

Atlas of Urban Expansion 2015 Edition

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ABSTRACT:

Massive urbanization, accompanied by the rapid expansion of cities and metropolitan regions and the sprawling growth of megacities the world over, is one of the most important transformations of our planet. Much of this explosive growth has been unplanned. Cities in developing countries have been unprepared for absorbing the many millions of the rural poor that are still crowding into informal settlements. These cities are likely to double their urban population in the next thirty years, and possibly triple in land area. While in industrialized countries the great transformation into an urban society is largely completed, there are growing concerns about continuing low-density sprawl and its deleterious environmental consequences - the effects on carbon emissions, energy use, and the loss farmland.

“*Monitoring Global Urbanization: Measuring the Quantity and Quality of Global Urban Expansion*” is a project jointly-sponsored by the United Nations Human Settlements Programme (UN Habitat), the Lincoln Institute of Land Policy, and the Urbanization Project at the Stern School of Business of New York State University, with major collaboration with the Center for Landuse Education and Research (CLEAR) at the University of Connecticut. The overall project is comprised by two major parts: Part I-The Quantity of Global Urban Expansion and Part II-The Quality of Global Urban Expansion. This paper addresses Part I which involves: (a) identifying the universe of cities with populations greater than 100,000 as of 2010; (b) creating a stratified sample of 200 cities; (c) mapping urban expansion in the global sample of cities; (d) measuring density change in the global sample of cities; and (e) mapping urban expansion in the entire universe of cities.

In work conducted previously, urban land cover was mapped for 120 cities for *circa* 1990 and 2000, using Landsat 4 or 5 TM and Landsat 7 ETM+ data. Application of our *Urban Landscape Analysis Tool* (ULAT) generated the following land cover classes: (a) urban built-up area; (b) suburban built-up area; (c) rural built-up area; (d) urbanized open space; (d) rural open space; and (e) water. From these data, metrics for fragmentation, compactness, urban expansion, density change of persons per unit built-up area, and others were calculated, as was the amount of infill, expansion, and leapfrog development between T_1 and T_2 . These data are reported in a number of publications, including *Making Room for a Planet of Cities*, *The Persistent Decline in Urban Densities*, *The Fragmentation of Urban Footprints*, and *A Planet of Cities: Country Estimates and Projections of Urban Land Cover*. The data and metrics are made freely available via the *Atlas of Urban Expansion* website. Furthermore, the *Atlas* includes maps and animations of urban growth for the period 1800-200 for a sample of 30 cities.

The *Atlas of Urban Expansion* provides the geographic and quantitative dimensions of urban expansion and its key attributes in cities the world over. The data and images are available for free downloading, for scholars, public officials, planners, those engaged in international development, and concerned citizens. The global empirical evidence presented is critical for an intelligent discussion of plans and policies to manage urban expansion everywhere.

The *Atlas of Urban Expansion* and *Making Room for a Planet of Cities* provide both the conceptual framework and, for the first time, the basic empirical data and quantitative dimensions of past, present, and future urban expansion in cities around the world that are necessary for making minimal preparations for the massive urban growth expected in the coming decades.

The *Atlas of Urban Expansion 2015 Edition* builds upon our earlier effort to include analyses of *circa* 2013-14 Landsat 8 OLI data for 100 of the 120 cities previously studied, as well as an additional 100 cities selected from the universe of cities with populations greater than 100,000 as of 2010. This edition of the *Atlas*, expected to be completed by Spring 2015, will include data and results for three dates, *circa* 1990, 2000, and 2013-14, spanning more than two decades.

In this paper, we discuss the analysis methods and present results to date.