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Project

# THE NYU URBAN EXPANSION PROGRAM: A PRIMER

The NYU Urban Expansion Program  
The Urbanization Project  
Stern School of Business, New York University

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URBAN  
EXPANSION





## 1. The NYU Urban Expansion Program

The NYU Urban Expansion Program is one of two research and action programs at the *NYU Stern Urbanization Project*, a think tank and urban action center of the Stern School of Business at New York University (NYU). The program is dedicated to assisting municipalities of rapidly growing cities in preparing for their coming expansion, so that it is orderly and so that residential land on the urban fringe remains plentiful and affordable. Its work is divided into two components: *Making Room for Urban Expansion* and *Monitoring Global Urban Expansion*. Part of the funding of the program's activities comes from the NYU Stern School of Business and the NYU Marron Institute of Urban Management and another part from its partnerships with other organizations, municipalities, and governments. The overall rationale for the program is laid out in a book titled *Planet of Cities* [Cambridge MA: Lincoln Institute of Land Policy, 2012]. A summary of this rationale and of the progress made to-date are given below (The program is described in a recent article in *The Economist*, dated 21 June 2014, online at: <http://www.economist.com/news/international/21604576-cities-are-bound-grow-they-need-planning-be-liveable-roads-redemption>; a short video describing it can be seen online at: <http://urbanizationproject.org/blog/urban-expansion>).

## 2. The Mission: Assistance to Rapidly-Growing Cities

In 2010, the urban population of the world reached 3.6 billion and, of this population, 2.5 billion (70% of the total) lived in some 4,000+ cities and metropolitan areas that had 100,000 people or more. Between 2000 and 2050, the world's urban population will grow by almost 80%

and most of this growth will be in developing countries: The population in cities in the developed countries will only grow by an estimated 160 million people. The urban population of developing countries will grow by 2.6 billion people, some 16 times that of the developed countries. We have assembled data on the current population growth rates in the 4,000+ cities (see figure 1). The populations of 1,430 of these cities—36% of the total number of cities and 39% of their total population—are now growing at 3% or more per year. On average, these cities can be expected to triple their populations by 2050.

**Mission Statement:** *The primary mission of the NYU Urban Expansion Program is to lend assistance to the municipalities of rapidly growing cities in making room for their inevitable expansion, making realistic projections of the future land needs as well as minimum necessary preparations for accommodating the growth of their populations in an orderly and sustainable manner, ensuring that land remains plentiful and affordable. The secondary mission of the NYU Urban Expansion Program is to gain a better understanding of urban expansion the world over by monitoring it in the entire universe of the 4,000+ cities, and by collecting and analyzing evidence on the quantity of land required for urban expansion, on its physical organization and its affordability, and on the forces affecting it in a stratified global sample of 200 of these cities.*

## 3. Making Room for Urban Expansion

It has become quite evident that we cannot hope to slow down the urbanization process or to shift populations among cities. People are free to move within their own countries and their right to move is enshrined in the Universal Declaration of Human Rights. In other words, for all practical purposes the growth of the population of cities can be taken as given and there is little we can do about it. However, when we translate this population growth to the expansion of urban areas needed to accommodate it, there is a lot we can do about it. We all understand what it means to prepare adequate lands for urban expansion, enough land to accommodate both residences and workplaces, so as to ensure that there are no land supply bottlenecks and that land—and particularly residential land—remains affordable for all. Unfortunately, municipalities of many rapidly growing cities often underestimate the amount of land needed to accommodate urban expansion. Others simply refuse to prepare adequate lands for expansion because of budget limitations and other pressing needs, hoping against hope to contain it and usually failing in the attempt. In the minority of cases where expansion is

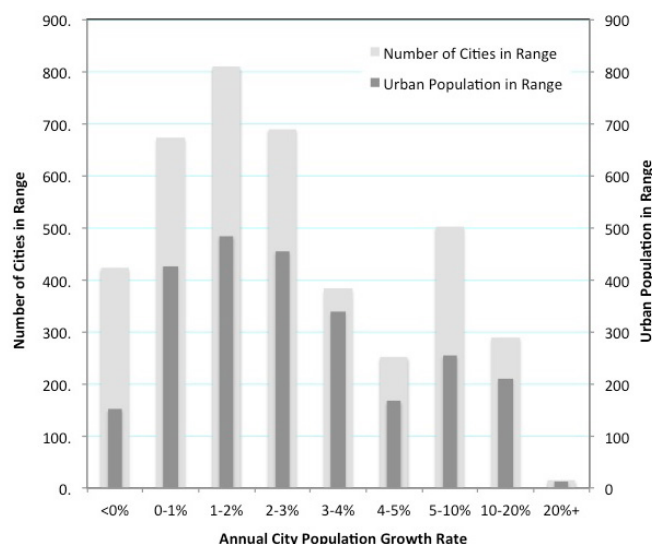


Figure 1: the distribution of 4,043 cities that had 100,000 people or more in 2010 by their annual population growth rates

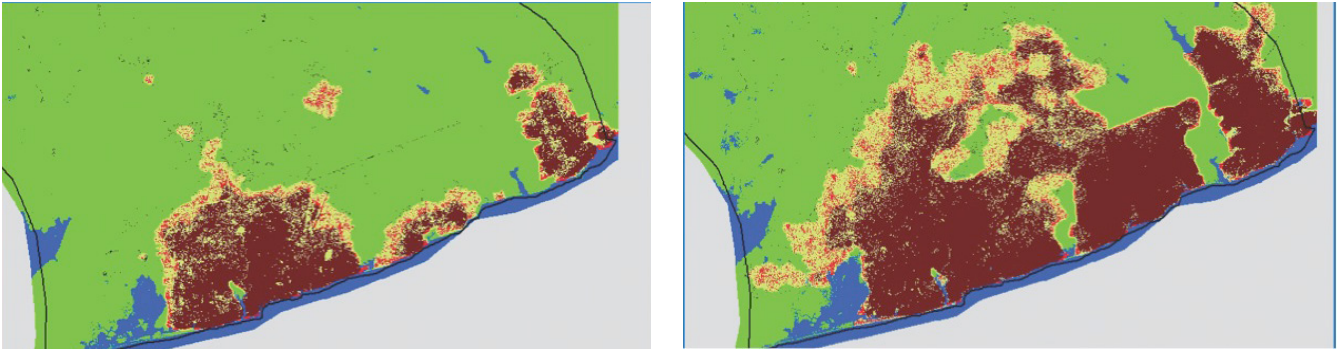


Figure 2: Between 1985 and 2000, the population of Accra, Ghana increased by 50% while its built up increased by 153%.

effectively contained by draconian laws and decrees, it typically results in land supply bottlenecks that render housing unaffordable to the great majority of residents.

We studied the rates of urban expansion in a global sample of 120 cities between 1990 and 2000 (see <http://www.lincolnst.edu/subcenters/atlas-urban-expansion/>). While the population of the cities in this sample grew by 17%, on average, during this period, the built-up area of these cities grew by 28%, almost two-thirds faster than the rate of population growth (see figure 2).

We found, to our surprise, that the built-up areas of cities expanded faster than city populations because urban densities are in decline. They declined, on average, by 2% per year in this sample of cities. We also studied the rate of urban expansion in a global representative sample of 30 cities between 1800 and 2000. The area of 28 out of 30 of these cities grew by at least 16 times during the last 70 years of the 20th century (see the animation of the growth of Paris, Sao Paulo and Los Angeles online at: <http://urbanizationproject.org/blog/30-cities-from-200-years-ago-and-where-they-are-now#.VHjOcEtnwII>). Densities in these cities declined, on average by 1.5% per year from their peak densities. And if densities decline, on average, by 1-2% per year, the area of rapidly growing cities will not

only triple in line with their expected population growth; it may grow by 4-7 times, on average. This may appear as a surprisingly high growth multiple, but there are examples, albeit only a few, of cities that planned for that growth multiple (see figure 3). As noted earlier, the mission of the urban expansion initiative is to alert municipalities in rapidly growing cities to the expected growth in the area needed to accommodate their population growth and to help them identify and prepare adequate lands to accommodate this growth.

## 4. Country Urban Expansion Initiatives

*The primary mission of the NYU Urban Expansion Program is to lend assistance to the municipalities of rapidly growing cities in making room for their inevitable expansion, making realistic projections of the future land needs as well as minimum necessary preparations for accommodating the growth of their populations in an orderly and sustainable manner, ensuring that land remains plentiful and affordable.*

The NYU Urban Expansion Program seeks to demonstrate the feasibility of making realistic preparations at the necessary scale on the ground in cities in all world regions. Its goal, in its most ambitious form, is to implement country urban expansion initiatives in a dozen countries by 2020, countries at different levels of economic development with different land and housing regulatory regimes. These initiatives initially engage 4-6 cities in a country, cities now growing at 3% or more per year, usually not including the largest city in the country or the capital. While each one of these focuses is country-specific, they focus on engaging municipalities and on building their planning and implementation capacity, rather than on central or regional governments, yet engage these higher levels of government in the process.

To-date, there are two country urban expansion initiatives in advanced stages, one in Ethiopia and one in Colombia. Partnership funding has now been secured for a third



Figure 3: Ildefons Cerdà's Ensanche Plan for Barcelona, Spain, 1859, expanded its built-up area 9-fold.





initiative in India and is in the process of being secured in Mexico. Exploratory studies to assess the feasibility of such initiatives—to determine whether municipalities are both interested and capable in carrying out the initiative’s four-step municipal action program; whether the legal and administrative tools are available for its immediate implementation; and whether partners can be found to co-finance the initiative—are scheduled to take place in early 2015 in India, Mexico, Myanmar, China, Ecuador, and Indonesia. An exploratory study was completed in Vietnam in early 2014 and it was determined that conditions were not right for a country urban expansion initiative there at the present time.

A typical *Urban Expansion Initiative* consists of a simple four-step municipal action program to be implemented immediately, in advance of the occupation of the urban fringe by formal and informal construction:

1. *Realistic Maps*: preparing maps of the lands that will need to be converted to urban use between now and 2040, based on realistic population and urban area per capita projections;
2. *Generous City Limits*: compelling federal or regional authorities to create a single municipal jurisdiction that can execute plans in the entire area for expansion;
3. *Arterial Road Grid*: locating a 25-to-30-meter wide arterial road grid with a 1-kilometer spacing throughout the expansion area and transferring the rights-of way for all roads to the municipality; and
4. *Selective Protection of Public Open Spaces*: creating a civic-municipal organization that can prepare and implement a metropolitan public open space plan, locating a hierarchy of public open spaces, large and small, throughout the expansion area, acquiring the land rights for all these spaces, and actively protecting them over time from incursion by formal and informal land developers.

In order to be considered successful, country urban expansion initiatives must end up with “stakes in the ground”: The legal implementation of the expansion plans and the actual acquisition of the rights of ways for arterial roads and public open spaces. The initiative does not aim to produce paper plans as its final goal, but to empower municipalities to create their own plans and action programs and to accompany them on the road to their implementation so as to ensure the orderly, efficient,

equitable and sustainable expansion of their cities.

The NYU Urban Expansion Program, in association with its partners, offers municipalities advice and instruction in planning and implementing this action program at no cost. Municipalities are then responsible for obtaining the additional funds necessary for the full implementation of their action programs on the ground, with continued assistance and support from the NYU Urban Expansion Program. In parallel, participants in the program at the municipal level are encouraged to expand the initial demonstration and proof of concept by successful cities to countrywide urban expansion initiatives.

A typical country urban expansion initiative now costs \$800,000 to \$1,000,000 and takes two-to-three years to complete. Exploratory studies in individual countries cost \$20-40,000 and are financed directly by the NYU Urban Expansion Program. The program contributed \$500,000 to each of the first two country initiatives—the one in Ethiopia and the one in Colombia— and has now partnered with Cities Alliance to complete the Ethiopia program in four cities and to expand it to other cities in the country, and with the Corporación Andina de Fomento (CAF) to complete the Colombia program in two cities.

The NYU Urban Expansion Program plans to continue to contribute \$100,000 of its own funds to set in motion any new country initiative. It is in constant negotiation with partners for new country initiatives and in constant contact with donors to obtain new funds for program activities. A partnership for funding the India initiative has been created with the Infrastructure Development Finance Corporation of India (IDFC). A partnership for funding the Mexico initiative is currently being negotiated with Banco de Obras (BANOBRAS) and a partnership for funding the Ecuador initiative is currently being negotiated with the Inter-American Development Bank (IDB). We are now actively seeking new partnerships for funding both individual country initiatives and multi-county initiatives.

## 5. The Four-Step Municipal Action Program

### 1. Realistic Maps:

A realistic projection of urban land needs for future expansion must go hand in hand with policy reforms, reforms that abandon artificial limits on population growth and urban expansion in favor of economic development and the expansion of the urban economy. The Regional Plan for the Mumbai Metropolitan Region 1996-2011, for

example (figure 4), has undergone this transformation. The plan acknowledges the failure of earlier plans that focused on containment and promotes a new strategy based on an accelerated rate of urban expansion, allowing the built-up area to more than triple. Realistic maps of the areas required for projected expansion—preferably for the coming 30 years—can and will ensure that there will be an ample land supply for the city to expand, preventing land supply bottlenecks and the concomitant speculation in inflated land prices. It will, in turn, ensure that land remains affordable to all segments of the urban population, both for residential and for productive purposes.

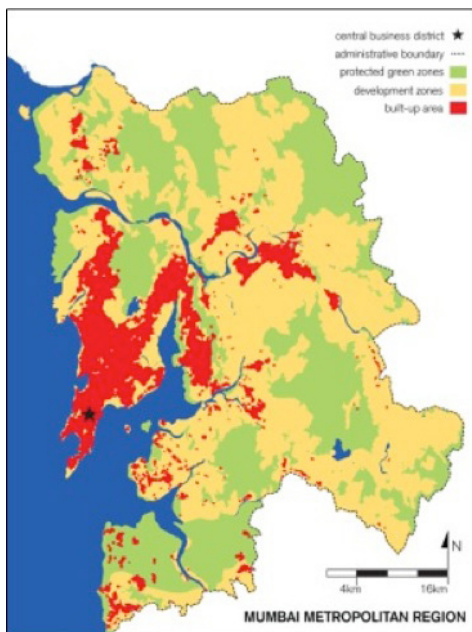


Figure 4: The Mumbai Metropolitan Region Land Use Plan, 1996-2011, allowed its built-up area to more than triple.

## 2. Generous City Limits:

Realistic maps will be of little use unless they are put into practice by designating municipal administrative jurisdictions that fully encompass these realistic maps and enshrine them in law. Municipalities cannot be expected to institute these enlarged jurisdictions; they need to be legislated by regional or national authorities. New city limits have to be large enough to accommodate realistic maps of projected expansion. If they are to err, they should err on the side of more rather than on the side of less, to allow for the small probability that the city may become very large. And once they are put into law, these limits—designating areas where orderly urban development would be allowed and encouraged—should be subject to study and review and changed regularly, preferably every decade, as population and urban area per capita trends become better understood. Chinese cities have exceptionally large administrative areas,

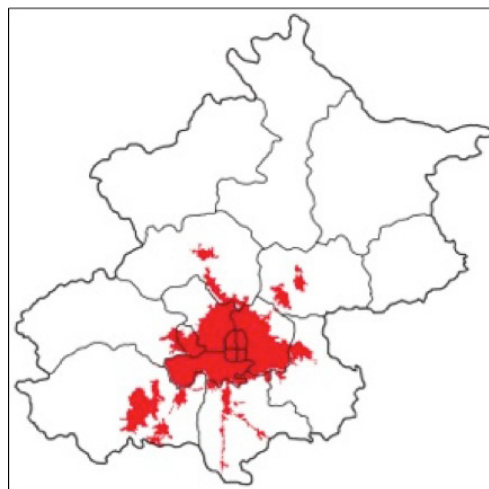


Figure 5: In 1999, the administrative area of Beijing, China, was 11 times larger than its built-up area.

making it considerably easier to plan for their expansion. In 1999, for example, the administrative area of Beijing was 11 times larger than its built up area (Figure 5).

## 3. Arterial Road Grid:

The arterial road grid pertains only to the network of *major arterial roads*—the urban roads that typically carry intra-urban traffic, public transport, and trunk infrastructure, especially water and sewer lines. To accommodate urban expansion, an arterial road grid on the urban fringe must have four essential properties: (1) it must cover the entire area designated for expansion and not just a segment of that area; (2) it must be a network of long, continuous roads that crisscross the expansion area and are connected to the existing road network; (3) roads should be spaced no more than one kilometer apart to ensure that public transportation is within a 10-minute walk; (4) the width of the roads should be of the order of 25-30 meters, so that they can have designated bus lanes, bike paths, a median, and several lanes to carry intra-city traffic. Initially, only rights-of-way for the grid should be acquired by municipal authorities; dirt roads can then be opened up in large portions of the grid; selected segments can then be improved over the years but only as demand requires them and as budgets become available. The 2011 development plan for Ahmadabad, India, for example, has adopted the arterial road grid as its basic framework for expansion (Figure 6).

An early introduction of an arterial grid into expansion areas would help attain five important objectives: (1) An anti-poverty objective: by opening up sufficient lands for urban expansion, land prices and hence housing prices in both formal and informal markets will remain affordable; (2) A planning objective: By locating the grid now, municipalities



Figure 6: The arterial road grid in the 2011 development plan for Ahmedabad, India, allows for orderly urban expansion.

can actively shape future growth, moving ahead of developers rather than following them. With the superblock system created by the arterial road network it becomes possible to plan for land uses and land subdivisions over time, as dictated by market forces as well as by neighborhood concerns; (3) A transport objective: The grid will function as an efficient framework for a public transport system crisscrossing the entire expansion area within a 10-minute walk of all locations; (4) An environmental objective: The arterial grid will be an essential element of an effective public transport system, one of the most important elements in any urban strategy that aims to reduce our carbon footprint. It will also provide planners with an effective tool for directing urban development away from sensitive natural habitats that are likely to be encroached upon otherwise; and (5) A financial objective: Municipalities can acquire the land needed for the grid now, and individual road segments can be improved to higher standards later as demand for travel along them increases. If rights-of-way are acquired now, their costs will be many, many times lower than the cost of pushing an arterial road through a fully built neighborhood.

#### 4. Selective Protection of Public Open Spaces:

The selective protection of open spaces involves four key steps: (1) The creation of an organization comprising public, private and civic organizations for the aggressive protection of these open spaces from invasion by formal and informal developers. (2) The preparation of a metropolitan open space plan under the auspices of that organization, a plan that contains a hierarchy of open spaces of all sizes and types—from football fields and playgrounds to wetlands, farms, and nature parks—in areas of expansion; (3) The passage of

new regulations or the enforcement of existing regulations that mandate the allocation of a certain share of all private lands for public use and facilitates the creation of open space conservancies that enable people to donate their lands for public use while maintaining their ownership of these lands; and (4) The selective purchase by the organization of private lands for use as public open space on the urban periphery while land prices are low, the registration of liens on private lands designated for future use as open space, or the acquisition of the development rights to land through purchase and exchange of land rights or through the creation of open space conservancies. The most important aspect of this fourth element of the initiative is this: its actual extent will be limited by the private, public and civic resources—both financial and human—that can be made available for its implementation. That is why it must be selective. Instead of protecting too much land from development at no cost to the public and ending up with no open space at all, it aims to protect some land and protect it well at a minimal cost to



Figure 7: In 2011, Toronto, Canada, had a hierarchy of public open spaces that constituted 11 percent of its area.

the public so that it remains open in perpetuity. Toronto, for example, has an enviable hierarchy of urban parks large and small distributed throughout the city, taking up more than 11 percent of its area (Figure 7).

## 6. Progress to-Date in Ethiopia and Colombia

Two country initiatives that were initiated in early 2013—one in Ethiopia and one in Colombia—are now in advanced stages of implementation.

### The Ethiopia Urban Expansion Initiative

Ethiopia is now among the most rapidly urbanizing countries in the world. According to UN estimates, Ethiopia's urban population will triple between 2010





and 2040. The Ethiopia program focused on four rapidly growing cities that are also regional capitals—Mekelle (Tigray National Regional State), Adama (Oromia National Regional State), Hawassa (Southern Nations, Nationalities and Peoples Regional State) and Bahir Dar (Amhara National Regional State). Preliminary city-level population projections suggested that these cities will much more than triple their 2010 population by 2040: Hawassa's 2010 population will grow more than 6-fold by 2040, Mekelle almost 5-fold its 2010 population, and Adama and Bahir Dar almost 4-fold. The built-up areas of these cities can be expected to expand at an even faster rate than their population. Because urban population growth in Ethiopia will be accompanied by economic development and the increasing availability of inexpensive transport the annual consumption of urban land per person will grow as well—a phenomenon consistent with the historical experience of cities all over the world. Assuming a 1% annual increase in urban land per person, Mekelle, Adama, and Bahir Dar are expected to increase their 2010 built-up areas by more than 5-fold and Hawassa may increase in size by more than by more than 8-fold.

The Minister of Urban Development, Housing and Construction (MUDHCO), H.E. Mekuria Haile Teklemariam, signed an MOU with the NYU Stern Urbanization Project in July 2013 and a training workshop was held that month in Addis Ababa with officials from the Ministry, the four participating cities, as well as their regional governments (see figure 8).

The urban expansion initiative in Ethiopia quickly became an integral part of the country's overall urban development strategy. (A short video on the Ethiopia

Urban Expansion Initiative can be seen at: <https://www.youtube.com/watch?v=XQ7kUhTxJOM>).

Following the workshop, municipal teams in the four participating cities commenced a work program involving city population and area projections to

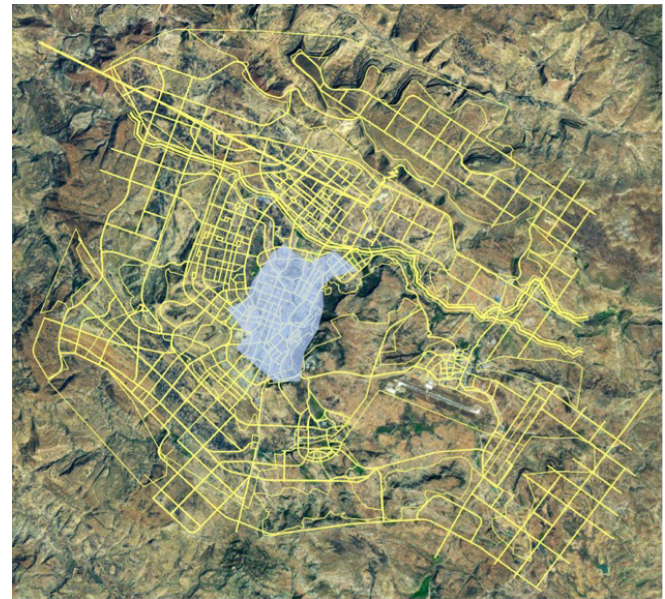


Figure 9: Draft arterial road plan prepared by municipal officials in Mekele, Ethiopia, 2014

2040, the designation of new municipal boundaries, the planning of the arterial infrastructure grid, the estimation of compensation costs, the drafting of phased implementation schedules, and the estimation of the institutional capacity required to deliver the different targets of their municipal action programs. Municipal teams in all four cities and regions agreed to complete this process by February 2014 in line with the Ministry's ambitious implementation schedule.

The participating cities obtained budgets for the first year of compensation payments for the arterial road network as part of their 2014 budgets. Precise budget figures are still unknown. All of the cities are starting in year one with land that is already within the old city boundaries, so there is less to pay in compensation than will be the case when they move into agricultural lands on the urban periphery.

The combined NYU-Ministry team returned in October 2013 and in December 2013 to work with the cities and their regional counterparts. By December, the 25-year expansion plans for each city were sufficiently detailed to begin extensive consultations with residents and local officials in the surrounding rural areas (see figure 9). In February 2014 the four cities presented their final



Figure 8: Municipal officials from Bahir Dar, Ethiopia, drafting arterial road grids during workshop in Addis Ababa, July 2013



expansion plans to Minister Mekuria, to their regional governments, and to their city councils to request and subsequently gain their approvals.

The approved new municipal boundaries add 35,129 hectares to Mekelle's administrative boundary to accommodate a projected population increase of about 1.2 million by 2040; Hawassa added 16,034 hectares to accommodate 1 million new residents by 2040; Adama added 21,490 hectares to accommodate 0.8 million new residents by 2040; and Bahir Dar added 26,015 hectares to accommodate 1.8 million new residents by 2043.

In November 2014, Phase II of the Ethiopia Urban Expansion Initiative was initiated with the addition of three cities in each of the four regions. These cities are now scheduled to complete their expansion plans by April 2015. As part of the Phase II action program, the Ethiopia Initiative is also supporting curriculum development at the Ethiopian Civil Service University and the four federal universities located in the regional capitals, so as to ensure that cities undertaking urban expansion plans have the necessary capacity to plan and implement them. The Ethiopian Civil Service University incorporated a course on urban expansion into its regular masters program in urban management. 400 students are currently attending this course. The universities at Mekelle and Bahir Dar are participating in planning and monitoring activities.

In November 2014, The Ministry and the Cities Alliance agreed to a medium-term Ethiopia Country Program that will support implementation of expansion plans in the 16 Phase I and II cities, providing for extensive capacity building and technical assistance in urban land management, municipal engineering and finance, urban planning and design and affordable, incremental housing delivery, and plot consolidation in informal settlements. The country program will ensure that training and advice on urban expansion is available for all urban local governments in Ethiopia in the coming years.

### The Colombia Urban Expansion Initiative

The Colombia Urban Expansion Initiative, like all other country initiatives is divided into two phases. Phase I ends at the completion of the plans for urban expansion by 2040, while Phase II ends with the acquisition of the rights-of-way of the entire arterial grid as well as the selective acquisition of public open spaces in the expansion area. In Phase I, the country team reached out to the municipalities of rapidly growing cities to assess their interests, to sign cooperation agreements, to help

form municipal teams, and to help these teams prepare materials for the training workshop. As part of this effort, the country team provided municipalities with population and built-up area histories and projections, 1990-2040. The country team, accompanied by experts in urban transport, real estate law, and environmental assessment, then visited the participating cities to become acquainted with areas of new expansion and environmental sensitive areas, to assess planning and implementation capacity, and to explore the available legal mechanisms for program implementation.

In September 2013, the mayors of the participating cities—Valledupar, Montería, Santa Marta, Tunja and Yopal—together with their municipal teams participated in a workshop in Cartagena, Colombia. The NYU Urban Expansion Program team, in collaboration with a number of Colombian experts introduced the program, trained participants, and conducted a studio exercise where teams began to draft expansion plans and arterial road grid layouts. The workshop was attended by representatives of the Corporación Andina de Fomento (CAF), a financial institution with presence in 18 countries in Latin America and the Caribbean. A partnership agreement to collaborate on urban expansion initiatives in the region was later signed with CAF. Following the workshop, the country team visited the participating cities numerous times, and it became clear that two cities—Valledupar and Montería—were making faster progress than others. The focus of the work then turned to these two cities. Arterial road plans were completed (see figure 10); the plots that had arterial roads passing through them were identified from rural cadasters; and the share of the land in each plot required for the arterial road grid was calculated. This work completed Phase I of the work in Colombia.

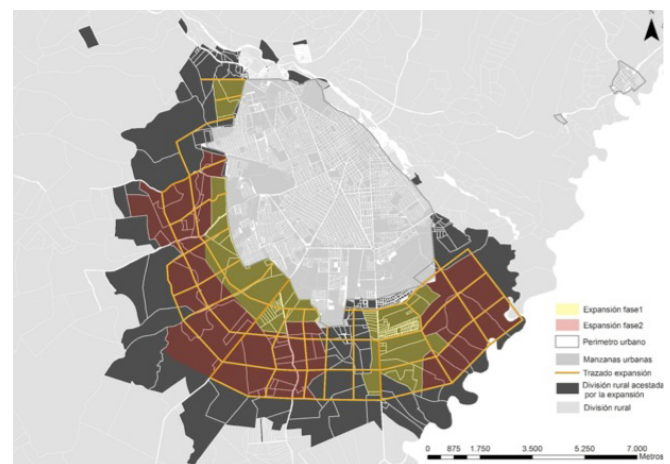


Figure 10: The draft arterial grid plan for Valledupar, Colombia, prepared by municipal officials in 2014





To initiate Phase II, an agreement was signed with CAF to contribute \$200,000 to carry out a topographic study of the arterial road grid; to review alternative strategies for acquiring the land for the rights-of-way of the grid from landowners; and to hire the services of a legal firm to negotiate agreements with individual landowners to put liens on their land titles specifying the area needed for the grid. Phase II has now been initiated and is expected to be completed in late 2015. In parallel, a team of NYU Stern School of Business students is working with the country team to prepare a business plan for setting up a civic sector institution in Valledupar, nominally titled “Friends of Public Open Space in Valledupar”. Municipal officials and civic leaders will be contacted in early 2015 to set up the institution, which will then draft a plan for identifying and acquiring a hierarchy of public open space in the expansion area of Valledupar. A short video on the Colombia Urban Expansion Initiative can be seen at <https://www.youtube.com/watch?v=OtVpkeDD7ok>.

## 7. Prospective New Country Initiatives

A number of new country urban expansion initiatives are now in the exploratory stage. The main difference between these new initiatives and the earlier ones in Ethiopia and Colombia is that the NYU Urban Expansion Program does not have the necessary funds to fund these initiatives by itself and, therefore, required the formation of partnerships with other organizations and institutions that can jointly finance new initiatives. Six new initiatives are now in the exploratory stage, in different phases of partnership formation. Only in India, has a partnership been officially formed. Potential partnerships for other individual-country or multiple-country initiatives are now at different stages of development, some more advanced than others. The formation of such partnerships is critical for the implementation of new country urban expansion initiatives.

### India Urban Expansion Initiative

The India Urban Expansion Initiative will be executed by a partnership between the NYU Stern Urbanization Project and the Infrastructure Development Finance Corporation of India (IDFC), with financial commitments of \$100,000 from the former and 2 million Indian Rupees (\$320,000) from the latter. A Memorandum of Understanding on the proposed partnership is now in the final stages of preparation.

A team for undertaking the project has been formed. Discussions are now underway with a shortlist of three state governments—in Madhya Pradesh, Rajasthan

and Andhra Pradesh (the new divided state of Andhra Pradesh)—to determine which states would be the focus of the first phase of the initiative. Preliminary observations suggest that these states have the political will to get the project implemented and it has become quite clear that the initiative needs to be carried out with strong state-level support and cannot be implemented by contacting individual municipalities directly. Within each state, we have shortlisted the rapidly growing cities that meet the 3 percent population growth cut off.

We have secured in principle approval from the Government of Andhra Pradesh to work in the cities of Nellore, Kurnool, Anantapur, Kadapa and Madanapalle, pending discussions with the Urban Development Minister who might have some thoughts on city choice. We have also made preliminary contact with the state administrations of Rajasthan and Madhya Pradesh and will conduct meetings during December 2014 and January 2015 to gauge interest.

We have identified a potential model for implementing the India Urban Expansion Initiative on the ground, a model that has been quite successful in several Indian states, notably Gujarat and Haryana. This model is referred to as the Development Plan–Town Planning Scheme (DP-TPS) model. It is based on preparing an overall development plan in the expansion areas that includes an arterial road grid and then following it up with a large number of small town planning schemes that are, in essence, land readjustment schemes. Each scheme focuses on an area with a small number of rural plots. Plot owners are given smaller plots in the scheme, allowing for a share of the area to be used for streets and another share to be sold to finance infrastructure in the area. The leader of CEPT, the organization responsible for many of these schemes in Ahmedabad, has been recruited as the urban planner for the project team.

The project team is now scheduled to visit state governments in March 2015 to finalize the choice of the state for the initiative, to sign agreements with municipal administrations, and to prepare the ground for a training workshop for municipal officials now scheduled for mid-2015.

### Mexico Urban Expansion Initiative

A team responsible for the Mexico Urban Expansion Initiative has been formed and the exploratory phase of the Initiative was launched on 15 October 2015 with a luncheon sponsored by the NYU Urban Expansion Program. The luncheon was attended by representatives of 10 municipalities as well as by representatives of Federal



Government agencies that regulate and/or finance the urban expansion (BANOBAS, SEDATU, CONAVI, the Senate). The team later followed up with meetings and email communications with all the luncheon attendees.

Following the luncheon meeting, municipalities of five rapidly growing cities sent us letters of interest signed by their Mayors and the Planning Department Commissioners: Chihuahua, Reynosa, Hermosillo, Playa del Carmen, and 3 out of 4 municipalities that comprise the expansion area of Queretaro's metropolitan region. The fourth municipality is now being pursued. The project team accompanied by local experts now plans to visit the participating cities in the beginning of 2015, with the aim of launch the training workshop in April or May 2015.

We have not yet secured a partner to co-fund the initiative. We presented a financial proposal to BANOBAS, the National Works and Infrastructure Bank, whose mission is to finance municipal infrastructure. Their overall reaction to our proposal was positive. We now need to reassure BANOBAS that (1) there are feasible ways to protect the road right-of-way from squatting; (2) we can bring in other partners; and (3) we do intend to bring the project all the way to registering road rights-of-way liens on property titles rather than leave municipalities with paper plans. The Corporación Andina de Fomento (CAF), which already has a partnership agreement with us and is already working with us in Colombia, has shown an interest in financing the Mexico Expansion Initiative, and may be a possible partner as well.

### China Urban Expansion Initiative

The China Urban Expansion Initiative will focus on rapidly growing intermediate cities, cities that had populations of 800,000-1,200,000 in 2010 and are now growing at 3% or more per annum. There are no less than 87 Chinese cities that fit these criteria. 68 cities are now growing at 5% or more per annum and 56 cities are now growing at 7% or more per annum, and we may focus on 4-5 of these more rapidly growing cities. A key to the success of our initiative in China would be to sharpen our sense of what we could offer that is different from what they are already doing and doing well. To this end, we are thinking of new urban expansion strategies that are different from their current practices: (1) We want to focus on longer-term plans, going up to 2040, rather than on 5-year or 10-year plans; (2) We want to integrate transportation planning with land use planning; (3) We want to move away from radials and ring roads and towards an arterial road network that could serve the entire city rather than its center and a small set of its sub-centers; (4) We want

to promote a model of a more decentralized, finer grain, city with more decentralized industry as well as more decentralized public facilities and amenities; (5) We want to preserve and integrate the affordable housing stock in urban villages in and around these cities into the city's fabric; (6) We want to promote and integrate efficient urban agriculture as well as a hierarchy of public open spaces into the fabric of the city; and (7) We want to expand the range of transportation modes, not limiting them to cars and rail transit.

An exploratory mission to China is now scheduled for March 2015. As of now, we only have seed funding for this initiative and we are seeking a partner or partners than can help us fund it in its entirety. The exploratory mission's goals are (1) to judge the interest of municipal governments in participating in such an initiative; (2) to judge the willingness of the central and provincial governments to support it; (3) to explore the legal and institutional mechanisms available for its immediate implementation; and (4) to explore possible partnerships.

### Myanmar Urban Expansion Initiative

A team responsible for the Myanmar Urban Expansion Initiative has been formed and, pending government approval, an exploratory mission is now scheduled for January 2015. We have not yet secured a partner to co-fund the initiative. Several potential donor partners have been informally contacted. Local representatives of donor organizations that support urban projects in Myanmar—including the Asian Development Bank (ADB), the World Bank, Cities Alliance, and the Korea International Cooperation Agency (KOICA)—will be contacted during the exploratory mission in January. Our initial survey of potential partners confirmed that very few donors are supporting urban development activities outside of Yangon.

Officials in the government department responsible for urban planning—the Department of Human Settlements and Housing Development (DHSHD) in the Ministry of Construction (MOC)—have now been informally briefed about the proposed initiative. Their initial reaction was positive. We have drafted a detailed letter to the Director General of MOC outlining the proposed Myanmar Urban Expansion Initiative. We are now waiting on further feedback from ministry officials before submitting the letter, hopefully before 10 December 2014. This letter will serve as a Memorandum of Understanding with the MOC for the Exploratory Study.

The results of the 2014 census were analyzed and out of an initial list of 16 cities of over 100,000 in population, 9



secondary cities, all growing at well above 3% per year, have been identified as potential participants in the proposed initiative. A number of these cities is scheduled to be visited during the exploratory mission in January to gauge their interest and their implementation capacity.

### Ecuador Urban Expansion Initiative

A team leader for the Ecuador Urban Expansion Initiative has been identified and several exploratory activities have been initiated. To-date, we have not yet secured a partner to co-fund the initiative but contacts with several potential partners have been initiated.

Accordingly to recent census data, there are seven intermediate cities of Ecuador that are now growing at more than 3% per annum: Esmeraldas, Riobamba, Portoviejo, Loja, Ambato, Ibarra, and Cuenca.

The team leader, accompanied by the Mayor of Valledupar, gave a joint presentation on the NYU Urban Expansion Program, the progress made in Colombia, and the proposed Ecuador Urban Expansion Initiative in a conference sponsored by Mutualista Pichincha, a private real estate finance corporation, on 15 October 2014. The presentation was attended by the Minister of Housing and Urban Development, MIDUVI; the Technical Manager of the Banco del Estado (BEDE); and by municipal officials of several of the cities listed above. Following the event, the Minister expressed the interest of the National Government in the Initiative. A formal visit to the Minister is now scheduled to take place in December 2014. The Technical Manager of BEDE—the national entity that attends the financial requirements of local governments—also expressed the interest of BEDE being part of the process. A meeting with her will take place before mid-December 2014. The Resident Representative of the Inter-American Development Bank (IDB) in Ecuador met with the team leader, acknowledged the importance of the initiative, and expressed an interest in collaborating in its implementation.

Although we have decided to advance negotiations with potential partners before signing letters of interests with municipalities, the mayor of Portoviejo requested the team leader to present him with details of the initiative and following the presentation expressed his interest in signing a letter of interest. It is expected that other municipalities will be visited in the coming months to gauge their interest and their capacities, in preparation for a training workshop that—provided we manage to find a suitable partner in time—can take place in mid-2015.

### Indonesia Urban Expansion Initiative

The Indonesia Urban Expansion Initiative is at a very early stage. A team leader has been identified and an exploratory mission to Indonesia is now scheduled for early 2015. To-date, we have not yet secured a partner to co-fund the initiative but contacts with several potential partners have been initiated.

## 8. Monitoring Global Urban Expansion

*The secondary mission of the NYU Urban Expansion Program is to gain a better understanding of urban expansion the world over by monitoring it in the entire universe of the 4,000+ cities, and by collecting and analyzing evidence on the quantity of land required for urban expansion, on its physical organization and its affordability, and on the forces affecting it in a stratified global sample of 200 of these cities.*

There is great reluctance to engage with the prospects of urban expansion, for reasons that may be perfectly understandable. Many people believe the cities consume enough land as it is, and all future construction should take place within their current boundaries. Many oppose expansion so the planet can remain sustainable, people can walk and cycle at their leisure, municipal budgets are not unduly burdened, decaying central cities can thrive again, and precious cultivated lands on the urban fringe are not laid to waste. This reluctance tends to keep such prospects rather obscure and even somewhat frightening, and prevents us from addressing them in a clear and forthright manner.

We believe that the best way to engage with this reluctance to confront continuing urban expansion is to produce and present solid empirical data on actual urban expansion and its key attributes in cities around the world over long periods of time. Such data, we believe, can demonstrate the extent, the form, and the context of global urban expansion in the distant and recent pasts, and suggest how and by how much they are likely to grow further in the future. Coupled with theories that could explain the underlying forces that propel and shape urban expansion, these data could also provide the evidence needed to demonstrate various concerns: that it would be very difficult, if not futile, to resist it; that ignoring or denying it in the hope that it will not occur will simply allow it to take place unhindered and in a more costly and destructive way; that acquiring a better understanding of it will make it less formidable and more manageable; and that making minimal yet effective preparations for it is the right way, and certainly the only responsible way, to proceed.



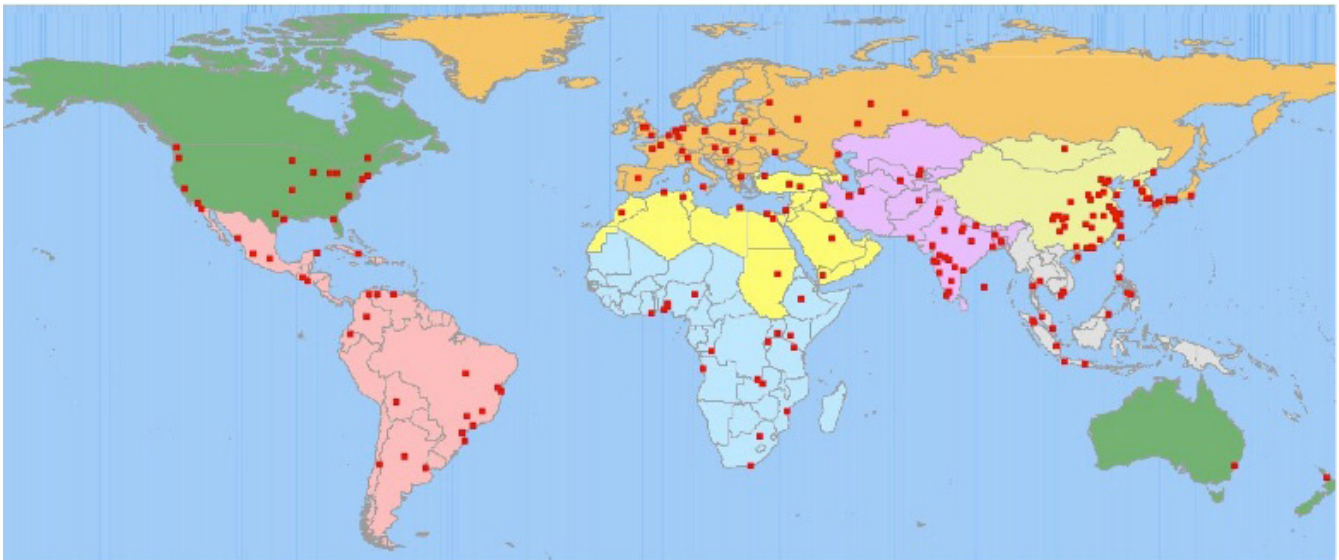


Figure 11: Map of the world showing the division into the eight world regions and the global sample of 200 cities.

The NYU Urban Expansion Program has embarked on a multi-phase research effort to monitor global urban expansion. The research effort focuses on the universe of all cities and metropolitan areas that had 100,000 people or more in 2010, and on a stratified global sample of 200 cities chosen from that universe (see figure 11).

To-date, we have identified 4,043 cities in this universe and, as we shall explain below, this universe is now being revised and completed in collaboration with the U.N. Population Division. In 2010, these cities contained 70% of the total urban population in the world. The sample of 200 cities is a stratified sample. It is stratified into three strata: eight world regions, four city population size categories, and three groups of countries with different number of cities. In general, the sample is drawn with the urban population in mind: it seeks to focus on urban dwellers rather than on cities. The sample thus contains 5% of the cities in the universe and 27% of the urban population in the universe. We have conducted a statistical test to determine whether the sample is truly representative of the universe of cities by checking whether the mean population growth rate in the sample is the same as that of the universe as a whole. We can say with 95% confidence that the two are not different from each other.

The more ambitious goal of the monitoring program is to have more and more data collected for this sample on a regular basis.

The sections below describe progress to-date on the various phases of monitoring global urban expansion.

### Phase I: *The Atlas of Urban Expansion: The 2015 Edition*

*The Atlas of Urban Expansion: The 2015 Edition* is a joint project of the United Nations Human Settlements Programme (UN Habitat), the Lincoln Institute of Land Policy, and the NYU Stern Urbanization Project. The Atlas will be modeled on the earlier *Atlas of Urban Expansion published by the Lincoln Institute of Land Policy in 2012* (online at: <http://www.lincolninst.edu/subcenters/atlas-urban-expansion/>). That Atlas provided satellite-based maps of urban extent and their associated metrics—including extent, built-up area density, fragmentation, and compactness—for a global sample of 120 cities for 1990 and 2000. This sample was a 3.3% stratified sample of the universe of 3,646 cities that had 100,000 people or more in 2000. The new *Atlas of Urban Expansion: The 2015 Edition* will use the same methods to provide the same maps and metrics for a global sample of 200 cities for 1990, 2000, and 2010. It will have maps and metrics for all 200 cities for three dates, 1990, 2000 and 2013, following the same format as the earlier *Atlas of Urban Expansion*.

Work on the Atlas is being undertaken by a team of researchers and students at the Department of Natural Resources and the Environment at the University of Connecticut. The work is based on the classification of Landsat satellite imagery with 30-meter pixel resolution, its conversion into maps, and the calculation of metrics associated with these maps. To-date, more than half other classifications have been completed and all of them should be completed by the end of January 2015. The work on the Atlas should be completed by April 2015.



## Phase II (a): The quality of urban layouts in expansion areas

This phase of monitoring global urban expansion is a joint project of United Nations Human Settlements Programme (UN Habitat) and the NYU Stern Urbanization Project. It focuses on the quality of urban layouts in the expansion areas in the global sample of 200 cities. Using the high-resolution satellite imagery of *Bing* and *Google Earth*, we focus on a random set of 10-hectare locales in the expansion areas of cities (areas developed between 1990 and 2013). In each city, we seek to obtain average measures for five metrics: (1) the share of land in arterial roads and access to arterial roads; (2) the share of land in streets and the distribution of street widths; (3) the share of land in residential areas in different stages of housing sector evolution (atomistic housing, informal land subdivisions, formal land subdivisions, and housing projects); (4) average block size and the density of street intersections; and (5) plot dimensions in land subdivisions. The bulk of this work, which is quite labor intensive, will be done in the *India Urban Expansion Observatory*, now being set up at the Mahatma Education Society, a private university in Navi Mumbai, India.

The partnership agreement between UN Habitat and the NYU Stern Urbanization has been signed. A Memorandum of understanding between the Mahatma Education Society and the NYU Stern Urbanization has been signed as well. Pilot studies in four cities—Valledupar and Bogotá in Colombia and Mekele and Addis Ababa in Ethiopia—have been completed. A python script for calculating the metrics in each locale is in the final stages of preparation and testing. The space for the India Urban Expansion Observatory at the Mahatma Education Society is now ready. Equipment will be installed and analysts will be recruited before the end of 2014. Training is now scheduled to start in early January 2015 and the Observatory should be in full operation by mid-January 2015. Its work should be completed by the end of 2015. The analysis and the subsequent report on the results should be available in time for Habitat III, the Global Conference on Human Settlements now scheduled for the summer of 2016.

## Phase II (b): The quality of urban layouts in a sub-sample of entire cities

This phase of monitoring global urban expansion is also a joint project of United Nations Human Settlements Programme (UN Habitat) and the NYU Stern Urbanization Project. In an extension to the Phase II work in expansion areas, we plan to measure the same metrics in the entire areas of 30 cities, a global sub-sample of the larger sample of 200 cities. For these 30 cities, we have maps showing

the time that different parts of these cities were built up, going all the way back to 1800. In these 30 cities, we plan to divide the area built before 1990 into 4 sub-areas: (1) areas built before 1900; (2) areas built between 1900 and 1930; (3) areas built between 1930 and 1960; and (4) areas built between 1960 and 1990. Again, using a random set of 10-hectare locales in each of these areas, we plan to measure the same five metrics listed in the section above. This study will allow us to study the changes in these metrics over time in rigorous and systematic manner.

The data collection part of this study will be undertaken by Grupo gvSIG in Valencia, Spain. The NYU Urban Expansion Program, in collaboration with gvSIG will analyze the data and prepare a report based on the results. The methodology for data collection is now being tested in two pilot cities, Tokyo and Paris. There is agreement in principle on the partnership between UN Habitat and the NYU Stern Urbanization Project to carry out this study, as well as on a budget for undertaking the study, but a formal agreement has not yet been signed. The work on this study is due to start in early January 2015 and be finished by the end of 2015 in time for a report to be prepared for Habitat III.

## Phase III (a): A telephone survey of the regulatory regime governing land and housing in expansion areas

This phase of monitoring global urban expansion is also a joint project of United Nations Human Settlements Programme (UN Habitat) and the NYU Stern Urbanization Project. The aim of this survey is to obtain information on the rules and regulations that govern zoning, land use, land subdivision, and building construction in areas of expansion in the global sample of 200 cities. The focus here will be on rules that are actually enforced, rather than on rules that are on the books. The survey instrument is now in preparation, awaiting additional inputs from expert advisors as well as from UN Habitat. We plan to test the survey instrument in six cities: Shenzhen, China; Pune, India; Addis Ababa, Ethiopia; Zwolle, the Netherlands; Springfield, MA, USA; and Valledupar, Colombia. NYU students fluent in the language of the country will conduct the telephone survey and will direct it at both municipal officials and developers. We are budgeting 40 hours per city for the telephone survey. The pilot study should be completed by the first week of 2015.

A formal agreement on this study between UN Habitat and the NYU Stern Urbanization Project has not yet been signed. There is, however, agreement in principle on the budget and the overall thrust of the proposed study.



### Phase III(b): A real estate broker survey of the affordability of land and housing in expansion areas

This phase of monitoring global urban expansion is also a joint project of United Nations Human Settlements Programme (UN Habitat) and the NYU Stern Urbanization Project. We are currently also pursuing the possibility of forming a partnership with the McKinsey Global Institute as well. The aim of this survey is to find out whether land and housing in the expansion areas of cities are affordable to the majority of urban households. If they are not affordable, the earlier phases of the monitoring initiative may help us explain why. This study will focus on the price and characteristics of plots of land in formal and informal subdivisions, as well as land-and-house packages and apartments in the expansion areas of cities. We will seek to obtain this information for the entire area of expansion that, in large metropolitan areas, may consist of more than one land and housing market. To this effect, we will need to employ real estate brokers and ask them to assemble this information (including location information) for a large number of units in each city, focusing on units which may be affordable by median-income families and typically excluding luxury units. In parallel, we shall seek to obtain reliable information on household income quintiles in the cities studied.

We are in the process of formulating a pilot study and we plan to test it in four cities: Shenzhen, China; Pune, India; Addis Ababa, Ethiopia; and Valledupar, Colombia. We hope to complete the pilot study as soon as possible in 2015 and then conduct the study for the remainder of 2015. We plan to use the telephone survey of Phase III(a) to obtain the contacts necessary for getting this information. We have a budget estimate for this study, but cannot be sure it is adequate until we complete the pilot study.

### Phase IV: Population and urban extent projections for all 4,000+ cities, 2000-2040

This phase of monitoring global urban expansion is a joint project of United Nations Human Population Division and the NYU Stern Urbanization Project, with the possible partnership of the Center for International Earth Science Information Network (CIESIN) at Columbia University as well. The aim of this research project is to generate population projections to 2040 for the universe of all 4,000+ cities that had 100,000 people or more in 2010; to use these population projections to generate urban extent projections to 2040 for all cities; and then to create maps showing where expansion is most likely to take place in all cities in the universe by 2040.

We are now working on generating a common database: An agreed upon universe of 4,000+ cities and metropolitan areas that had 100,000 people or more in 2010. For many of these cities, we will have population data going back to 1950. With the collaboration of CIESIN we will seek to obtain census data for the administrative districts containing these cities and metropolitan areas for three time periods, 1990, 2000 and 2010. The UN Population Division now has population projections to 2030 for a subset of these cities. We will seek to expand these projections to all cities and to 2040. We will then use these projections to create gross urban expansion projections for all cities. Given those estimates, we will then seek to model where expansion is most likely to take place in all cities in the universe.

To-date no agreements have been signed and, except for a modest budget for exploratory work, no budgets are available for this work. We intend to develop models for projecting city population and urban extent but no models have been explored yet. We plan to apply for a National Science Foundation (NSF) grant to carry out this work.

\* \* \*

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