A NEW PLAN FOR AFRICAN CITIES:

THE ETHIOPIA URBAN EXPANSION INITIATIVE

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ABSTRACT

In the next 20 years, African cities will more than double in population, and their spatial extent could more than triple. What form will this growth take? The current planning regime in African cities focuses on Comprehensive Master Planning, a slow and costly methodology. Many of these plans are never built, but the cities continue to grow rapidly in the absence of a framework. Recent evidence from the NYU Stern Urbanization Project indicates that this growth is highly informal and poorly laid out, lacking a network of arterial roads, for example. Over time, this will negatively impact productivity and the efficiency of the metropolitan labor markets in these cities – cities that are expected to drive GDP growth across the continent. As an alternative, NYU Stern Urbanization Project has developed a methodology entitled "Making Room for Urban Expansion," which proposes to secure the bare-minimum public goods necessary for orderly growth – a network of arterial roads, and a hierarchy of public open space. In partnership with the Government of Ethiopia, NYU has tested this methodology in eighteen Ethiopian cities. This Ethiopia Urban Expansion Initiative has resulted in the designation and protection of hundreds of kilometers of arterial roads and large reserves of public open space. Beyond paper plans, the Ethiopia Urban Expansion Initiative has led to real changes on the ground, from the construction of many kilometers of road to a dramatic increase in the supply of land on the market in these cities. The conclusion is clear – a viable new method has been developed for addressing the rapid growth of Africa's cities.

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Introduction

Talk of African cities conjures up images of sprawling slums, unending traffic congestion, garbage blowing across the savannah, outbreaks of disease, and enclaves of privilege. These cities are deficient in many ways – they lack basic security, basic sanitary facilities, and basic planning. At the same time, these cities are vital for the economic development of the continent. Cities are the backbone of economic productivity in many African countries. The majority of non-subsistence economic activity takes place in cities, as rural areas become economically marginal at best. Pundits have bemoaned the African curse of urbanization without prosperity, but incomes in cities are often several times higher than incomes in rural areas (Sahn and Stifel 2003). The wealth of African nations may not be increasing due to urbanization, but the wealth of individuals almost certainly is. There are certainly cases in which the explanation for the growth of cities can be found in the ills of the countryside, but it is far more common for people to move to cities seeking a better life. How else to explain the rising number of rural to urban migrants? Nairobi, Kenya, for example, saw its population rise from 1,380,012 in 1990 to 2,213,868 in 2000 to 3,236,589 in 2010 – a growth rate of 4.73% from 1990 – 2000 and 3.80% between 2000 and 2010[2]. This rate of increase is repeated across Sub-Saharan Africa, with an average rate of growth of 3.73% per year in cities with populations greater than 100,000. An increase of 3% per year translates to a doubling time of 20 years. This means that, on average, African cities will *more than double* in population in the next two decades.

Rapid Population Growth, Falling Densities, Disorderly Layouts

Sub-Saharan Africa is currently about 30% urbanized (United Nations 2014), and the share of its population living in urban areas is expected to increase dramatically in the coming decades. If current trends hold, the continent will be 60 – 70% urban by 2050. This represents a doubling (and then some) of the population of the typical African city, but far more than a doubling its spatial extent. *The Dynamics of Global Urban Expansion* (Angel et al 2005) used Mod 500 satellite imagery to study cities with greater than 100,000 people in 1990 and 2000, comparing population growth with change in spatial extent. This study revealed that, in general, the spatial expansion of cities tends to outrun population growth, as population density worldwide is falling at between 1% and 2% per year. As a result, most estimates of future spatial extent in cities are low – sometimes extremely low. A city that is growing at 3% per year, for example, can expect to see its population double in twenty years. But with a 1% decline in density, total area can be expected to more than triple. Paris is a good example of the long-term implications of this trend. From 1800 – 2000, the population of Paris increased twenty-fold. In the same period of time, the area of Paris increased more than 200-fold (Angel 2012).

The 2012 *Atlas of Urban Expansion* (Angel et al, 2012) used higher quality satellite imagery (30-meter resolution) to measure the change in the spatial extent of 120 cities from 1990 to

[1] This draft working paper will be updated as additional data becomes available on the progress of
[2] From World Urbanization Prospects 2014

2000 with much greater precision. The work has now been extended through 2014, and an updated *Atlas of Urban Expansion: 2015 Edition* is being produced that focuses on a representative global sample of 200 cities, 18 of which are in Sub-Saharan Africa. The preliminary evidence indicates that the areas of cities have continued to expand quite rapidly, at an average rate of 4.08% annually. Kigali, Rwanda (to take one example) expanded its city footprint from 8,843 hectares to 16,116 hectares from 2000 to 2014[3] (see Table 1 for preliminary expansion results for 16 of the cities in Sub-Saharan Africa). Densities have also continued to fall, decreasing at an average rate of -2.48% annually. In short, cities in Sub-Saharan Africa should be preparing for a significant increase in their spatial extent.

A common response to this evidence is to claim that the problem will be solved by densification – that it is neither desirable nor necessary for cities to expand into their rural hinterlands, and that we must take action to prevent it by encouraging more people to live on less land. The history of planning contains many examples of attempts to contain the growth of cities, (perhaps starting with Queen Elizabeth's royal edict to prevent the expansion of London in the 16th century) but the record shows that attempts generally fail, and i0n the rare case in which market forces cause density to rise, the trend is accompanied by a decline in affordability, as the rich and the poor compete for space. Even Portland, Oregon, a hotbed of pro-containment sentiment, has failed to maintain its population density over the past 40 years – despite strict enforcement of an Urban Growth Boundary (Angel 2012). It is true that continued density decline in developed countries is a problem. In many developed cities, densities have already fallen below the level that can sustain public transit, resulting in an unfortunate commitment to the private automobile, with all its consequences in terms of resource consumption and greenhouse gas emissions. In the developing world, however, the reasons for density decline are generally the result of desirable trends. Incomes are rising and people are becoming more mobile. As people become richer, they consume more of everything, including land and transportation. This means cities can expand outward, and slums and other areas can become less crowded. The example of Manhattan in the early 20th century is illustrative – in 1910, the density of the Lower East Side was over 1500 people per hectare – more crowded than the worst slums in the world today (Angel and Lamson-Hall 2014). By 2010, density in that neighborhood had fallen to slightly less than 400 people per hectare. The provision of public infrastructure in the form of the subway allowed Manhattan to decongest, and rising incomes caused a drop in average household size, translating into the consumption of more land per person – the reciprocal of density.

In addition to confirming that cities are, indeed, growing, and urban population densities are, indeed, falling, freely available high resolution satellite imagery has now made it possible to study the *quality* of this expansion, by studying urban layouts in a systematic manner. Specifically, it is now possible to map streets and roads and identify land use typologies in the global sample of 200 cities – a task that would have been prohibitively expensive, even a decade ago. A new research program underway at the NYU Stern Urbanization Project, a think tank and urban action center, entitled *Monitoring Global Urban Expansion Phase II: The Quality of Urban Layouts*, is now providing preliminary information on the quality of the growth that has taken place in the past two decades. Preliminary

[3] City footprint includes urban and suburban built-up area and urbanized open space. More information is available at http://www.lincolninst.edu/subcenters/atlas-urban-expansion/area-metrics.aspx

results are available for seven of the cities in Sub-Saharan Africa for the period 1990 – 2014 (See Table 2).

City label	City population			City footprint (ha)		
	1990	2000	2010	1990	2000	2014
Accra	1,197,161	1,668,240	2,060,076	14,742	45,865	86,286
Arusha	119,852	279,757	397,190	741	2,917	5,144
Beira	314,192	418,040	437,291	13,766	15,391	18,703
Gombe	153,744	230,055	342,000	1,732	2,545	6,249
Ibadan	1,739,222	2,236,331	2,814,304	27,284	39,026	60,944
Johannesburg	3,708,875	5,605,027	7,991,825	234,334	278,285	333,947
Kampala	754,863	1,096,690	1,594,363	25,994	38,855	56,699
Kigali	219,142	578,122	1,044,145	4,197	8,844	16,116
Kinshasha	3,683,274	6,140,419	9,381,673	17,551	34,117	47,539
Lagos	4,764,093	7,280,706	10,780,986	41,169	68,147	125,425
Luanda	1,390,240	2,591,388	4,508,434	15,751	26,462	69,915
Lubumbashi	722,478	1,089,100	1,642,230	9,855	13,266	25,201
Nakuru	168,047	224,416	292,994	2,916	7,517	21,239
Ndola	333,984	373,498	452,604	5,826	7,645	8,886
Oyo	183,000	243,000	322,000	2,358	3,203	7,295
Port_Elizabeth	827,530	958,028	1,103,828	20,333	27,518	34,828

Table 1: Selected population and built-up area results for 16 cities in Sub-Saharan Africa[4]

City	Share of Residential in Atomistic	Share of Residential in Informal Land Subdivisions	Share of Residential in Formal Land Subdivisions	Share of Built-up Area Occupied by Roads & Boulevards	Share of Roads of Width <4m	Share of Roads of Width>16 m
Accra	52 ± 12%	41 ± 12%	7 ± 8%	17 ± 3%	31 ± 7%	2 ± 2%
Addis Ababa	50 ± 16%	30 ± 14%	- ± -	25 ± 4%	33 ± 6%	7 ± 4%
Arusha	84 ± 8%	14 ± 7%	- ± -	14 ± 3%	63 ± 10%	4 ± 3%
Ibadan	83 ± 7%	17 ± 7%	- ± -	13 ± 1%	76 ± 5%	- ± -
Johannesburg	33 ± 15%	41 ± 16%	24 ± 14%	18 ± 3%	22 ± 9%	4 ± 4%
Lagos	58 ± 20%	32 ± 19%	- ± -	14 ± 2%	33 ± 13%	1 ± 1%
Luanda	58 ± 13%	36 ± 13%	- ± -	15 ± 2%	49 ± 10%	2 ± 2%

Table 2: Selected estimates of the quality of urban layouts for 7 cities in Sub-Saharan Africa

On average, 90% of the residential development that took place in these seven cities between 1990 - 2014 was either informal (lacking even paved roads) or completely

[4] City population is based on United Nations figures and estimated to 6/15/1990, 6/15/2000, 6/15/2010. Area calculations are based on LANDSAT satellite imagery, circa 1990, circa 2000, circa 2010

unplanned, with no discernible layout whatsoever. Only 16% of the land in the area developed between 1990 – 2014 was in roads and boulevards, and of those roads, 44% of them were less than 4 meters wide. Only 2.8% of the roads were greater than 16 meters wide. A standard grid plan, consisting of 30m wide arterial roads spaced 1km apart and a network of 12m wide local roads, would produce a road network that takes up around 30% of the land in the city. That so little land is in this use, and so few roads are wide enough to qualify as arterial roads, indicates that these areas are likely suffering from serious connectivity issues. In addition, the difficulty in providing public transportation and trunk infrastructure on a network of small, irregular roads creates significant obstacles for upgrading these large, informally developed areas.

Connectivity is not an academic concern; it has real and significant impacts on the productivity of cities by determining the size of the effective metropolitan labor market. When connectivity is poor, it is more difficult for workers to access jobs in a given area, reducing the likelihood that they will find a job that best suits them. It is difficult to get fine-grained census data to demonstrate this concept in African cities, but it has been recently explored in an unpublished study in the United States entitled *Commuting and the Productivy of American Cities* (Angel and Blei 2015). This study concluded that the productivity advantages of larger cities are primarily constrained by the number of jobs within a one-hour commute of any given point. An accompanying paper entitled *Commuting and the Spatial Structure of American Cities* (Angel and Blei 2015) demonstrated that neither the monocentric city model nor the polycentric city model accurately describes the distribution of employment in a given metropolitan area. In fact, jobs are distributed throughout the metropolitan area. This means that as cities grow, a top priority must be connecting newly built areas to existing area and also to each other, which calls for the implementation of simple and orderly transport plans. Naturally, these plans are much easier to implement if the transportation rights-of-ways are obtained in advance of development, necessitating the preparation of plans that will prepare cities for their inevitable urban expansion.

The Failure of the Comprehensive Master Plan

Despite the clear urgency of preparing for urban expansion, most African planners choose to spend their energy in the preparation of Comprehensive Master Plans (CMPs) that aim to coordinate the activities of many different sectors, while providing relatively little of what is so urgently needed: well-planned land for expansion. These plans require many years to prepare and necessitate meticulous collection of data on many variables, from prosaic details such as sewer water flows to complex issues such as women's rights. More often than not, municipalities will engage consulting firms or international experts to prepare these plans, because of their technical complexity (Okpala 2009).

For example, the preparation of the Integrated Urban Development Masterplan for the City of Nairobi, Kenya, has been under way for three years. It is a collaboration between the Nairobi City County government and JICA, the Japanese aid agency (JICA 2015). It relies on a network of consultants who have been gathering sectoral information and preparing sub-master plans for a decade. The goal of the final plan is to integrate all of these outputs into one grand design. This is a challenging task – so challenging, in fact, that the very people charged with crafting the plan are concerned that it will be impossible to implement: in an Annex to the final report of the Joint Coordinating Committee, the Permanent Secretary of the Ministry of Nairobi Metropolitan Development pointed out that the previous master

plan, the Nairobi plan of 1973, was never implemented. The main challenge in Nairobi, he said, was how to actually implement the plan once it was completed (Nippon Koei Co., Ltd. 2014).

The plan addresses Transportation, Government and Institutions, Environment, Land use and Human Settlements, Population, Social Systems and the Urban Economy, and Infrastructure. It is broadly organized into Energy, Transport, Housing, and Civil sectors. Every proposed solution is evaluated using a methodology called Strategic Environmental Assessment (SEA), which evaluates the potential environmental, social, and economic impacts of proposed policies, plans, or programs. It is a 9-step process that happens *in addition* to the process of developing the proposals themselves (Gibb International 2014). In the meantime, the city of Nairobi has likely added half a million people to its population.[5]

Comprehensive Master Plans are in place or under development in Lagos, Nigera; Kigali, Rwanda; Addis Ababa, Ethiopia; Harare, Zimbabwe; Lusaka, Zambia; Luanda, Angola; and many less prominent cities throughout Africa. Every city municipal government in Nigeria is required to prepare a master plan, despite the fact that these plans are almost never implemented. As far back as 1999, African planners alerted to the fact that the Comprehensive Master Plan is poorly suited to a modern African context (Watson and Agbola 2013). Indeed, the legal framework for these plans (at least in Anglophone Africa) can be traced to colonial era legislation – the British Town and Country Planning Act of 1947, which required permission for development of all lands, or the older 1932 English Town and Country Planning Act, which established a requirement for comprehensive, wall-to-wall land use plans (Okpala 2009). This legislation was quickly copied by colonial governments and was used, explicitly, to restrict the growth of African cities in order to preserve the European character of those cities and limit the mobility of the population. This legislation remains in force in many countries and continues to be used for similar purposes. In Zimbabwe, for example, the Rhodesia-era 1976 Town Planning Act was recently used to justify the eviction of 700,000 squatters, in a program called "Drive Out the Rubbish" (Watson and Agbola 2013). And indeed, many comprehensive master plans pit shack dwellers against developers, particularly when the plans are focused on redevelopment and renovation, rather than on growing the urban extent to accommodate population increase.

These criticisms are well-documented, and many alternatives have arisen to address them. Community Planning and City Development Strategies (CDS) aims to increase stakeholder involvement, modifying the top-down nature of the plans, for example (Okpala 2009). These new strategies may resolve the matter of the distasteful origins of the Comprehensive Master Plan, but they have so far failed to address the three most fundamental issues with those plans – that they are time-consuming and expensive to prepare; that they are too complicated to implement; and that they fail to address the main issue facing African cities – namely, the issue of accommodating population growth.

It is apparent, then, that a new planning methodology is needed – one that is simple to prepare, cheap and easy to implement, and able to address the challenges of rapid urbanization. It must also be flexible enough to match the technical capacity of the local planning authorities, so that the people designing the plan will also be the ones implementing it.

[5] From World Urbanization Prospects 2014

Making Room for Urban Expansion

The New York University Stern Urbanization Project has developed such a methodology, and is currently implementing it in 18 cities in Ethiopia and in 5 cities in Colombia. Additional exploratory studies have been conducted in India, Vietnam, Myanmar, Ecuador, Mexico, Indonesia, and China. The essence of the work involves preparing cities for the next 30 years of urban spatial expansion by securing land for arterial roads, infrastructure, and parks. These are public goods that the market fails to provide, and they are also goods that are difficult to secure after land has been occupied – it is neither feasible nor desirable to relocate residents in order to create a system of large roads and parks. This approach is both a radical paring down of the current planning ideology and a dramatic increase in its scope and ambition. It is known as "Making Room for Urban Expansion."

Urban Expansion Initiatives – whether in Asia or Africa, Latin America or the Middle East – propose a basic action plan to prepare rapidly growing cities and municipalities for their inevitable spatial expansion: (1) The preparation of realistic maps based on forecasts of urban growth; (2) The expansion of city boundaries so that the land necessary for that growth is under the control of one government authority; (3) The securing of land for a 1km x 1km grid of 30-meter-wide arterial roads; and (4) The selective protection of a hierarchy of public open spaces in the expansion zone.

The argument for taking these actions (out of all possible actions) is a simple one – land for key public works must be secured in advance of development. Other planning activities – like determining which land urban land uses or the location of public facilities - can come later. Creating a skeleton that the city can expand into allows municipalities to attain a measure of control of the urban expansion process. Given immediate and pressing needs and scarce resources to devote to future planning, there is good reason for cities to prioritize these things above all others.

By taking these actions now, rapidly growing cities will be able to avoid some of the worst consequences of unplanned expansion while also reaping benefits in equity and access. The roads will carry public transportation and trunk infrastructure, reducing congestion and lowering the cost of sanitation and other services. Arranging these roads in a rectilinear grid creates a skeleton for the city that will maximize connectivity, encourage walkable growth, and minimize locational advantage, creating a more integrated metropolitan labor market and increasing productivity. The protection of public open space will safeguard environmentally sensitive areas, while providing recreational opportunities for residents. In all, these actions will go far toward creating a city that is more efficient, equitable, and sustainable, on a timeline that addresses rapid growth.

Figure 1: Cerda's 1859 Ensance plan of Barcelona (Source: Soria y Puig 1999, fig. 19, 279)

The rationale behind this approach is documented in Dr. Shlomo Angel's 2012 book *Planet of Cities.* This book draws on historical examples such as the Manhattan Grid of 1811 and Cerda's 1859 Ensanche plan in Barcelona, along with

counterexamples such as Bangkok, Thailand, or Sao Paolo, Brazil, to establish that a network of arterial roads and a hierarchy of public open spaces are the critical components of an effective expansion strategy.

The Case for an Ethiopia Urban Expansion Initiative

In early 2013 NYU entered into a partnership with the Government of Ethiopia's Ministry of Urban Development and Construction (MUDC), headed by Minister Mekuria Haile, to implement this concept - to create an Ethiopia Urban Expansion Initiative (UXI) that would help rapidly growing cities plan for their spatial expansion through 2040 and then, crucially, help them secure the land for those plans. NYU is committed to provide $400,000 worth of technical assistance and the Government of Ethiopia is committed to lend political weight to the project and fast-track it bureaucratically. This arrangement brings outside assistance to the Government of Ethiopia, but is distinctly different from a standard contract for consultant services. Rather, it is structured as a partnership – the Government of Ethiopia and NYU have interests in common. The Government of Ethiopia is interested in capitalizing on the benefits of urbanization, and NYU is interested in testing its methodology to help cities do just that.

Ethiopia is embracing this approach as one of the most rapidly urbanizing countries in sub-Saharan Africa. The share of the population living in cities has increased from an estimated 7.1% in 1994 (Schmidt and Kedir 2009) to 16% in 2008 (FDRE 2008), and is expected to reach 60% by 2040 at the current annual growth rate of 3.5% (United Nations 2014). In other words, the next three decades are the ones in which Ethiopia will be building its cities – cities it may live with for many generations. Ethiopia faces this daunting task as one of the poorest countries on earth, with a per capita GDP of less than $600 – far below the 2014 average in Sub-Saharan Africa (excluding South Africa) of $1,699.

Despite the relative and absolute poverty in the country, the Government of Ethiopia has been investing in public infrastructure and improving service reliability and rural-urban links, and this investment is driving a large share of GDP growth (World Bank 2015a). The Government of Ethiopia sees planning for urban expansion as a natural extension of those programs – all part of a bigger goal, which is the transformation of Ethiopia into a middle-income country by 2025. The government has embarked on a massive home ownership scheme that relies on heavily subsidized housing cooperatives, but is also interested in promoting market-based housing solutions, by increasing the supply of land for development. Additionally, there is an understanding that supporting urbanization in small and medium sized cities can help distribute the benefits of economic growth. As a result, the government spent relatively little time debating the merits of planning for urban expansion, and it was possible to move ahead quite quickly.

The Government of Ethiopia has also invested heavily in public sector capacity building at the local level. In particular, three World Bank funded programs managed by Dr. David DeGroot have made it easier for the initiative to move forward– the Public Sector Capacity Building Program Support Project (PSCAP), which focused on improving processes and procedures in government; the Urban Local Government Development Program (ULGDP), which provides conditional, on-budget performance based grants to incentivize reforms in urban services, address a 30-year infrastructure backlog, and create a framework for local government to be responsible for providing local services – ULGDP funds account for about 50% of the budgets of the first four cities in the Ethiopia UXI; and the creation of the Urban

Management Masters program at the Ethiopian Civil Service University (ECSU), which supplies civil servants to all levels of government, but specifically at the local level. In essence, these programs enabled urban local governments in Ethiopia to accomplish public sector functions such as bidding out contracts, managing road construction, and providing basic services. Dr. DeGroot is now the leader of NYU's Ethiopia Urban Expansion Initiative. The rest of the team consists of urban planner Richard Martin (based in Kenya), local coordinator Tsigereda Tafesse (based in Addis Ababa), and New York coordinator Patrick Lamson-Hall, under the supervision of NYU Urban Expansion Program head, Dr. Shlomo Angel.

In 2006, the Ethiopian government established the current four-tiered structure of urban management. The base of the structure is the Woreda, which is followed by Urban Local Governments, then regional governments, whose primary task is to evaluate city compliance with the conditionality requirements in their ULGDP block grants, and whose secondary task is to mediate relations between the cities in a region. At the apex of the structure is the Ministry of Urban Development and Construction, which oversees urban policy for the nation and provides significant technical support. Urban Local Governments have ownership of the planning process. City officials are responsible for preparing and implementing local development plans (LDPs), which generally operate on a 5 – 10 year time horizon in their planning. These plans include areas of expansion, but prior to the creation of the UXI, the plans were based on top-down determinations of how much growth would be desirable, not on estimates of how much growth was likely to occur. As a result, some areas in cities are quite well planned, and a regular mechanism exists for releasing land to the market, but demand for land outstrips supply, leading to the development of informal settlements that are later demolished or rehabilitated at great cost (figure 2).

Figure 2: Informal development on the urban fringe of Hawassa (Source: Hawassa City Adminstration)

It should also be noted that, in Ethiopia, all land is owned by the government, and a primary function of local governments is to prepare land for leasing. Citizens bid for leases in an open auction, but the government always has the option to cancel the leases and seize the land for public purpose, with compensation limited to the value of crops and structures (Yirsaw 2010). This has made the process of actually *obtaining* land somewhat easier politically, and certainly more affordable. In addition, the designation of the hierarchy of open spaces is de facto – after the spaces are put in the statutory plan, no further action needs to be taken on the part of the municipality to secure the land. However, this is not a necessary pre-condition for an Urban Expansion Initiative– in other contexts, such as the initiative in Colombia, alternative mechanisms have been found that can accomplish the same aim, such as title liens, swaps, and land pooling and reconstitution.

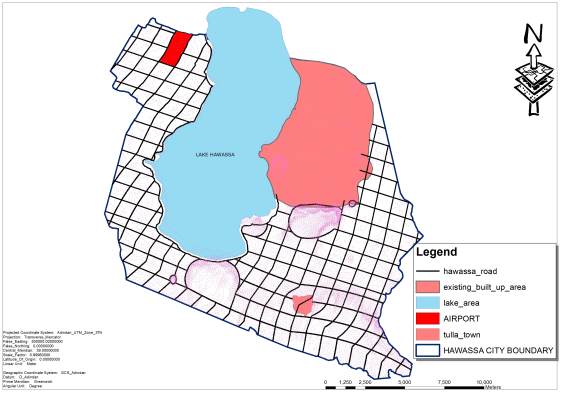

Figure 3: Expansion plan of Hawassa (Source: Hawassa City Adminstration)

Since the launch of the Ethiopia UXI in mid-2013, the first group of four cities have approved plans that will allow them to accommodate their projected spatial growth through 2040, and 14 more cities have plans under development (figure 3, for example). These four cities – Hawassa, Adama, Mekele, and Bahir Dar - have approved plans for over 1700km of 30m wide arterial roads, along with 81,000 hectares of land for expansion – enough to accommodate a 4-fold increase in the current built-up area of these cities. These cities have also expanded their administrative boundaries, literally increasing the area under their control in response to estimates of their growth. The cities budgeted over $8 million for their expansion plans in 2014, and in 2015 they budgeted at least $24 million. Preparing for urban expansion is consuming about 50% of local infrastructure budgets – an investment that will generate substantial returns. In addition, a course has been established at the Ethiopian Civil Service University entitled *Urbanization and Urban Development Management*, focused on explaining the practice of urban expansion. Several hundred urban managers have already taken this course. In short, Ethiopian cities have taken a series of simple, highly proactive steps in anticipation of their inevitable spatial expansion.

Selection of Cities for the Initiative

The selection of cities for participation in the initiative was partly technical, and partly political. Primarily, it was important to select cities that were growing rapidly enough to lend urgency to the planning process. The cities had to meet three selection criteria: (1) They were not the primary city in the country; (2) They had population growth rates of at least 3% per year, meaning a doubling time of 20 years; and (3) They had a population of at least 100,000 as of 2010. They also had to be technically capable of executing the initiative. Finally, it was important to distribute the cities throughout Ethiopia, in order to demonstrate the workability of the concept in more than one region. After consulting with Minister Mekuria, four of the cities that met these criteria were selected to participate in the intiative: Mekele, Adama, Hawassa, and Bahir Dar (figure 4).

Figure 4: Hawassa, Adama, Mekele, Bahir Dar

Projections prepared by NYU forecast remarkably rapid growth for these cities between 2010 and 2040, with the cities expected to more than triple their 2010 population by 2040: Hawasa will grow to more than 6-fold its 2010 population by 2040, Mekele to almost 5-fold its 2010 population, and Adama and Bahir Dar to almost 4-fold their 2010 populations (see table 3).

The built-up areas of these cities are predicted to expand at an even faster rate than their population. Borrowing from the findings of the *Atlas of Urban Expansion*, and taking into account the rapid increase in the country's GDP per capita, a conservative estimate was made that the urban area per person would grow at 1.5% per year. In general, the *Atlas of Urban Expansion*[6] found that the built-up area of cities grew twice as fast, on average, as

[6] The Urban Expansion Initiatives are supported by a research agenda – also underway at NYU – entitled *Monitoring Global Urban Expansion*. This agenda focuses on the universe of 4,235 cities with populations greater than 100,000 in 2010. Within

their population in the 1990s. Urban area per person grew, on average, at 2% per year during this period. It grew at an average annual rate of 1.5% in a smaller representative sample of 30 cities between 1800 and 2000.

Given this information, NYU estimated how much land the four Ethiopian cities would require for their expansion between 2010 and 2040, assuming a conservative 1.5% annual increase in urban area per person. It is impossible to forecast the amount land that will be needed for the expansion of a city over a 30-year period – it is the result of too many factors. The purpose of these estimates is to get an approximate order of magnitude. Planning for urban expansion does not require the construction of actual infrastructure until shortly before development reaches a given area, so the opportunity cost of overestimating the growth of a city is quite low, as opposed to the opportunity cost of making plans that *underestimate* this growth[7], which is quite high.

City Label	Population 2010	Population 2040	Population 2040 as multiple of 2010	Area 2010	Area 2040	Area 2040 as multiple of 2010
Mekele	254,000	1,235,000	4.9	3,932	20,000	5.1
Adama	253,000	954,000	3.8	2,429	12,100	5.0
Hawasa	190,000	1,222,000	6.4	1,125	10,000	8.9
Bahir Dar	178,000	656,000	3.7	3,021	20,000	6.6

Table 1: Projected increases in the population and built-up areas of four rapidly growing Ethiopian cities, 2010 - 2040, assuming a 1.5% annual increase in built-up area per person

As table 3 shows, shows, by 2040 the areas of the cities will have grown quite dramatically: Hawasa by almost 9-fold, Bahir Dar by over 6-fold, and Adama and Mek'ele by 5-fold, in comparison to their 2010 built-up areas. Even given a large margin of error, the numbers speak for themselves. And as the historical expansion rates of other rapidly growing cities show, they are not unrealistic or unreasonable. The historical expansion and future expansion of Mekele can be seen in figure 5, for example.

those 4235 cities, a sample of 200 cities was drawn and used to study urban expansion between 1990 and 2014, the quality of urban layouts, and changes in population density. More information on the sample and the universe can be found at http://www.lincolninst.edu/subcenters/atlas-urban-expansion/.

[7] As the architect Daniel Burnham famously said, "Make no little plans."

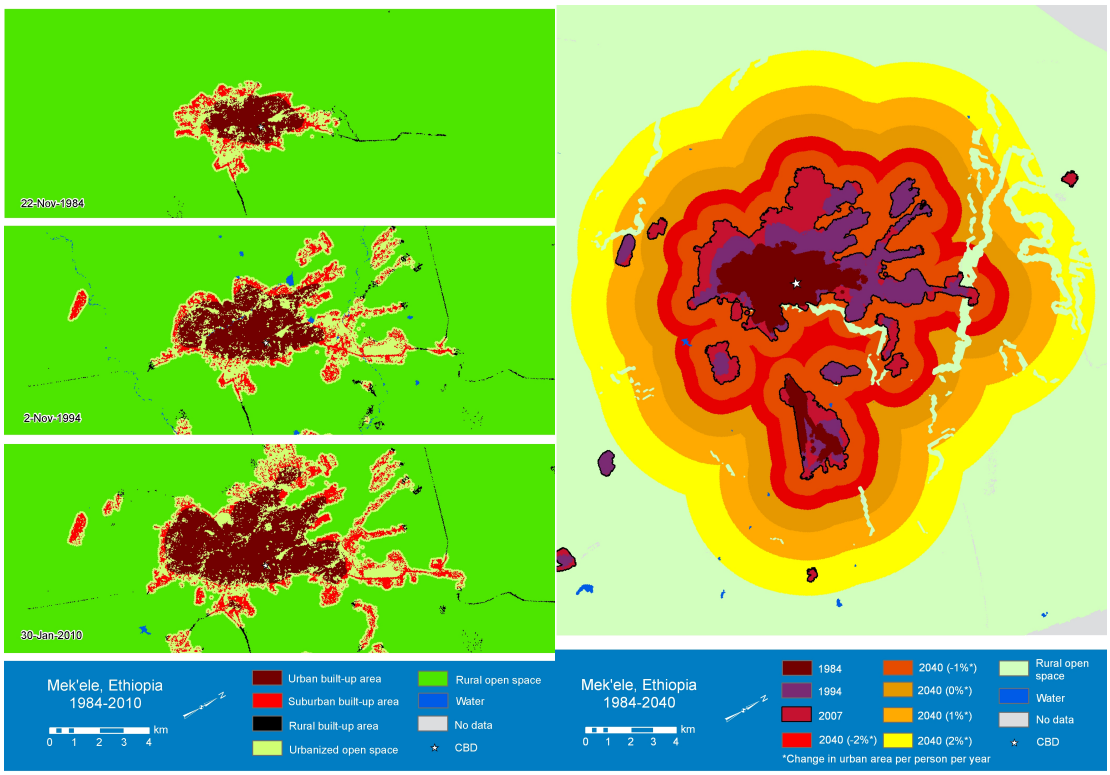

Figure 5: The expansion of Mekele from 1984 – 2010 (left) and 2040 (right)

The selection of four cities was motivated by several considerations, but primarily by the dictum of not putting all of one's eggs in one basket. It was thought that engaging with several cities would be more likely to result in one city that actually fully implemented the initiative. It also created conditions for shared learning experiences among the cities and, generally, made the scalability of the project seem less dubious – successfully completing the work in three or four cities would make it much more likely that the work would be expanded to the country as a whole, which was always a goal.

And indeed, each of these cities has provided a different lens on the potential challenges of the project. Mekele, in the north, is surrounded by marginal land, making expansion much easier. Hawassa, by contrast, is surrounded by rich agricultural land and is also facing tremendous population pressure – a challenging case. Bahir Dar and Adama struggled with the difficulty of long-term planning with an unstable city administration. Yet each city has succeeded in implementing some version of the UXI, and all the cities are now on track to accommodate their urban growth – something inconceivable, just two years ago.

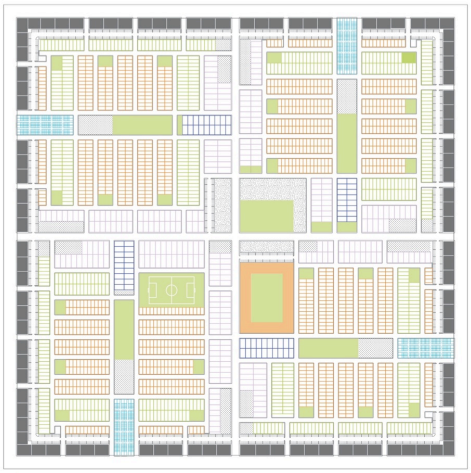

Figure 6: A proposed macroblock layout

Development of Concept Plans

The NYU team visited the four cities for the first time in early 2013. They traveled with an MUDC escort who introduced them to the mayors and planners. On a recommendation from the MUDC, NYU helped organize city-based urban expansion teams as a way of focusing resources on the initiative. These teams were given a

small honorarium from NYU, as well as permission from their supervisors to spend one day a week on the work. They were initially tasked with preparing concept plans to exhibit at a launching workshop in July 2013, in Addis Ababa.

NYU trained the city teams in estimating the future territorial extent of the city, based on NYU population and density projections. This was translated into a number of hectares required through 2040, which was the basis of a concept plan composed of 30m wide arterial roads, spaced one kilometer apart. To manage the scale of the growth (far larger than any previous plans they had made), the teams were encouraged to keep things quite simple, organizing them around the concept of the 1km x 1km macroblock (see figure 6 for a proposed macroblock design). They would focus on only three variables – the area of the macroblocks, the area of the arterial road grid, and the length of the grid (table 4).

City label	Number of Macroblocks	Grid Kilometers	Area of Macroblocks (ha)	Area of Grid (ha)
Adama	187	430	16,030	1,330
Bahir Dar	260	515	26,015	-
Hawassa	156	374	16,034	1,122
Mekele	226	459	23,370	1,376

Table 4: Estimates of macroblocks, areas of expansion, and size of grid.

These concept plans (i.e. figure 7) were completed in a matter of weeks, and the teams and the city mayors were brought to Addis Ababa for a workshop and presentations. Minister Mekuria opened the proceedings, lending further top-level endorsement to the initiative. Dr. Angel and Dr. DeGroot gave an advanced tutorial on the methodology and concept, and then the city teams presented their estimates and concept plans. These plans were critiqued and questioned on the first day, and on the second day the teams worked with Dr. Angel and Mr. Martin to draw new drafts (figure 8).

Crude as they may appear, these plans were an enormous leap forward for the mayors and urban planners who prepared them. Several of the participants expressed that it was the first time they had been encouraged to develop a vision for their city in the long term, and that it was exciting to do so. This enthusiasm was supported by the commitment of the Government of Ethiopia to actually enact these plans – it was a visioning exercise toward a future city, not the creation of paper plans.

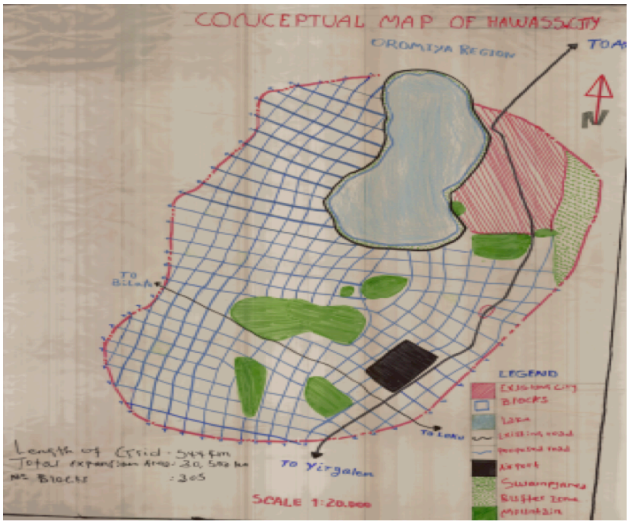

Figure 7: Concept plan from July 2013 workshop.

Boundaries and Layouts

To move the plans from concept to implementation, the cities needed to expand their administrative boundaries to include enough land for expansion, and they had to revise their grid layout to reflect conditions on the ground. Both of these activities required conducting a ground survey of the expansion zone. The MUDC,

understanding that this process would be time consuming, gave the cities 8 months from the workshop to create refined plans. These plans were not ready to be engineered, but they were precise enough to be enacted as legally binding – thus reserving the land for the arterial grid and the public open spaces in a statuatory way.

Figure 8: Bahir Dar city team updating concept plan, July 2013.

The cities were able to submit expanded boundary proposals to their regions in November 2013, and received approval in December 2013. The cities now control enough land to accommodate their projected expansion through 2040 (figure 9).

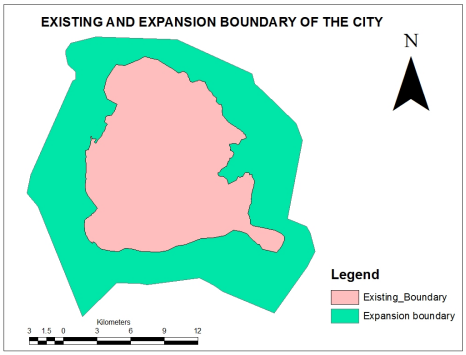

Figure 9: Revised boundary for Mekele (Source: Mekele City Administration.)

Simultaneously, they dispatched teams to walk the routes of the proposed expansion grids, noting obstacles that fell within the 30-meter right of way. They were equipped with GPS units and cameras and were instructed to photograph the obstacles and note their locations. They also collected information on what sorts of crops were in the path of the grid, and any other obstacles, such as unmarked irrigation ditches or gullies. They used this information to update the arterial grid plans in AUTOCAD, incorporating topography and hydrological features (figure 10). In February 2014 the cities presented their updated plans to the MUDC, and the MUDC approved the layouts. This meant that the grid layouts and public open spaces had legal status, and the cities could proceed with compensating landowners and submitting tenders for the construction of the roads.

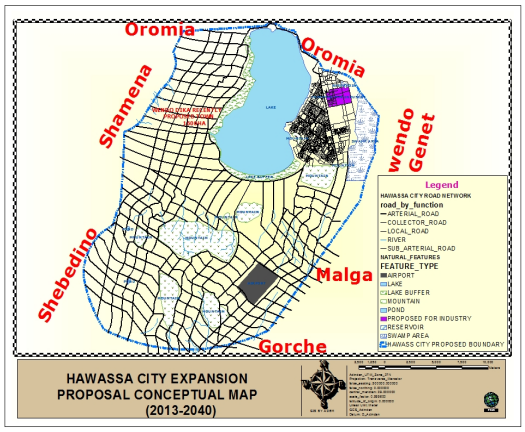

Figure 10: Revised concept plan, February 2014 (Source: Hawassa City Administration.)

The ease with which this process took place is not unique to Ethiopia, and it illustrates the simplicity of Making Room for Urban Expansion. At its most basic, planning for urban expansion is as easy as designing a grid of roads and designating a network of parks, roughly corresponding to the area the city will need if its growth corresponds to projections. In Ethiopia, city officials at the local level were able to prepare credible plans for 30 years of expansion in just 8 months, working one day a week.

Budget and Spending Requests

Of course, simply approving a paper plan does very little to prepare a city for urban expansion. As discussed earlier, many if not most cities have paper plans hanging in the Mayor's office, gathering dust. The key is to develop a paper plan that can be translated into activity on the ground. In other words, the city of tomorrow should, in general, resemble the plan of today. For this, financing is needed.

City Label	Total Cost for Grid Compensation, USD	Arterial Grid Length (km)	$/Km
Hawassa	14,228,445	374	38,044
Adama	13,215,202	430	30,733
Bahir Dar	19,387,200	515	37,645
Mekele	21,849,561	459	47,603

Table 5: Estimates for compensating the land for the arterial grid (Source: From city administrations.)

The city estimates indicated that, in general, they would need $15-$20 million each to obtain the land for the arterial roads (table 5). This is dramatically less than the cost of developing and implementing a comprehensive master plan, but the UXI lacked international financing partners like JICA or the World Bank (and, indeed, the bureaucratic challenges of working with such organizations would have undermined the swiftness on which the UXI relied), meaning the cities themselves would have to pay for the land, or they would have to get support from the national government. If this was done too quickly, it would threaten their ability to maintain other services, including servicing land for leasing. If it was done too slowly (all too common in African planning), the delay would render the plan meaningless for addressing rapid urbanization.

The basic solution that emerged was simple – for the cities to be convinced that it was worthwhile for them to spend heavily on urban expansion, there had to be a mechanism for them to capture the value increase that would result from the conversion of land to urban use. Urban expansion had to work as an investment. In Ethiopia, that took the form of a revolving fund for the revenues from leasing land in the expansion areas. It was demonstrated that, if the cities were willing to tolerate a loss for the first two or three years, they could then invest lease revenues into the fund and use it to recover the costs of the grid and develop more land for leasing, creating a virtuous cycle of increased revenues and rendering the program sustainable. This is a particular solution for the few countries in which the government leases land, but the basic point is more universal: the funding source for preparing land for urban expansion should always be the increase in value of the land itself.

City label	Requested 2014/15 USD	Allcoated 2014/15 USD	Allocated 2015/16 USD
Adama	30,388,302	2,900,000	6,000,000
Bahir Dar	31,680,000	2,500,000	6,000,000
Hawassa	26,313,125	1,500,000	6,000,000
Mekele	35,599,409	2,000,000	6,000,000

Table 6: Budget requests and allocations for urban expansion

On average, each city needed $3.4 million to pay compensation for the arterial grid in the first year (calculated from table 5). They also requested additional funds to prepare more land for leasing. In all, each city requested around $31 million for 2014/15. They received an average of $2.1 million – less than 1/10 of their request, and only 2/3 of the amount needed for grid compensation. This was not, in fact, stinginess on the part of the government. It represented 1/3 of the total infrastructure budget for the four cities for the

year, demonstrating a strong commitment for a new program. In 2015/16 this was followed up with an additional $6 million per city per year, making urban expansion the primary channel for infrastructure spending (table 6).

The urban expansion teams then had to figure out what to do with the money they had. The speed of urbanization in Ethiopia seemed to compel the cities to use all of the funds from their first year allocations to pay compensation for the arterial grid (securing critical public works), but this strategy would have left the revolving fund empty, with no mechanism for actually releasing land to the market. Each city responded to this conundrum with a slightly different approach, reflecting their relative capacities, along with other plans already underway. This has yielded different outcomes among the cities, though it is likely that these changes will even out as the program continues.

Figure 11: Road grading in Adama on the arterial grid (Source: Adama City Administration.)

Bahir Dar and Adama

Bahir Dar and Adama struggled with a turnover problem throughout the project. Both the city managers and mayors were replaced between July 2013 of the launching workshop and the arrival of the first funds in July 2014. This put the local teams in the awkward position of working without the understanding of their own management. Perhaps as a result, they focused on a familiar strategy - the development of macroblocks, emphasizing the release of serviced plots to the market over the securing of the arterial roads. This is simply an enhanced variation of the previous LDP planning that they undertook. However, it seems to be functioning as a pragmatic stopgap, generating future revenues that will accelerate the project in the future. Assuming the cities move forward with their plans to obtain the land for the grid, no harm will be done. In this regard, however, they have failed to fully implement the agenda. It is imperative that the cities complete the compensation of the grid, beyond their immediate development zone. When the compensation of the grid is complete, the farmers who own the land on which the grid sits will become partners in protecting it, as they will not receive any additional compensation for structures that are built after the compensation has been paid. This is critical to ensuring that the arterial roads will not be encroached upon by squatters or informal developers. The same must be done for the network of open spaces, which have been designated on the maps, but have not been secured through compensation except in the macroblocks that have already been built. Regardless, both cities have significantly expanded their supply of land for expansion.

In Adama, 35 macroblocks were designated for development in the first five years of the project – 7 blocks per year. However, the city only received enough compensation funds for slightly over one block in the first year, which they have built and leased (figure 11). The mayor of Adama was recently replaced, which has left the initiative leaderless. To try and get around this, the city has created a new Land Development and Management Agency to take over the work of urban expansion. At the moment, their work is on hold, awaiting the

next batch of funds in 2015. The city has requested additional support and patience from the central government in order to shore up its efforts.

Bahir Dar used their first year of funding to develop three macroblocks adjacent to the existing city. This provided land for 204 housing cooperatives (the preferred style of public housing in Ethiopia) with space for 4,250 people. It represents a 10-fold increase over the previous year, and is a significant step toward relieving the housing shortage in Bahir Dar, which city officials estimate at around 23,500.

Figure 12: Intersection of two segments of arterial road in Bahir Dar, housing cooperatives in the background.

So far, 6km of arterial roads have been constructed, with many more planned (figure 12). Releasing this macroblock generated $1.85 million in revenue. However, an unusual arrangement in Amhara region required the city to turn most of that money over to the regional government. As a result, no funds were available to construct the remainder of the first year plan, which consisted of four additional macroblocks. Bahir Dar is also working with the local university on the technical design, and the university is overseeing the surveying to ensure quality. It is expected that the surveying of the grid will be finished in February 2016. No compensation for the grid has been paid, beyond the first macroblocks, however.

Mekele and Hawassa

Mekele and Hawassa - operating under similar financial constraints - have shown considerably greater initiative and creativity in advancing the initiative. This is largely due to the stability of their city administrations, and the higher priority placed on urban expansion. In Mekele, this is also because the nature of the surrounding landscape makes expansion quite simple – it is of much lower value than the fertile land in Bahir Dar and Adama. In Hawassa, there is simply very high demand for land, necessitating a response.

Figure 13: Grid construction in Mekele (Source: Mekele City Administration.)

Mekele has started road construction under the first phase of the project. 10.87km of road are planned for 2015, with 4.85km out to bid (figure 13). The city also used the urban expansion funds to accelerate the completion of an existing development plan, leasing 1400 plots and generating $1 million which will be invested in future expansion. They are surveying the outer reaches of the arterial grid for the technical design and should be completed in late 2015. The local university is designing the first tenders and monitoring

construction standards. To date, they have paid $405,000 in compensation for the first phase of the arterial grid.

Hawassa pioneered an innovative solution to the funding problem. In the village of Tula to the southwest, the city negotiated an arrangement with landowners along the road grid where they would agree to relocate without compensation, provided they receive a serviced plot, with water, road access, and electricity. As a result of this deal, they have been able to begin construction of the first segment of arterial road using city funds (figure 14). This represents a significant step forward in planning for urban expansion – one that aligns the country much more closely with the successful planners of old. If these sorts of arrangements were to become common, the process of planning for urban expansion would be greatly accelerated and cheapened.

Figure 14: Grid construction in Hawassa (Source: Hawassa City Administration.)

As often happens, necessity was the mother of invention. Hawassa is suffering from a manpower shortage due to competition from a pre-existing project. In an effort to develop the northern part of the country, the central government is supporting the creation of a 300ha industrial park, a dry port, and an international airport. This work is not competing with the UXI for funding, but it is consuming a lot of the city's planning capacity, making it difficult for them to focus on the arterial grid. The city is trying to finish the grid as quickly as possible and begin the revenue generating process of land leasing, which will allow them to increase their capacity. To this end, the survey of the grid is almost completed, and the city had raised $1,150,000 in land lease sales by March 2015.

Conclusion

Many cities in Africa struggle with the consequences of unplanned urban expansion. NYU Stern Urbanization Project has proposed a new planning methodology to help rapidly growing cities prepare land for urban development. This methodology is a simple one, relying on four steps: 1) The creation of accurate maps that project future growth; 2) Implementing generous municipal boundaries that can accommodate growth; 3) Designing a network of arterial roads, spaced 1km apart, throughout the expansion area; and 4) Designating a hierarchy of public open spaces that will protect environmentally sensitive areas. In resource-scarce environments, these are the minimum preparations that a rapidly growing city can make.

In July 2013, NYU Stern Urbanization Project partnered with the Government of Ethiopia to test this methodology in 4 cities there. Eight months later, the cities had completed the first two steps and had embarked on compensation for the arterial grid. By February 2015, the cities had already used the new plans to significantly increase the supply of land (figure 15, for example.) Assessing their work against the proposed four point plan, it's clear that they have succeeded in two of the points – they now have accurate projections of their urban expansion, and they have expanded their city boundaries to accommodate that expansion. On the third and fourth points, the outcome is unclear. The cities have certainly designed a grid of arterial roads, and they have also designated a network of public open spaces. These

things have been confirmed on paper – the plans are now legally binding. As the cities move into their second budget year, they must now finish paying compensation for the grid, securing it for future use. They must also clearly mark the boundaries of the arterial roads and the public open spaces to prevent any encroachment.

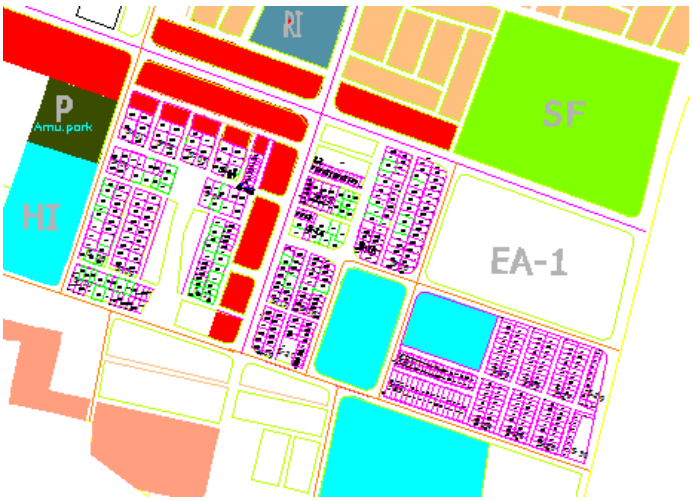

Figure 15: New plots for sale in the expansion zone of Mekele.

The Government of Ethiopia has been happy with the results of the Urban Expansion Initiative. A national-level push to attain middle-income status by 2025 is currently underway, and urbanization has been identified as a critical component in this process. On one hand, wages and productivity are higher in cities. On the other hand, these urban expansion initiatives should make it substantially easier for new city dwellers to become landowners. In short, the Government of Ethiopia has realized that planning for urban expansion can also help build wealth for the nation. With this in mind, they incorporated urban expansion into their next five-year plan, the Growth and Transformation Plan II, and the Ethiopia UXI expanded to include 14 additional cities in mid-2014.

In general, the Ethiopia UXI has leveraged a relatively small investment to produce a large effect, very quickly. Total NYU funding equaled $475,000, sparking $32 million in local spending on urban expansion implementation to date and producing results on the ground in less than two years. The Urban Expansion Initiative has given urban local governments in Ethiopia the tools to address a serious issue that had been neglected, and to do so quickly and at a low cost. The key, as in all plans, is follow-through.

Africa is urbanizing – it is inevitable. Optimists see a grand opportunity for reshaping the continent, envisioning vibrant, productive urban centers that can drive higher standards of living and create wealth. Pessimists look at the state of African cities today and they see failure, decline, collapse, and decay. “Making Room for Urban Expansion” is ammunition for the optimists. As the success of the Ethiopian Urban Expansion Initiative demonstrates, the methodology has the potential to radically refocus and refine planning in Africa, and can produce real results. It will allow governments to move beyond the sclerotic and costly plans of today, toward a nimble, affordable, intuitive strategy that will allow African cities to accommodate their coming millions.