mind-set of institutions to favor cooperative and inter-sectoral planning approaches instead of traditionally siloed sectoral practices. This requires changes in institutional set up and attitudes, such as reconsiderations and reform of institutional responsibilities and mandates; enhancement of horizontal (between sectors and stakeholders) and vertical linkages (different levels of government); and incentives and budget allocation for coordination, cooperation, and fostering of community awareness and participation (Vogt, 2015).

Examples of an Urban Nexus approach include linking of water, energy, and agriculture (food) sectors as done in Nashik or the integration of urban agriculture as a climate change mitigation and adaptation strategy in Rosario.



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Operationalizing the Urban Nexus Approach

As illustrated by these three case studies, operationalization of a Nexus approach requires (1) shifting from a silo to a coordinated and cross-sectoral approach of working; (2) collaboration across government jurisdictions and amongst multiple stakeholders; and (3) awareness raising/evidence demonstration, incentives and financial and staff resources for such collaboration and coordination.

Fourthly, the case studies illustrate the need for planning and working at the city-region level. A city region is conceptualized as one or more

urban centers and its surrounding peri-urban and rural areas. It is, after all, at this level that urban expansion, agricultural land use, management of water and catchment areas, and climate change play out and can most effectively be managed. Urban and rural areas are, however, still often treated as separate sectors at the national and local level, and within different agencies. This distinction does not reflect realities on the ground. Nor will this false dichotomy enable the needs of sustainable urbanization and rural transformation to be met. Applying a city-region perspective can also help create participatory governance structures that include stakeholders from multiple sectors

Like New York City, the City of Toronto also has a wide variety of policies and programs, trying to link its food, energy and climate plans and optimize these different scales of planning. Examples include its 2013 GrowTO urban agriculture program to promote local food production and increase rooftop and community gardens (household, neighborhood level), its 2013-2017 Parks Plan to enhance the quantity of quality of green areas in the city (neighborhood and city level); its Live Green Toronto program to engage Toronto residents, community groups and businesses in taking action to reduce their energy use and emissions (city level), its 2012 Greater Golden Horseshoe Action Plan which promotes the preservation of farmland in Ontario as well as the expansion of urban opportunities to grow food (regional level) as well. All these plans are linked through Toronto's environmental Program and Food Policy Council.

Up-scaling and replication of pilot initiatives at the city level is facilitated by supporting projects and programs with policy development. Local food growing is, for example, supported by the City Council's local food procurement policy passed in 2011, which set targets of 25% local food purchasing. Complementary strategies to increase local food purchasing include: menu planning support and training; community food procurement portal; local food promotion. Review of zoning bylaws is another strategy used to address barriers to the expansion of agriculture in Toronto. Elaboration of a soil assessment guide aims similarly to support promotion of agricultural activities.

The City's Live Green Toronto Program provides grants, incentives and support for home-based improvements (energy loans, eco-roofs), school programs and city wide public programs for more sustainable public infrastructure and transportation (cycling, carpooling). Live Green Awards and community facilitators play an important role in sustaining and up-scaling specific interventions (Baker, 2015).

Baker Lauren, 2015. **Toronto's food and environmental policy**. Presentation to the ICMA-RUAF webinar on Urban intersections-climate change and food security (June 2015). <http://www.ruaf.org/publications/webinar-2-urban-intersections-climate-change-and-food-security-2015>; <http://learning.icma.org/store/streaming/seminar-launch.php?key=ieyq1wRb8jiuq94Ht0caQzwdzPbBYO06iLb8zIGvQB4%3D>

from both urban and rural areas (Forster, Hussein and Mattheisen, 2015).

Fifthly, the New York case study illustrates the importance of planning at different levels: including household and institutional level (composting program, rooftop farms), farm level (farm support programs), street and neighborhood level (green infrastructure, food retail and marketing), city level (green infrastructure, food distribution, composting) and regional level (rural farming areas and water shed).

Finally, while food security is recognized as an important global issue with significant resources devoted to it, until recently too little attention has been focused on the issue of urban food security. Food should be an integral part of and provides concrete opportunities for operationalizing the Urban Nexus. An alarming increase in diet-related health problems (like obesity and diseases related to food quality) in many cities around the world have made it very evident that cities need to think about how to ensure access to sufficient, affordable, healthy, and safe food for their populations (3Keel, 2014).

For many years, urban sustainability debates have centered on issues of transport, energy, waste and water management, housing and land planning, and climate change. Only more

recently, and triggered by the 2007-2008 food price crisis, the economic crisis affecting many countries, and climate-induced disruptions to food supply, resilient urban food systems are considered a key component of sustainable cities and integral to urban-water-energy-climate intersections. The three case studies from Nashik, Rosario, and New York, and the example from Toronto illustrate the role that food and agriculture can play in linking different urban sectors, as well as in linking urban to rural areas. Cities, as hubs of consumption, increasingly recognize their responsibility in building more sustainable food systems that provide decent livelihood opportunities for those producing, processing, and selling food in rural, peri-urban, and urban areas.

In addition, food in itself is increasingly seen as a driver for other sustainable urbanization policies. Food is not only directly related to other urban domains, such as water management and climate change, but also to transport (a large part of city transport is related to food supply and consumption), health (malnutrition, obesity, school feeding), land use planning of agricultural and multi-functional areas, community development and revitalization, employment generation (in food production, processing, retail) and waste management (productive use of waste (water) and management of food waste).

Summary of Key Recommendations for Governments and Support Agencies

1. **Avoid silos and promote cooperation**

Linking water, food, and climate change through different technologies and at different scales, offers many opportunities and benefits in and around urban areas. Applying an Urban Nexus approach guides stakeholders toward identifying and pursuing possible synergies between sectors, jurisdictions, and technical domains so as to increase institutional performance, optimize resource management, and service quality. It counters traditional sectoral thinking, trade-offs, and divided responsibilities that often result in poorly coordinated investments, increased costs, and underutilized infrastructures and facilities. Enhanced inter-sectoral coordination and cooperation, however, requires sufficient human and financial resources and time for the approach to work (GIZ and ICLEI, 2014).

2. **Strengthen horizontal and vertical governance/ work across city regions**

Cities do not operate in a vacuum. As they seek to create urban nexus strategies they will undoubtedly cross their own geographical and jurisdictional boundaries and find the need to collaborate with state/regional and federal organizations. In order to achieve the greatest success and efficiency, a coordinated effort must occur across all levels of governance. This can, however, be a difficult challenge. One challenge still present is to involve central, provincial and local governments (vertical governance), without losing sight of the need to build strong and permanent relations between local government departments as well as and between local governments and local actors from civil society (horizontal governance). In better linking these various levels, attention should also be paid in developing functional and political links from the bottom up, preserving the capacity of producers, community members and citizens to be part of the decision making processes at all levels.

3. **Recognize food as a critical component of an urban nexus**

The urgency of urban food security should be recognized as well as the potential of food and agriculture to address the urban nexus. Food can be the entry point or common denominator that brings down broader issues such as water management, climate change, and resilience to a digestible form and provide cities and metropolitan regions practical strategies to address broader issues (UN FAO and RUAFA, 2015; UN Habitat, 2015).

Sufficient resources should be dedicated to food and agriculture as part of urban development, water management, and climate change programs. There is growing recognition of urban and peri-urban agriculture and forestry as an important strategy for climate-change adaptation and disaster-risk reduction, while also bringing mitigation and important developmental benefits. The case studies show examples of promoting urban agriculture in flood-risk prone areas, developing rooftop gardens and other green infrastructure in dense urban settlements as part of storm water management or temperature mitigation strategies, including urban agriculture and forestry in new housing schemes and preserving peri-urban greenbelts for local food

production, while at the same time promoting water and climate friendly production technologies.

Crucial to all these strategies are control measures to safeguard agricultural land from urban sprawl while encouraging sustainable urban agriculture where appropriate, securing producers' access to and tenure of land, credit and capital and providing technical training and support (de Zeeuw et al., 2011; World Bank, 2012, Dubbeling, 2013, UN Habitat, 2015).

4. Develop nexus strategies at different levels and scales of planning

Development of concrete nexus strategies can take place at different levels and scales: in a neighborhood or small community, at the city level, and city region level. A multiplicity of interventions at different levels should be promoted for entire city regions to benefit from scale effects. The key challenge remains to upscale to whole cities and regions interactions between different intervention strategies which often tend to start with (and may remain limited to) robust initiatives at smaller scales.

References and Works Cited

De Zeeuw, Henk; Rene van Veenhuizen and Marielle Dubbeling, 2011. **The role of urban agriculture in building resilient cities in developing countries.** Journal of Agricultural Science (February 2011), Volume 149, Supplement S1 (Foresight project on Global Food and Farming Futures), Cambridge University Press. <http://dx.doi.org/10.1017/S0021859610001279>

Dubbeling, Marielle, de Zeeuw, Henk and René van Veenhuizen, 2011. **Cities, Poverty and Food; Multi-stakeholder Policy and Planning in Urban Agriculture, RUAF Foundation and Practical Action Publishers, UK** <http://www.ruaf.org/publications/cities-poverty-and-food-multi-stakeholder-policy-and-planning-urban-agriculture>

Dubbeling, Marielle, 2013. Scoping paper feeding into the development of UNEP's position on urban and peri-urban agriculture. **RUAF Foundation, The Netherlands.** <http://www.ruaf.org/projects/scoping-paper-urban-food-systems-unesp>

Dubbeling, Marielle. 2013b. **Urban and peri-urban agriculture and forestry as a strategy for climate change adaptation and disaster risk reduction.** In: Disaster risk reduction and resilience building in cities: focussing on the urban poor. Regional Development Dialogue, Vol 34, No 1, Spring 2013. United Nations Centre for Regional Development, Japan

Dubbeling, Marielle, 2014.. **Integrating urban agriculture and forestry into climate change action plans: Lessons from Western province, Sri Lanka and Rosario Argentina.** CDKN Background paper. Climate Development Knowledge Network, London. UK. http://cdkn.org/wp-content/uploads/2015/02/SriLanka_Argentina_BackgroundPaper_FINAL_WEB.pdf

GIZ and ICLEI, 2014. **Operationalizing the Urban Nexus- Towards resource-efficient and integrated cities and metropolitan regions.** Bundes Ministerium für wirtschaftliche Zusammenarbeit und Entwicklung, Germany. http://resilient-cities.iclei.org/fileadmin/sites/resilient-cities/files/Full_papers/Urban_NEXUS_Publication_ICLEI-GIZ_2014_web.pdf

Forster, Thomas, Karim Hussein and Emily Mattheisen, 2015. **City Region Food Systems: An inclusive and integrated approach to improving food systems and development of urban and rural areas.** In: Dubbeling (ed), City region food systems, Urban Agriculture Magazine No 29. RUAF Foundation. Leusden, The Netherlands. <http://www.ruaf.org/sites/default/files/UAM29.pdf>

Maheshwari B.L., R.C. Purohit, H.M. Malano, V.P. Singh and P. Amerasinghe (Editors) , 2012. **Securing Water, Food, Energy and the Liveability of Cities: Challenges and Opportunities for Peri-urban Futures.** Water Science and Technology Library. Springer Science+Business Media B.V. Dordrecht, The Netherlands

Moss, D. 2015. **Farming for healthy urban tap water.** Farming Matters, 31.3, September 2015. ILEIA, The Netherlands.

Mougeot, Luc J.A., 2015 Urban agriculture in cities of the Global south-Four logics of integration. In: D. Imbert (ed), 2015. Food and the city- Histories of Culture and Cultivation. Dumbarton Oaks Colloquium on the History of Landscape Architecture 36. Harvard University Press

Lwasa, Shuaib and Marielle Dubbeling, 2015. Lwasa, S. and M. Dubbeling, 2015. Urban agriculture and climate change. In: Drechsel and De Zeeuw (ed). Cities and agriculture-Developing resilient urban food systems, 2015. Earthscan-Routledge London and New York.

Thebo, A. L., Drechsel, Pay, and E. F Lambin , 2015. **Global assessment of urban and peri-urban agriculture: irrigated and rainfed croplands**. Environmental Research Letters 9.
<http://iopscience.iop.org/1748-9326/9/11/114002/article>

Tuts, Rafael, 2015. **Integrated planning and management strategies for urban food security and climate change adaptation**. Presentation to the ICMA-RUAF webinar on Urban intersections-climate change and food security (June 2015). <http://www.ruaf.org/publications/webinar-2-urban-intersections-climate-change-and-food-security-2015>; <http://learning.icma.org/store/streaming/seminar-launch.php?key=ieyq1wRb8jiuq94Ht0caQzwdzPbBYO06iLb8zIGvQB4%3D>

UN FAO and RUAF Foundation , 2015. **City region food systems- Building sustainable and resilient city regions**.

http://www.fao.org/fileadmin/templates/agphome/documents/horticulture/crfs/UC_Booklet_Final_color_low.pdf

UN Habitat (2015). **Habitat III issue paper. Paper no 10: Urban-rural linkages**. United Nations. Nairobi, Kenya. http://unhabitat.org/wp-content/uploads/2015/04/Habitat-III-Issue-Paper-10_Urban-Rural-Linkages-2.0.pdf

University of Cambridge and ICLEI, 2014. **Climate change: implications for cities. Key Findings from the Intergovernmental Panel on Climate Change Fifth Assessment Report**. Available from:
http://www.iclei.org/fileadmin/PUBLICATIONS/Brochures/IPCC_AR5_Cities_Summary_FINAL_Web.pdf

Vogt, Carmen (2015). **Urban nexus-an approach for sustainable governance of rural-urban linkages; Considerations for integrated urban and metropolitan development**. Presentation to the ICMA-RUAF webinar on Urban intersections-food security, water and climate change (May 2015).
<http://www.ruaf.org/publications/webinar-1-urban-intersections-food-security-water-and-climate-change-2015>;
<http://learning.icma.org/store/streaming/seminar-launch.php?key=xPOcG7qeLRBn%2FuQ6tr4%2F0XdKb6%2Ft1am5O5CQr3NXOVE%3D>

World Bank, 2013. **Urban agriculture-findings from four city case studies**. World Bank, Urban Development and Resilience Unit, Washington, USA.
<http://www.ruaf.org/sites/default/files/Worldbank%20report%20on%20urban%20agriculture.pdf>