URBAN PATTERNS FOR A GREEN ECONOMY
OPTIMIZING INFRASTRUCTURE

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FOR A BETTER URBAN FUTURE

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OPTIMIZING

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URBAN PATTERNS FOR A GREEN ECONOMY: OPTIMIZING INFRASTRUCTURE

DISCLAIMER

Cover photo: Redesigned shelter at a bus stop in Uberlândia, Brazil, whose public transport network connects the central areas of the city with the outlying neighbourhoods along three main arteries © UN-Habitat/Alessandro Scotti

ACKNOWLEDGEMENTS

Foreword

The city is one of the highest pinnacles of human creation. Concentrating so many people in dense, interactive, shared spaces has historically provided distinct advantages, that is, agglomeration advantages. Through agglomeration, cities have the power to innovate, generate wealth, enhance quality of life and accommodate more people within a smaller footprint at lower per-capita resource use and emissions than any other settlement pattern.

Figure I: **Greenhouse gas emissions and containment index for selected metropolitan regions**

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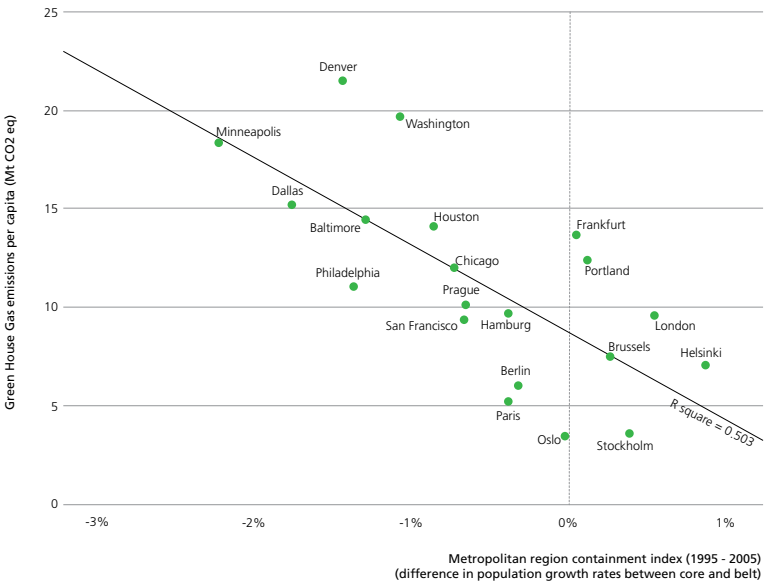
Or so they could. Increasingly, cities are forfeiting many of the benefits that agglomeration has to offer. Two meta-studies of urban land expansion have shown that over the last two decades most cities in the world have become less dense rather than more,[12] and are wasting their potential in ways that generate sprawl, congestion and segregation. These patterns are making cities less pleasant and equitable places in which to live. They are also threatening the earth's carrying capacity. And they are most

Figure II: **Average Built-up Area Densities in Three World Regions**
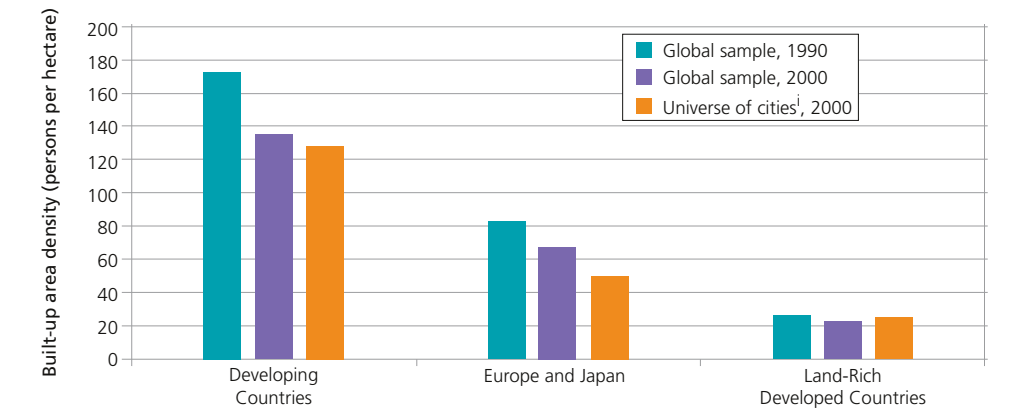
Source: Making Room for a Planet of Cites, by Shlomo Angel, Jason Parent, Daniel L. Civco, and Alejandro M. Blei. © 2011. Lincoln Institute of Land Policy, Cambridge, MA.

Figure III: **The General Decline in Built-Up Area Densities in 25 Representative Cities, 1800-2000**
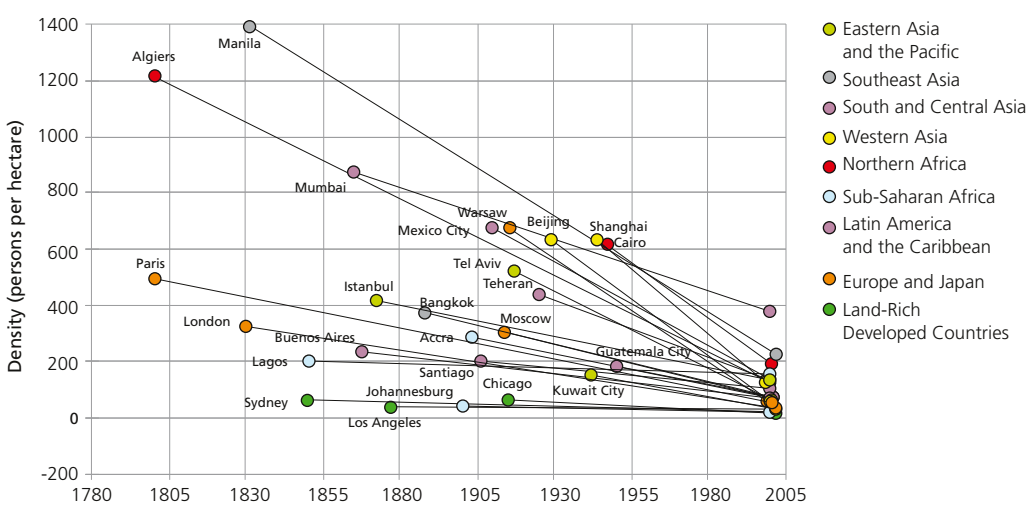
Source: Making Room for a Planet of Cites, by Shlomo Angel, Jason Parent, Daniel L. Civco, and Alejandro M. Blei. © 2011. Lincoln Institute of Land Policy, Cambridge, MA.

i   This refers to 3,646 large cities with a population of over 100,000 or more.

acute in fast-growing cities, particularly those with the lowest institutional capacities, weakest environmental protections and longest infrastructure backlogs.

Increasingly, city managers wish to learn by example. Rather than more theory and principles, they want to know what has worked, what has not, and which lessons are transferrable to their own contexts. There is much information available, but little time. UN-Habitat has developed these "quick guides" for urban practitioners who need condensed resources at their fingertips. The aim is to suggest patterns that can help cities and city-regions regain these inherent advantages in a time of increased uncertainty and unprecedented demographic expansion.

More than half the global population now lives in towns and cities. By the year 2050, UN-Habitat research projects that that figure will rise to two-thirds. This rapid, large-scale concentration of humanity in the world's cities represents new challenges for ingenuity, and numerous opportunities to improve the way in which human habitats are shaped. Most of this population growth will be in the cities of developing countries, which are expected to grow by an additional 1.3 billion people by 2030, compared to 100 million in the cities of the developed world over the same period.[3]

While urban population growth rates are stabilizing in regions which are already predominantly urban (such as Europe, North, South and Central America and Oceania), regions with a higher proportion of rural population (such as Asia and Africa) are likely to see exponential rates of urban population growth in the coming years.[4] Most urbanization is likely to occur in cities relatively unprepared to accommodate these numbers, with potential negative repercussions for quality of life, economic development and the natural environment.

Although the percentage of the urban population living in slums worldwide has decreased, the absolute number of people living in slums continues to grow.[5] No less than 62 per cent of all urban dwellers in sub-Saharan Africa live in slums, compared to Asia where it varies between 24 per cent and 43 per cent, and Latin America and the Caribbean where slums make up 27 per cent of the urban population.[6] If these growing cities are to be socially sustainable, new approaches will be required to integrate the poor so that the urbanization process improves inter-generational equity rather than entrenching socio-spatial fragmentation. Privatized models of service delivery that discriminate between consumers based on their ability to pay threaten to worsen inequalities,[7] and require carefully considered parameters to ensure that the poor are not disadvantaged.

According to a recent World Bank study, urban population growth is likely to result in the significant loss of non-urban land as built environments expand into their surroundings. Cities in developing countries are expected to triple their land area between 2005 and 2030, with each new city dweller converting an average of 160 metres^2 of non-urban land to urban land.[8] Despite slower population growth, cities in industrialized countries are likely to see a 2.5 times growth in city land areas over the same period due to a more rapid decline in average densities when compared to their developing country counterparts.[9] As built environments become less dense and stocks of built up land accumulate, the amount of reproductive and ecologically buffering land available for ecosystems and food production is diminished, reducing the ability of city-regions to support themselves.[10]

While international trade has made it possible for cities to meet their demands for food, water and energy with imports from faraway lands, it is becoming increasingly

Figure IV: **Ecological Footprint and Human Development Index for selected countries and cities.**
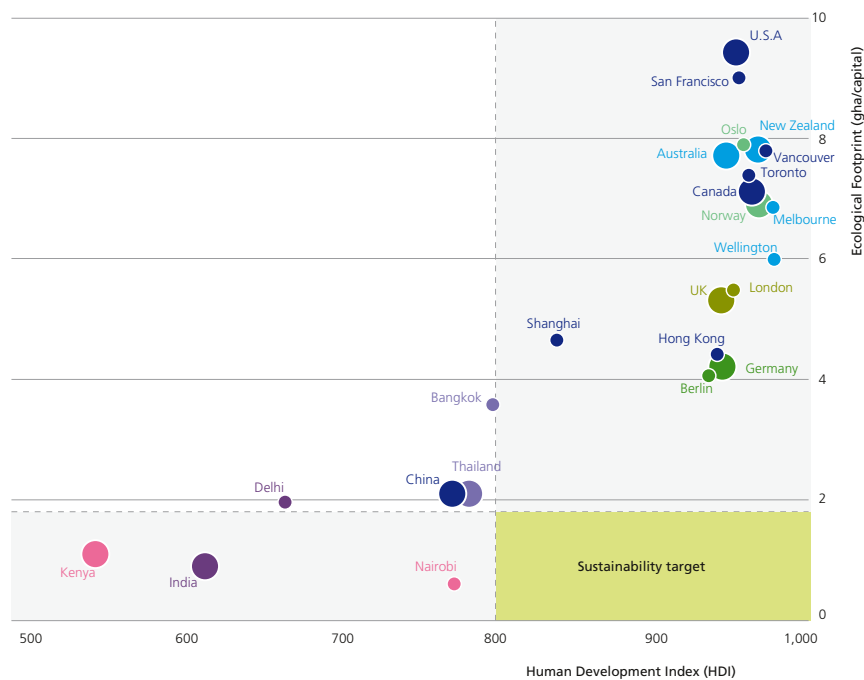
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apparent that the appetite of the world's growing and increasingly affluent population is coming up against limitations in the planet's ability to support human life on this scale. It is estimated that our addiction to oil will result in a peak in oil extraction within the next decade, leading to dramatic increases in the costs of fuel, mobility, food and other imports. Greater demand for potable water, combined with changing rainfall patterns, the depletion of aquifers and pollution of groundwater, is likely to see increasing competition for scarce fresh water resources, raising the possibility of conflict in the near future.

The ability of ecosystems to continue providing biotic resources like wood, fish and food, and to absorb manmade wastes - commonly referred to as the earth's "bio-capacity" - is also diminishing. Comparing global ecological footprints to the earth's available capacity shows that, at current rates of resource use, we are exceeding bio-capacity by 30 per cent,[11] and approximately 60 per cent of the ecosystems we depend on for goods and services are being degraded or used in an unsustainable manner.[12] We are living off the planet's natural capital instead of the interest from this capital, and there are already signs of the devastating effect this will have on our societies and economies in depleting fish stocks, loss of fertile soil, shrinking forests and increasingly unpredictable weather patterns.[13]

The global population is reaching a size where cities need to start thinking beyond their immediate interests to consider their role as nodes of human consumption and waste production in a finite planet that is struggling to keep pace with humanity's demands. If cities are to survive, they must acknowledge the warning signs of ecosystem degradation and build their economies in a manner that respects and

rehabilitates the ecosystems on which life depends. If cities are to prosper, they must embrace the challenge of providing shelter and uninterrupted access to water, food and energy and improve quality of life for all of their citizens.

The way in which city spaces, buildings and infrastructural systems are planned, designed and operated influences the extent to which they encroach on natural ecosystems, and locks them into certain modes of consumption from which they struggle to deviate. Urban activities have direct and indirect consequences for the natural environment in the short, medium and long term, and their scale of influence typically extends far beyond the boundaries of what is typically considered to constitute "the city". Managing the indirect, distant and sometimes obscured impacts of city decision making in an increasingly globalized world requires appropriate governance mechanisms that improve cities' accountability for the resources they rely on.

As nexuses of knowledge, infrastructure and governance, cities represent a key opportunity to stimulate larger scale change toward green economies. In a world where cities are increasingly competing against each other economically, where weather patterns are unpredictable and low resource prices can no longer be assumed, cities need to proactively shape their economies and operations in preparation

cities, and to collaborate with experts and interest groups across disciplines and sectors to promote both human and environmental prosperity. The guides are based on the outputs of an expert group meeting hosted by UN-Habitat in February 2011 entitled *What Does the Green Economy Mean for Sustainable Urban Development?* Each guide focuses on one of the following cross-cutting themes:

Working with Nature

With functioning ecosystems forming the foundation for social and economic activity, this guide looks at how built environments can be planned to operate in collaboration with nature. It looks at how to plan cities and regions for ecosystem health, focusing on allowing sufficient space for natural systems to continue providing crucial goods and services like fresh water, food, fuel and waste amelioration.

Leveraging Density

This guide looks at the relationship between built and natural environments from the perspective of cities, and considers how their impact on ecosystem functioning might be reduced by making best use of their land coverage. Planning the growth of cities to achieve appropriate densities and providing alternative forms of mobility to private vehicles help to slow urban expansion onto ecologically sensitive land, and can reduce