Project Abstract

The Causes and Consequences of Urban Expansion
SES-0433278
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This research project is designed to investigate the causes and the consequences of the expansion of land in urban use in a global sample of 120 cities stratified by size, geographic region, and level of economic development. This investigation is of central scientific and policy importance at this time, particularly for cities in developing countries, where the urbanized population is expected to double, from 2 billion to 4 billion in the next 30–35 years. With increasing incomes in the developing countries, the consumption of land by their cities will likely double in the next 25 to 30 years. These growth rates imply that in the developing world a new city with more than 1 million inhabitants must be built **every week** for the next four decades. Confronting and managing this massive expansion in an efficient, equitable, and sustainable manner is a serious global challenge

In a related study, financed by the World Bank, the research team has undertaken to construct the sample of 120 cities and to collect census data and satellite imagery for two time periods, corresponding to the two most recent censuses, for each city in the sample. The location of urban areas in the sample is illustrated in Figure 1.

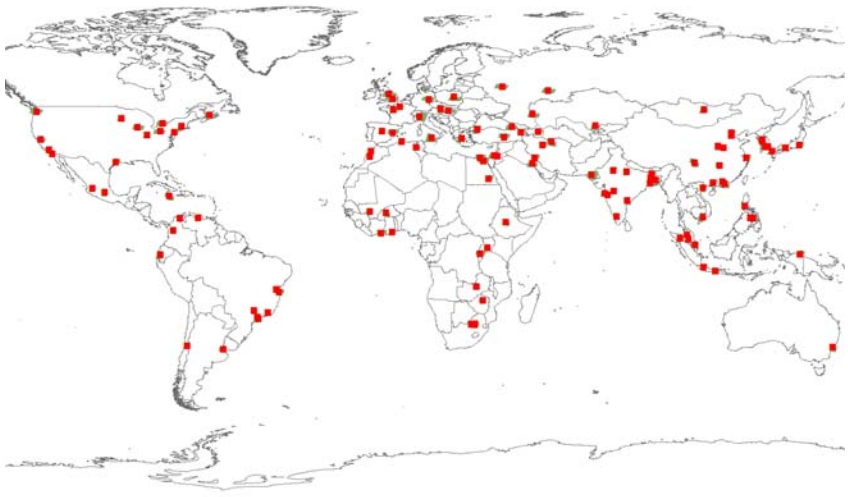


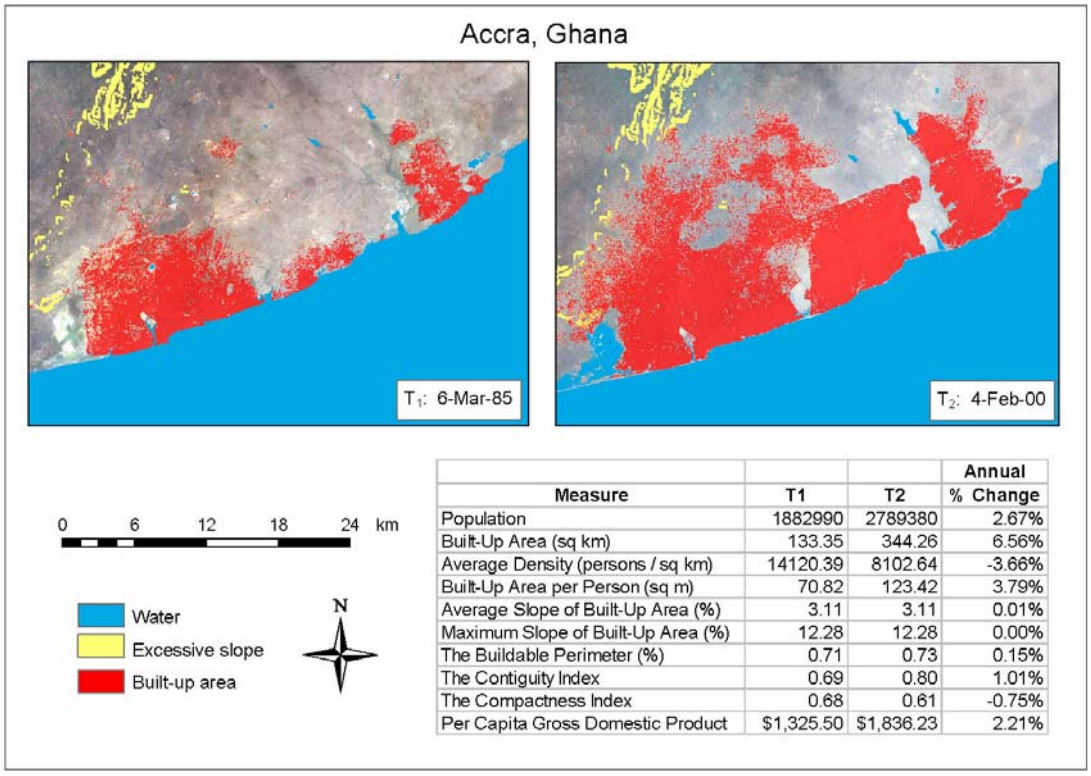
Figure 1

The proposed research will use the data collected for these 120 urban areas as a foundation for more extensive examination of the impact of local conditions — especially local planning and regulatory regimes — on urban expansion. This will permit exploration of the consequences of different levels of urban land consumption for human welfare in general, and for urban poverty

in particular. These explorations require data collection at the individual city level. The proposed research will undertake to:

1. Collect local data using local surveyors in each urban area
2. Improve and assess the land cover classification currently underway for the sample
3. Measure the social and economic impacts of urban expansion
4. Model the effects of local policies on urban expansion

The data collected and evaluated in tasks (1) and (2) will serve as inputs to the analysis undertaken in tasks (3) and (4). The data collected will further serve as an essential resource for scholars and policy makers in developing and testing hypotheses concerning the process of urban expansion, and will be made widely available. The analysis undertaken in tasks (3) and (4) will be the first to use a global sample to explore the relative importance of factors such as population growth, income, transportation costs and infrastructure, economic structure of the urban area and local regulatory policies on urban expansion. The analysis will also be the first to evaluate, in a global context, the impacts of urban expansion on housing affordability, access to sanitary and transportation infrastructure, and conditions in the most impoverished areas of cities.



Measure	T1	T2	Annual % Change
Population	1882990	2789380	2.67%
Built-Up Area (sq km)	133.35	344.26	6.56%
Average Density (persons / sq km)	14120.39	8102.64	-3.66%
Built-Up Area per Person (sq m)	70.82	123.42	3.79%
Average Slope of Built-Up Area (%)	3.11	3.11	0.01%
Maximum Slope of Built-Up Area (%)	12.28	12.28	0.00%
The Buildable Perimeter (%)	0.71	0.73	0.15%
The Contiguity Index	0.69	0.80	1.01%
The Compactness Index	0.68	0.61	-0.75%
Per Capita Gross Domestic Product	$1,325.50	$1,836.23	2.21%

Figure 2

As a first step, summary maps are being prepared for each urban area in the sample, providing summary measures of the magnitude of urban expansion and the density of human settlement. Maps are presented that illustrate the amount of urban expansion based on our analysis of satellite images. The dates for each image are given, and the levels of population and per capita

GDP are adjusted to these dates for comparison. An example for Accra, Ghana and surrounding urban area is illustrated above in Figure 2.

More detailed data for use in modeling the economic and physical determinants of urban expansion are currently being collected by field researchers. As of August 2005, data had been submitted from researchers in 47 different urban areas, and data collection was underway in a total of 104 urban areas. Field researchers are being recruited for the remaining 16 urban areas so that data collection can be complete by the summer of 2006.

The research has generated interest within both the scientific and policy communities. The World Bank, UN Habitat, and the UK Department for International Development have expressed interest in the research and contributed additional resources for collecting data relevant for both scientific analysis and evaluation of important objectives such as the Millennium Development Goals (see http://www.un.org/millenniumgoals/), particularly Goal 7, Target 11 (see http://www.unhabitat.org/mdg/).

The research team has been invited to present preliminary results of their analysis at the Allied Social Sciences Associations meetings in Boston (January, 2006) and the UN Habitat Conference, to be held in Vancouver, BC (June, 2006). A paper reporting on the satellite image classification techniques being developed and used in the research was presented at the meetings of the American Society for Photogrammetry and Remote Sensing (ASPRS) in Baltimore, MD (March, 2005).

Project Website

http://www.williams.edu/Economics/UrbanGrowth/HomePage.htm