Urbanization and Global Environmental Change

Main Message #1

Urbanization processes and climate change uncertainty modify the environment at multiple scales by altering the hydrological and carbon cycles, land use and cover, and biodiversity.

Source: Grimm et al., 2008

Land Expansion

Globally, urban areas are expanding outward. By 2030, urban land cover could nearly triple the global urban land area in 2000.

Source: Seto et al., 2011

Biodiversity and Ecosystems

The increase in urban expansion could result in considerable loss of habitats in key biodiversity hotspots. The highest rates of forecasted urban growth will take place in regions that have been relatively undisturbed by urban development.

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Source: Seto et al., 2012a

GHG Emissions and the Carbon Cycle

The relationships between urbanization processes, urban areas, and the carbon cycle have been studied only recently and by disparate research communities, largely segregated between natural, social, and engineering sciences.

A key challenge for the future is to develop frameworks that coherently integrate these contributions to develop co-produced science that informs more effective low carbon policies and decision-making.

Source: Romero-Lankao et al., 2014

Main Message #2

Cities are created by interconnecting biophysical and social processes that intersect with the larger Earth system. Contemporary solutions to sustainability challenges must address underlying urbanization processes and contexts, rather than symptoms of problems.

Source: Solecki et al., 2013

Water Availability

Despite vast urban water infrastructure, many cities remain water stressed. Some of the fastest growing cities are in geographically limited areas for water availability. 68% of large cities with severe geographical limitation are located in low- to middle-income countries, most notably in China, Central Asia, and Mexico.

Source: McDonald et al., 2014

Food Systems

Dietary patterns associated with urbanization are changing much faster in low- and middle-income countries than what has occurred in Western societies.

The expansion of the built environment along with the "nutrition transition" (higher consumption and production of meat, vegetable oils, sweeteners and processed carbohydrates) are driving global changes in water and energy use, land conversion, and ecosystems.

Source: Murray et al., 2016

Main Message #3

As urbanization and climate change continue to modify the environment, we can expect clear, but unequal implications for urban communities and populations, particularly in developing countries.

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Source: Satterthwaite et al., 2007

Vulnerability and Risk

Cities are faced with multiple hazards, sources of vulnerability, and different levels of adaptive capacity. In addition to thresholds and tipping points, we need an improved understanding of the interconnectivity of primary and secondary hazards, for example, the collapse of infrastructure from heavy storms and the resulting food-energy-water-economic implications.

Source: Romero-Lankao & Qin, 2011

Coastal Hazards

The largest urban extents in exposed locations to coastal hazards are expected to be in the Niger and Nile River Deltas, the Mekong and Ganges-Brahmaputra River Deltas, and along the Chinese coast.

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Source: Güneralp et al., 2015

Main Message #4

With the urban population estimated to grow by 404 million people between 2014 and 2050, living conditions in cities (particularly within the Global South) will become even more crucial for public health. The complex interactions between urbanization, global environmental change, and health and wellbeing are just beginning to be understood.

Source: Kroll & Kraas, 2016

Extreme Heat

Extreme heat events are among the leading weather-related causes of illness and death in cities.

Continued urbanization creates microclimates where temperatures are higher because of the urban heat island effect.

This trend, combined with a warmer future and an aging population will increase heat-related health risks.

Source: Watkins & Griffith, 2015

Air Pollution

Air pollution is not an old or resolved issue. In fact, many urban areas in both emerging and developed countries continually exceed the 2005 World Health Organization Air Quality Standards.

Air pollution research and policies should be adapted to the physical, economic, political, and social contexts within each region to best deploy scarce financial, technological, and human capital.

Source: Melamed, 2015

Infectious Disease

Land use change and food production practices associated with urbanization are leading drivers of recently emerging diseases from wildlife, while warmer climates and modifications to habitat biodiversity and species composition drive changes in pathogen range and virulence.

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Source: Daszak et al., 2013 & Siraj et al., 2014

Main Message #5

There are many collective and coordinated actions towards building more robust and resilient cities that can be shared and adapted across multiple scales, landscapes and regions.

Source: Sanchez Rodriguez, 2009

Governance

The emergence of the urban governance of climate change is one of a growing number of governance experiments as a result of dissatisfaction with progress at the international level and the fragmentation of political authority.

Relationships are being transformed both inside and outside of local governments by linking traditionally siloed municipal agencies and forging partnerships with civil society and business actors.

Source: Aylett, 2015

Adaptation to Climate Change

Urban areas are proactive initiators of strategies combining adaptation to climate change with development. When adaptation is planned in a way that generates initial learning, awareness, integration in the city's agenda and vision, and builds internal and external capacity, the process gives space to the development of comprehensive strategic adaptation actions that can eventually enhance the resilience of the most affected areas and groups.

Source: Anguelovski et al., 2014

Mitigation of Climate Change

Mitigation strategies, drivers and constraints vary across low- to high-income cities. In high-income cities efforts are underway that span across the energy, building, and transportation sectors, municipal services, and land use and spatial planning.

Despite their low contribution to global GHG emissions, low- and middle-income countries are voluntarily formulating climate plans that include mitigation actions. These countries have the potential to leapfrog the development paths characteristic of industrialized countries in favor of low-carbon pathways.

Source: Mohareb et al., 2016 & Lwasa, 2016

Main Message #6

Urbanization is a driver of societal transformation and a platform for experimentation towards more equitable, just, and sustainable cities.

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Source: Ernstson et al., 2010

Social and Environmental Justice

Sustainability plans are increasingly incorporating equity metrics, demonstrating that the principles of environmental justice are beginning to inform sustainable urbanization strategies.

However, many of the metrics focus on local concerns that may conflict with the sustainability objectives of other cities and the goal of planetary scale sustainable urbanization.

Source: Boone & Klinsky, 2016

Greening and the Economy

Many green economic measures promote prosperity and climate resilience in different urban contexts around the world. Beyond employment and income generation, urban greening also enhances quality of life by reducing air and environmental pollution, expanding green space and recreational areas, and encourages the creation of more livable neighborhoods by using mixed-use zones and compact designs.

Source: Simon et al., 2011

Global Teleconnections

Thinking in terms of a 'global system of cities' could foster coordinated governance approaches to planetary stewardship.

A better understanding of the rural to urban land change processes at multiple spatial and temporal scales and other urban-urban/urban-rural interconnectivities could enhance equity and human well-being in decision-making and actions aimed to promote global sustainability.

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Source: Seto et al., 2012b & Seitzinger et al., 2012


Thank you!

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