

Chapter 1

The challenges of measuring urbanisation in Africa

The definition of what constitutes a city or urban area differs between countries or institutions according to the criteria used, including political-administrative, morphological or functional. The chosen definition will influence urban statistics including on the number of cities, urban population or population density. The variety of existing definitions strongly limits the comparability of urban statistics across countries. Africapolis defines and applies one homogeneous spatial definition to provide a comparable measure of urban phenomena across countries and time. Its spatial approach makes it possible to describe key features of African urbanisation dynamics, such as urban sprawl, *in situ* urbanisation of rural areas and the emergence of metropolitan regions. In addition to promoting a harmonised use of definitions, Africapolis re-evaluates certain “myths” regarding African urbanisation — such as rural exodus — allowing for the design of policies that reflect current urban realities.

THE LIMITATIONS OF OFFICIAL DEFINITIONS OF URBAN

Since the beginning of the 1960s, the population density within African countries has grown five to six-fold on average. Population settlement patterns have evolved substantially, either spontaneously or through deliberate policy. Several phenomena are evident: cities are sprawling, densely populated rural areas are becoming (more) urban and in some cases coming together to form conurbations. The division between rural and urban is less and less straightforward. Demographic and environmental pressures are also generating new types of space, neither urban nor rural including nature reserves whose ecosystems need to be protected from both urban and agricultural development.

Urbanisation is developing beyond statistical definitions that are based solely on administrative divisions and which only permit a partial understanding of urban phenomenon. Africapolis aims to fill these gaps and highlight phenomena that have been overlooked by national and international statistics. Additionally, in the absence of a generally accepted definition of urban (city, agglomeration, metropolitan region), urban statistics can differ from one country to another and over time, which complicates comparative analyses. There is no universally accepted

definition of ‘city’ or ‘urban’ and the two are often erroneously interchanged.

A harmonised definition of urban is necessary to measure and compare urban phenomena at different territorial scales and over time and to implement policies adapted to territorial realities. Rethinking the definition of urban will have important political consequences such as changing the ranking of the largest cities of a country in terms of population. In particular, the introduction of a spatial dimension makes it possible to think in terms of territories rather than categories (like urban and rural) and to observe the emergence of new developments such as the transformation and densification of rural zones or new urban forms.

Three approaches to defining urban

Currently accepted definitions of urban phenomena can be grouped into three categories: cities, agglomerations and metropolitan regions (Moriconi-Ebrard, 2000). These definitions differ by country and result in extremely diverse urban statistical outcomes in terms of number of units identified, population sizes, population densities, socio-economic characteristics, etc.

The city, a politico-administrative entity

The concept of the city generally refers to a politico-administrative unit of which the boundaries and statutory jurisdiction are defined by the state according to various administrative, political and functional criteria, contexts and objectives. Historically, the “city” refers to a well-defined territory where the inhabitants had freed themselves from the power of landowners; and that enjoyed separate judicial structures. This politico-administrative approach to the city underpins the majority of definitions used around the world (China, Germany, Egypt, Japan, India, Iran, Russia, the United States, etc.). It is the foundation of most of the francophone nations in Africa; the first “cities” emerged from agglomerations endowed with the status of “communes” during the colonial period.

Whether the approach is administrative or functional — taking into consideration the flows related to human mobility, notably commuting — it results in a paradox: the limits of a city are not necessarily visible on the ground. Its boundaries can be drawn across continuously built-up areas creating an invisible separation between cities and suburbs. Conversely, a city can encompass, in addition to a main agglomeration, towns, fields, forests, or even several distinct agglomerations of equal importance.

Population growth encourages the emergence of new urban centres in addition to the expansion of existing ones. However, the number of administrative units does not change unless they are dismantled to create new jurisdictions that reflect the realities of urban growth. In Egypt, the *Central Agency for Public Mobilization and Statistics* (CAPMAS) defines a “city” (*madina*) as any governorate (*muhafaza*) or district (*markaz*) capital. Because the creation of new *markaz* is limited, the number of “cities” has remained practically unchanged since the 1960s census. Since cities are already densely populated, growth often occurs outside of the “official” urban perimeter. As a result, the country’s official level of urbanisation has remained stagnant at around 43% for a half century. This same phenomenon can be observed in all countries in which functional criteria underpin the definition of cities, such as in Guinea and Malawi.

Agglomeration: A morphological approach based on land use

An agglomeration is an area defined as an ensemble of dense constructions; density can be measured either by number of inhabitants per unit of surface or as a maximum distance between buildings or clusters of buildings.

Urban agglomerations conform to several criteria:

- A minimum population, which varies significantly between countries;
- Sometimes, a certain percentage of non-agricultural households, which also varies by country;
- The presence of certain infrastructure, services (health, culture, education, transportation, security, etc.) and administrative functions (headquarters) are included in some definitions.

If one or several of these criteria are fulfilled, the status of urban agglomeration is applied generally to the entirety of the city or cities that make up the built-up area. This approach prevails in several West African countries but with different population thresholds (1 500 inhabitants in Guinea-Bissau, 2 500 inhabitants in Sierra Leone and Liberia, 5 000 in Ghana and Algeria, 20 000 in Nigeria).

Historically, the notion of agglomeration related to the concept of *urbs*, literally “urban”. In the contemporary era, the first occurrence of an official national definition was in the 1841 English census. At the time, statisticians were preoccupied with determining the “real” size of London, as the majority of urban development occurred in the “suburbs” outside of the official boundaries of “the city”.

The metropolitan region: A functional approach

This approach is based on flows of people (generally commuting patterns), goods, and services, and sometimes on the density of networks. A metropolitan region is therefore neither a city nor an agglomeration but a collection of more or less polarised flows. The concept appeared for the first time in the 1950 census in the United States setting off the counter-urbanisation debate. Statisticians became eager to show that the sphere of influence of large cities

did not end at the limits of the agglomeration but extended to satellite localities sometimes rather distant from, though functionally connected to, the centre. As such, even if the population of a city decreases – as was the case in the northeast of the country – metropolitan regions can continue to grow. Though extensively used in statistical definitions the world over (Canada, Korea, Mexico, the United States, Europe, etc.), as of 2015, South Africa was the only country on the African continent to officially apply this category.

Some countries use all three levels of definition (city, agglomeration, and metropolitan region). This heterogeneity reflects the diversity of the countries' spatial and demographic characteristics, natural environments, population settlement patterns, development histories, and political systems. Consequently, it is not surprising that definitions of urban vary significantly between, for example, Nigeria (187 million inhabitants) and Gambia (2 million inhabitants).

The absence of a universally accepted definition

The variety of national statistical definitions based on political-administrative boundaries usually do not reflect the spatial and demographic realities of the urban phenomenon or of urban populations. Close to half of the agglomerations with more than 10 000 inhabitants identified by Africapolis do not conform to any official urban definition. Several hundred of them do not appear on any map or official record, to the point that some agglomerations do not even have an official name.

Heterogeneous national criteria

The heterogeneity of national criteria and methods limits the comparability of statistics and the generalisability of observations. As mentioned, the definitions established by countries are sometimes based on numerical criteria (for example, a minimum number of inhabitants), sometimes on space (administrative boundaries) and sometimes on function (provincial capital, local government seat, etc.) (Table 1.1). They are also interdependent: moving an administrative boundary changes the number

of inhabitants and other characteristics. In some cases, these definitions also vary over time within countries.

National definitions and criteria can also reflect political strategies, ideological motives, or bureaucratic inertia. As centres of power and decision making, cities are privileged sites in the political lives of public and private actors. They are politicised entities whose identification, spatial delimitation, legal status and level of autonomy are determined by the internal affairs of each state. National statistical frameworks are directly related to issues such as taxation or land rights (national and customary law) compliance with planning regulations, electoral maps. This is why, unlike other globally standardised indicators, such as the unemployment rate, gross domestic product (GDP), carbon emissions, and so on, there is no official body or international commission responsible for the standardisation of urban statistics. Added to this is the lack of capacity of the administrations in charge of statistics. For instance, data collected at the local level are not always transmitted or integrated at the national level and in most countries, urban statistics are not accessible or available. These statistical gaps have effects on other sectoral development strategies and plans and can result in a disconnect between the decision making process and implementation.

Moreover, as a result of rapid population growth, in many areas of Africa it is becoming less easy to distinguish between urban and non-urban (rural) areas. This separation, which was still straightforward only a few decades ago, is becoming increasingly arbitrary. For example, in southeastern Nigeria, in the highlands of Kenya and Uganda, in the hills of Rwanda and Burundi, or on the Ethiopian plateau, population densities, still considered non-urban, are already equivalent to that of many extensive agglomerations in the United States or Europe. Although their level of development is certainly not comparable, the population in these areas continues to grow steadily and agricultural, industrial and services activities are expanding and becoming more global, so that continuing to classify certain areas as “rural” is no longer entirely appropriate.

Table 1.1
The definitions of urban in Africa

Algeria	The urban/rural delimitation is performed after the census operation based on the classification of built-up areas. Groupings of 100 or more constructions, less than 200 metres from one another are considered urban.
Botswana	Agglomerations of 5 000 or more inhabitants where 75% of the economic activity is non-agricultural.
Burkina Faso	All provincial administrative centres (45) plus 4 medium-sized towns are considered urban areas.
Burundi	Commune of Bujumbura.
Comoros	Every locality or administrative centre of an island, region or prefecture that has the following facilities: asphalted roads, electricity, a medical centre, telephone services, etc.
Egypt	Governorates of Cairo, Alexandria, Port Said, Ismailia, Suez, frontier governorates and capitals of other governorates, as well as district capitals (<i>markaz</i>). The definition of urban areas for the 2006 Census is “ <i>shiakha</i> ”, a part of a district.
Equatorial Guinea	District centres and localities with 300 dwellings and/or 1 500 inhabitants or more.
Eswatini	A geographical area constituting a city or town, characterised by higher population density and human construction in comparison to the areas surrounding it.
Ethiopia	Localities of 2 000 or more inhabitants.
Guinea	Administrative centres of prefectures and the capital city (Conakry).
Kenya	Areas having a population of 2 000 or more inhabitants that have transport systems, build-up areas, industrial/manufacturing structures and other developed structures.
Lesotho	All administrative headquarters and settlements of rapid growth.
Liberia	Localities of 2 000 or more inhabitants.
Malawi	All townships and town planning areas and all district centres.
Mauritius	The five municipal council areas which are subdivided into twenty municipal wards defined according to official boundaries.
Namibia	Declared urban areas for which cadastral data is available and other unplanned areas.
Niger	Capital city, capitals of the departments and districts.
Rwanda	All administrative areas recognised as urban by the law. These are all administrative centres of provinces, and the cities of Kigali, Nyanza, Ruhango and Rwamagana.
Senegal	Agglomerations of 10 000 or more inhabitants.
South Africa	Places with some form of local authority.
Sudan	Localities of administrative and/or commercial importance or with a population of 5 000 or more inhabitants.
Tanzania	Areas legally recognised as urban and all areas recognised by local government authorities as urban.
Tunisia	Populations living in communes/municipalities.
Uganda	“Gazettes”, cities, municipalities and towns.
Zambia	Localities of 5 000 or more inhabitants, the majority of which all depend on non-agricultural activities.

Source: UN 2018a

Changing or missing definitions

Statistical definitions of urban can be incomplete or missing. Some countries, like Kenya, Nigeria or South Africa no longer have an official statistical definition of “urban population”. Others do not elaborate their classification criteria (Cabo Verde). Some definitions change between censuses, so that at the national level the data

are not comparable over time (Kenya). Still others publish obsolete lists including non-updated city populations (Chad, Ghana). Finally, some census offices outline categories without specifying a statistical approach: in Rwanda, the list of official cities is nominative. In addition, some countries give the choice between several possible definitions, such as the “mixed” categories of Tanzania,

which by definition are not reducible to rural or urban areas.

The example of Nigeria shows that administrative divisions complicate the calculation of statistical indicators that provide a precise picture of urbanisation. In Nigeria, which accounts for 18% of the continent's population, the national statistical services no longer publish city registries. What were formerly cities, towns and other municipalities have been dissolved and their division into local government areas (LGA) — the most granular scale of data — intentionally erases their boundaries, either by subdividing them into separate LGAs, or by associating them with rural peripheries. The LGA makes it difficult to estimate the population of an agglomeration, except for some exceptional cases. The figures for level of urbanisation, growth rates, densities, hierarchies and other “urban” indicators are therefore not verifiable. The Nigerian example demonstrates how administrative divisions prevent the calculation of statistical indicators that give an accurate representation of urbanisation.

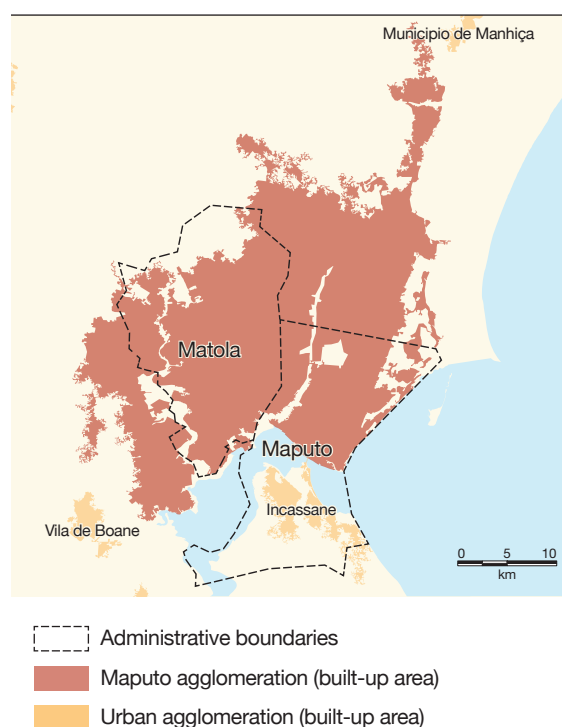
In Ghana, the definition of urban is based on a minimum size of *localities* (more than 5 000 inhabitants). However, between the 2000 and 2010 census, localities were replaced by *communities* which were essentially subdivisions of the original localities. The definition of urban was therefore deprived of its geo-statistical basis. Some *urban localities*, once redefined as such, no longer met the threshold requirement and de facto reverted to rural territories. In Chad, the definition of urban, based on the presence of an administrative capital, became obsolete in 1999, and was reinstated in 2008. By maintaining the same definition some places that were large enough to be cities were classified as officially rural due to their lack of capital status.

Arbitrary administrative boundaries

Spatial data and indicators do not only vary depending on the dynamics of their content, but also based on changes to their container: urban statistics are intrinsically linked to the way in which each urban space is delineated. In Africa as elsewhere, an administration can create, modify or statistically erase a city and thus hide certain imbalances such as the size of capitals

Map 1.1

Maputo and Matola (Mozambique): Two municipalities, one agglomeration



Sources: OECD/SWAC 2018, Africapolis (database); Geopolis 2018; Administrative file communicated by National Institute of Statistics (INE) “*unidades locais*”

vis-à-vis intermediary agglomerations. By simply moving the administrative boundaries of the container, it is possible to radically change the statistical representation of the contents.

In addition, statistical and geographic services charged with providing urban data are often separate institutions. Census mapping is sometimes entrusted to the ministry of agriculture, water, or to the military. Land registers may not exist or, where they do, may not be geo-referenced. Finally, because mapping is expensive and requires trained staff, documents are not regularly updated.

Administrative boundaries in Mozambique

In Mozambique, as in other Portuguese-speaking countries, urban population is calculated based on “urban perimeters” (*barrios urbanos*) defined within each locality (*localidade*). According to the list of localities, Maputo is a separate city from Matola, which was established as a separate

municipality in 1988 (Map 1.1). However, the two cities belong to the same agglomeration, as defined by Africapolis. Conforming to Mozambican statistics, the World Urbanization Prospects (United Nations, 2018b), displays Maputo and Matola as two separate entities.

The agglomeration of Maputo as defined by Africapolis (continuously built-up area), extends beyond its administrative boundary to include Matola, officially a distinct urban municipality, and areas considered as rural.

According to national statistics the population of the capital Maputo is 1.1 million inhabitants, compared to 2.6 million estimated by Africapolis. The second largest agglomeration according to Africapolis is Beira (501 000 inhabitants) and not Nampula (423 000 inhabitants). The official figures overestimate the population of the city of Nampula (679 000 inhabitants) by more than 50% (Map 1.2). Nampula was the capital of the country's most populous province in 2017 and the country's leading political and electoral bloc. Unlike the capital Maputo, the population of the country's main secondary agglomerations is overestimated by including very wide administrative areas. If the administrative area of the municipality (*cidade*) of Nampula is 481 square kilometres, the built-up area of the agglomeration itself is actually 4 times smaller (110 square kilometres).

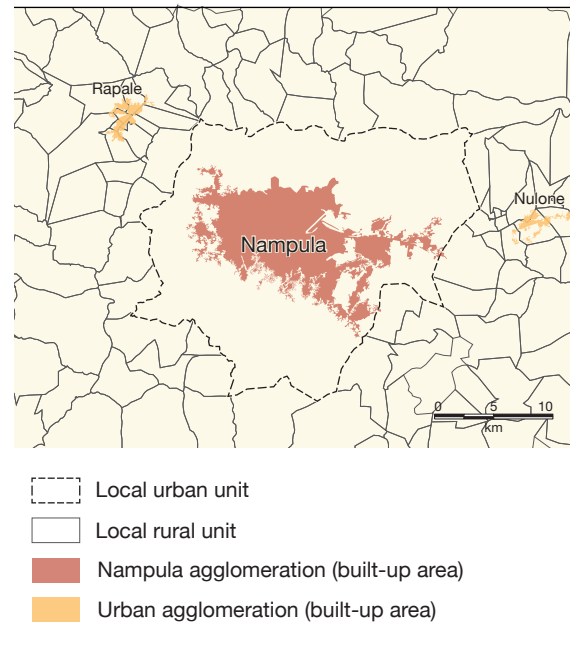
In Mozambique, the use of the Africapolis morphological criteria to measure the urban perimeter modifies the ranking of cities by population, with potentially important consequences for political representation.

A bias in international statistics on large agglomerations

Across the continent, the majority of studies on urbanisation, cities, and urban population are based on international databases that only cover cities with populations over 100 000. The *World Urbanization Prospects* (WUP) is the main reference for urban statistics at the international level. The WUP contains 222 agglomerations of more than 300 000 inhabitants for the whole of Africa (United Nations, 2018b). For example, studies based on this sample of data classify agglomerations of 500 000 inhabitants as “small

Map 1.2

Nampula (Mozambique): A partially-urban regional capital



Sources: OECD/SWAC 2018, Africapolis (database); Geopolis 2018; Administrative file communicated by INE “*unidades locais*”

towns” because they are at the bottom of the ranking. In comparison, Africapolis has more than 7 600 urban agglomerations. The agglomerations listed by the WUP represent only 3% of the agglomerations identified by Africapolis with a threshold of 10 000 inhabitants.

The United Nations (UN) Demographic Yearbooks adopt a lower threshold (100 000 inhabitants). This threshold includes about 10% of the urban population of the African continent, the remaining 90% being in agglomerations of between 10 000 and 100 000 inhabitants (United Nations, 2018a). This database is multilateral and not international: there is no homogenous definition, the directories are based on official data provided by national statistics institute and are calculated using heterogeneous methods.

Box 1.1

The administrative boundaries of Kinshasa (DRC) versus actual urbanisation

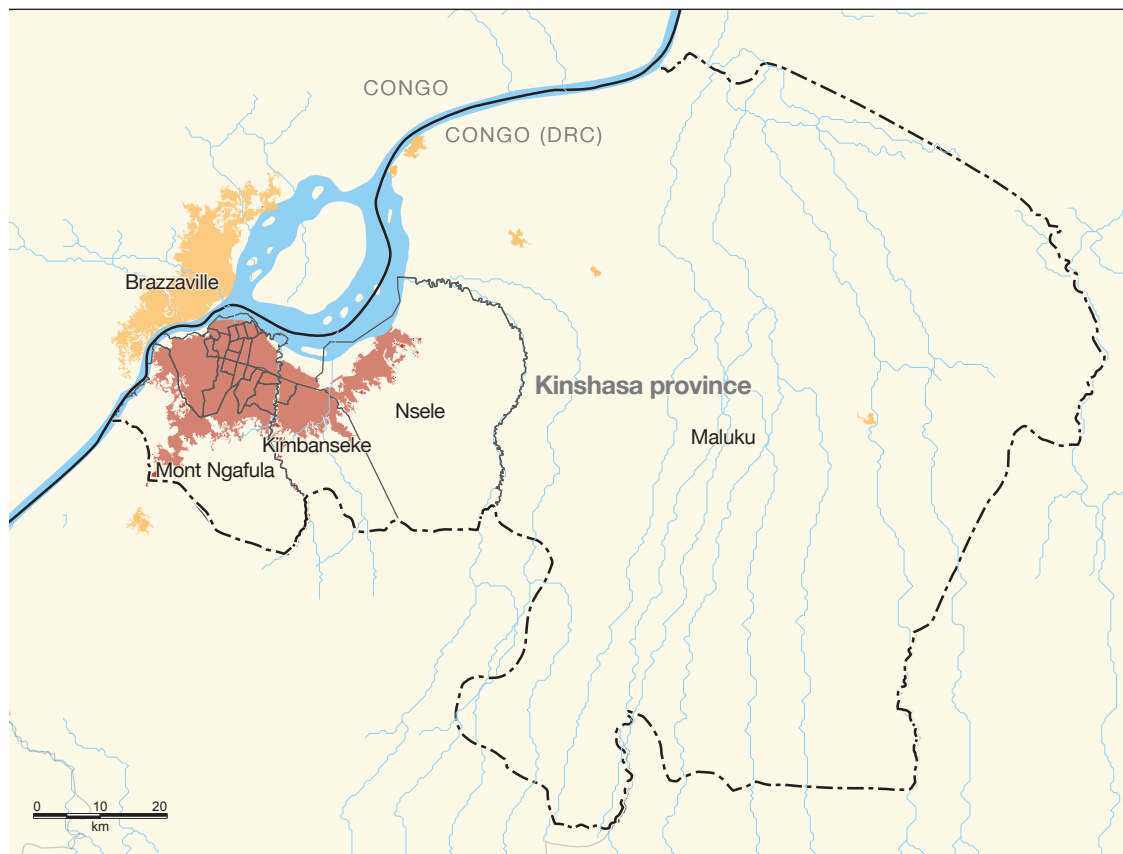
In the Democratic Republic of the Congo (DRC) the most recent census dates from 1984. The 2015 figures estimated by the United Nations and the National Institute of Statistics of the DRC serve as a reference for population statistics (DR Congo-INS/UNDP, 2015). The report provides an estimate of the population density of Kinshasa, based on the legal administrative area of the city-province. The administrative area extends over 9 965 square kilometres, including large agricultural and forest areas with low population densities (Map 1.3). The municipality (*commune*) of Maluku to the east, alone covers 80%

of the area of the province with an average density of 20 inhabitants per square kilometre. Three other municipalities also include large, sparsely populated areas: Mount Ngalufa, Kimbanseke and Nsele.

In Africapolis, the agglomeration of Kinshasa covers a built-up area of only 430 square kilometres. Thus, depending on which criterion of delimitation is used, the capital of the DRC is either the least dense large city in Africa if one refers to politico-administrative boundaries, or one the densest metropole on the continent if one refers to the morphological definition.

Map 1.3

Kinshasa: The city-region, the communes and the agglomeration in 2015

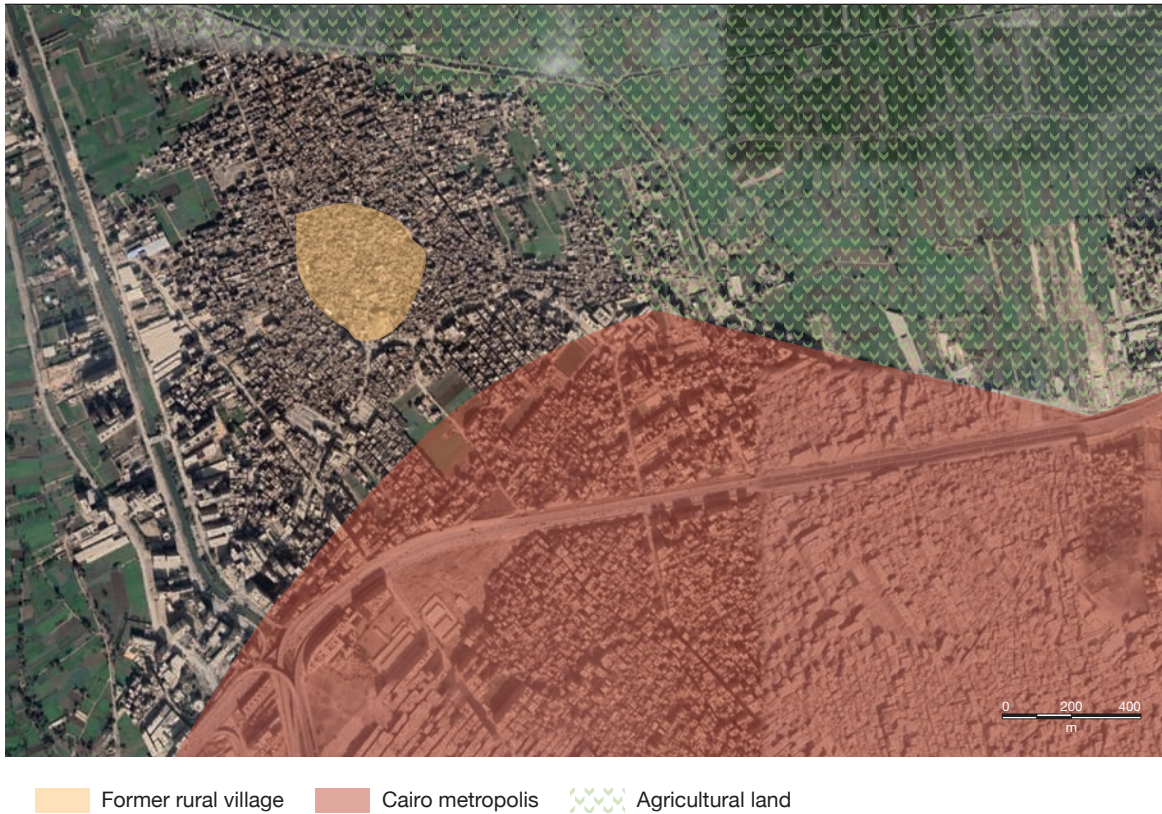


- Kinshasa province
- Kinshasa municipality
- Kinshasa agglomeration (built-up area)
- Urban agglomeration (built-up area)

Sources: OECD/SWAC 2018, Africapolis (database); Geopolis 2018

Image 1.1

Monshaat Al Bakkari: A rural village on the periphery of Cairo (Egypt)



Note: The former rural village of Monshaat Al Bakkari is now within the urban periphery of Cairo due to the capital's expansion.

Sources: *Google Earth* (accessed 15 October 2015); Geopolis 2018

THE BENEFITS OF A SPATIAL APPROACH

Africa's urban transition is a more multifaceted process than commonly appreciated. This is also explained by the fact that many phenomena are not captured by official statistics. If some aspects are already well known (the magnitude of urban growth, the growth of large cities, increases in levels of urbanisation), other characteristics need to be clarified. Integrating the spatial dimensions of urbanisation contributes to filling these gaps. A quote attributed to the French chemist Paul Vieille demonstrates this point: "What is striking when we do not see something is that we do not know we do not see it."

Beyond statistical limitations, several other factors underline the advantages of a spatial approach. For the large majority of African agglomerations it is impossible to separate the "official" from the "spontaneous". Thousands

of agglomerations have a "planned" or "official" part and one or more "spontaneous" parts. The emergence of spontaneous extensions and settlements is the result of several processes, including urban sprawl, *in situ* urbanisation and the formation of "metropolitan areas". In addition, the difference between the two notions is further blurred by the fact that very few countries have precise and updated geo-referenced boundaries of administrative urban and/or rural units.

Sprawl and urban administrative boundaries

The sprawl of agglomerations beyond their administrative boundaries has become a major component of urban growth. Unlike the administrative boundaries of cities, the

Box 1.2

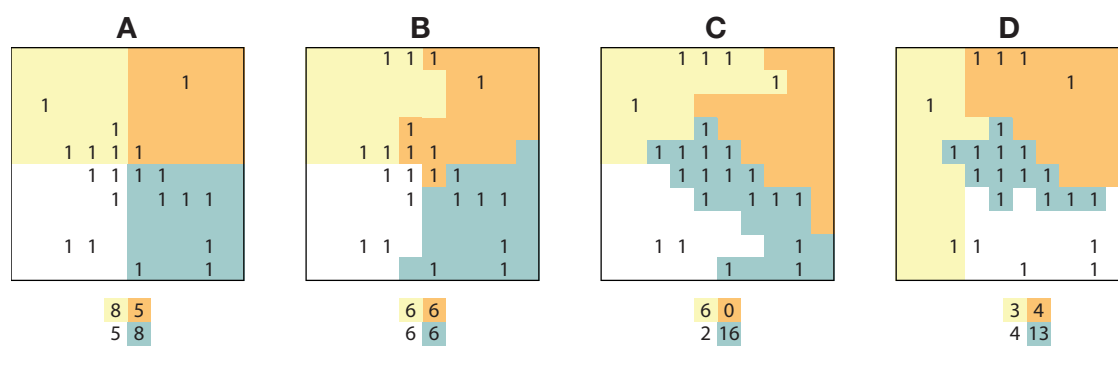
Territorial boundaries and political power

This example shows how changes in spatial boundaries can influence the measurement of otherwise stable distributions.

Consider a grid of 10 x 10 cells (100 cells) with 24 cells having a 'content', indicated by a 1. Each 1 can represent an agglomeration, a building, a ballot, etc. The overall grid is divided into four territories, or containers, represented by different colours. In each of the four cases (A, B, C, D), the "1s" are arranged exactly the same way in the grid but boundaries are drawn differently. The simple change in the territorial boundaries produces quite different results in terms of distribution (control) of the "1s".

Figure 1.1

The manipulation of spatial boundaries



A: Simple grid - perfectly equal territories (25 cells): due to the unequal spatial distribution of the "1s", blue and yellow dominate equally with eight "1s" each. White is the only loser with only three "1s".

B: Without changing the area covered by each colour container (25 cells), and only by slightly moving the boundaries, each of the four colours has an equal number of "1s".

spatial—built-up—limits of agglomerations fluctuate over time. Urban sprawl is traditionally conceptualised as the extension of urban settlements into natural or agricultural lands. However, in many cases this interpretation is too restrictive: agglomerations increasingly tend to absorb already inhabited areas (other towns, villages, hamlets and buildings originally outside of the agglomeration) (Image 1.1). This process extends beyond "sprawl", involving the absorption of a pre-existing rural habitat as well as the merging between urban agglomerations. In certain high population density areas this is driving the formation of large conurbations with several urban cores. Many examples show that, even when population growth is zero or

negative, agglomerations can continue to expand by merging with villages or agglomerations in their peripheries.

Given that in Africa the phenomenon of urban sprawl is compounded by rapid population growth, it is increasingly explained by centrifugal flows of urban and rural populations and not only by centripetal flows of populations to cities. Therefore, the importance of certain drivers of urban growth, such as rural migration, needs to be revisited when explaining current urbanisation dynamics.

C: The areas allocated to each colour are still equal with 25% of the territory each. However, blue alone contains two-thirds of the "1s", while white has none.

D: The area (cells) covered by each colour here is unequal. Blue controls only 13% of the surface, but contains 54% of all "1s".

The properties of each type of division

A: The division is a priori neutral and impartial. The grid method is also often used as an "objective" net in spatial analysis. Here it results in an unequal distribution of "1s"

B: A small manipulation of the limits gives a perfectly egalitarian distribution, but an arbitrary shape

C: The change of boundaries gives blue an overwhelming majority of "1s", and also creates a territory totally devoid of "1s"

D: This represents a "platonic" compensation strategy; the fact that blue controls the most "1s" is counterbalanced by the fact that its territory is less extensive than the others.

Divisions mapped onto agglomerations

By playing with the divisions, and without even manipulating the statistical definition of urban, it is easy to create a "city" or make one disappear, to give it more weight or to minimise it, to split it into different units or to add peripheral units to strengthen its significance.

Assume that the 4 colours are 4 political entities — for example communes — and that the group of 13 contiguous 1s in the middle of the grid represents a continuously inhabited territory.

A and B: The agglomeration is shared between four territorial subdivisions. It does not exist politically. In addition, none of the subdivisions alone has enough "1s" to be urban. As a result, the whole territory is considered rural.

C and D: The spatial unity of the agglomeration is preserved. In D, the blue unit coincides exactly with its spatial extent. With 13 "1s", it is "urban", while the 3 other territories (colours) are "rural". In C, 3 isolated/non-contiguous "1s" to the agglomeration are included, which increases its statistical weight, as well as the level of urbanisation of the whole territory (grid). Such alterations to administrative boundaries impact all urban indicators: agglomeration size, the level or urbanisation, density, urban hierarchy, rural-urban migration, etc. Between scenario C and D the level of urbanisation varies from 67% to 52%, and the density of the city drops by one-third in C. These aspects are undetectable when urban statistics are not complemented by detailed cartographic data.

In situ urbanisation of rural areas

In densely populated rural areas continued demographic growth leads to the emergence of new urban agglomerations through a process of *in situ* urbanisation. In-situ urbanisation is the transformation of rural areas into urban or quasi-urban areas as the result of increased density and population without necessitating migration. From a spatial point of view, urbanisation is above all a process of concentration of people and non-agricultural activities at the micro-local scale resulting in an "agglomeration". The increasing density goes hand-in-hand with the reorganisation of activities, notably the gradual decrease of agricultural activities. During this

process, the distinction between urban agglomeration and rural settlement remains unclear and contested. In regions where rural settlement density is already high, in-situ urbanisation can entail widespread and massive urbanisation. The emergence of these unplanned agglomerations goes often unnoticed by public authorities and statistics.

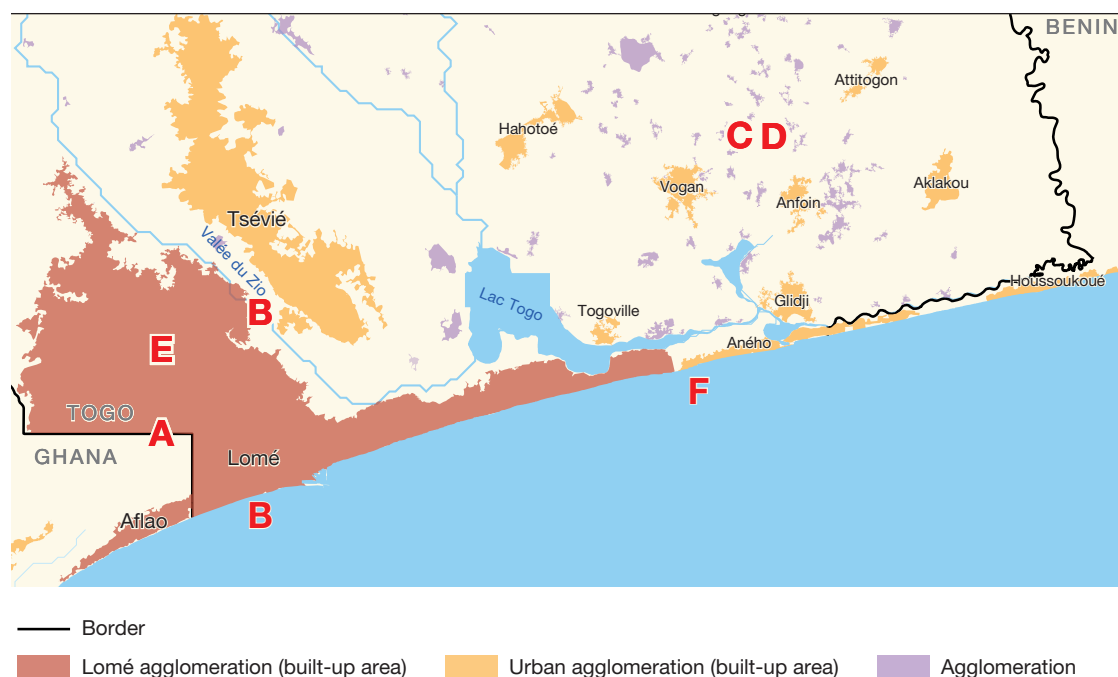
The extent of in-situ urbanisation across Africa also challenges the influence still attributed to rural exodus and residential migration in driving urban growth. In many current urbanisation hotspots, it is actually the contrary: the absence (or weakness) of rural migration drives densification and in-situ urbanisation. Rural-to-urban migration still play a role in "traditional"

Box 1.3

Togo: Microcosm of spatial phenomena

Map 1.4

Spatial footprint of the built-up areas in southern Togo



Sources: OECD/SWAC 2018, Africapolis (database); Geopolis 2018

(A) The role of politics

Lomé, the capital of Togo, is located on the border with Ghana. Lomé’s centre is only a few hundred metres from the border, where the built environment stops abruptly. The major discontinuity of the spatial development of the agglomeration is political, not “natural”. However, the agglomeration spreads out laterally along the coastline into Ghana and the small town of Aflao, creating a transnational agglomeration.

(B) Natural constraints and administrative limits

Lomé’s expansion to the south is blocked by the shoreline and to the north and northeast by the valley of the river Zio. The urban settlement continues on the opposite bank with the agglomeration of Tsévié. Tsévié is Togo’s second largest agglomeration by population but is functionally an extension of Lomé. Here the boundary of the agglomeration’s extension is defined by a “natural” barrier. This boundary is

less radical than the political boundary established by the border. The floor of the Zio River valley is a flood plain inappropriate for construction. However, the most vulnerable and disadvantaged populations have settled in these risky areas rendering the limits of the agglomeration fuzzy.

(C) The anarchic sprawl of peri-urban areas

Faced with a natural population growth rate of around 2.5% per year and the arrival of urban migrants, the countryside around Lomé is subject to intense pressure. Locally, this manifests through the expansion of existing villages, the proliferation of new villages and hamlets, and an anarchic encroachment of buildings of all kinds in the countryside — houses, buildings, garages, workshops. As densification accelerates, this process could produce a continuous agglomeration over the entire territory. Many of the new inhabitants having come from Lomé in

search of space, these migratory movements are no longer the product of rural exodus.

(D) Political recognition of “urban” status

Amongst the agglomerations with more than 10 000 inhabitants, some are officially “cities” according to the official Togolese definition. Others are villages or groups of agglomerated villages. In several African countries, this statutory difference results in different regulations regarding the conditions of access to land and construction, illustrating the importance of national particularities and the local context.

(E) The opposition between metropolitan and intermediary agglomerations

Driven by both centripetal and centrifugal movements, densification of vast areas and a saturated centre, the dimensions of the capital are not comparable with those of other agglomerations in Togo. Lomé

accounts for 51% of the urban population and 25% of Togo’s total population. It hosts almost all media and business headquarters, the international airport, embassies, government bodies, and so on. The singularity of Lomé is also qualitative and illustrates the common disconnect in Africa between the metropolitan capital and intermediary agglomerations.

(F) The emergence of metropolitan regions and the rest of the territory

The eastern outskirts of Lomé have seen the emergence of many new small towns beyond the morphological limits of the agglomerations. These outposts of the metropolis form extensive and highly interconnected geographical units whose development conditions are a priori different from those of smaller, isolated and less accessible agglomerations to the globalised economy of the interior of the country (land pressures, random population mobility, rising land prices, sprawl and loss of agricultural land and natural areas, etc.).

urbanisation and in rural areas that attract other rural populations. The latter form is notably the case for rural areas adjacent to major urban centres. Yet, this is rather a migration to a host region than to a city or urban centre. This type of migration is further boosted by people driven out of cities due to lack of space or housing, as for instance in southern Togo and Uganda.

These migrations may only be temporary and concern, for example, students, civil servants and the employees of major companies (Wa Kabwe-Segatti, 2009; Mercandalli and Losch, 2018; Awumbila, 2017; Bakewell and Jónsson, 2011). Other types of residential migration have been replaced by commuting, which also help to explain the sprawl of agglomerations and the densification of their peripheries.

However, during the later phases of the twentieth century, migrations increasingly stemmed from local and cyclical crises: civil wars, insecurity, natural disasters with mostly large agglomerations serving as refuges for flows of national or foreign refugees driven out of their regions by insecurity.

The formation of metropolitan regions

One of the particularities of sub-Saharan Africa is the emergence of cross-border “metropolitan regions”, such as Lomé. Their emergence is linked to the political fragmentation of coastal areas but also the proximity of numerous metropolises to the border: Bangui, Banjul, Bujumbura, Brazzaville, Gaborone, Kinshasa, Maseru, Mbabane, N’Djamena. This feature encourages the transnational mobility of goods and people. In the long term, exchanges between metropolises surpass exchanges with intermediary cities in the interior, aggravating territorial disparities. The emergence of “metropolitan areas” in all countries of sub-Saharan Africa, with the exception of the most recent one—South Sudan is characterised by a decoupling of metropolitan areas from the rest of the country that is struggling to develop.

Box 1.3 shows an example of the spatial approach to urban measurement for the case of southern Togo, which combines *urban sprawl, in situ* urbanisation as well as the emergence of a metropolitan region centred on Lomé.

AFRICAPOLIS: A NEW VISION OF AFRICAN URBANISATION

Africapolis, the continental version of the global e-Geopolis initiative, is designed to enable comparative and long-term analyses of urbanisation dynamics in Africa. Africapolis is based on a spatial approach and applies a physical criteria — a continuously built-up area — and a demographic criteria — more than 10 000 inhabitants — to define an urban agglomeration. An urban unit is defined by combining satellite and aerial imagery, official demographic data such as censuses and other cartographic sources. Unlike cities whose boundaries are fixed, the urban agglomerations defined by Africapolis are units whose exact shape, contents and boundaries vary over time in function of the evolution of the built environment. Africapolis' innovative spatial approach to urbanisation focuses on the concrete spatial manifestations of urbanisation (morphology) which also make comparisons across countries and time possible. Economic, demographic, sociological or political approaches need to be taken simultaneously into account. On the one hand, this is because the finiteness of available space forces people to share the same spaces and to face new situations in terms of habitat, land

use and mobility; on the other hand, because, once constrained by these choices, the occupation of space is dependent on the intrinsic logics of spatialisation.

Africapolis applies the same definition of urbanised space for all countries regardless of nationally-specific definitions.

A bottom-up approach

Africapolis defines an agglomeration as urban if its population exceeds 10 000 people and its built environment contains no unbuilt spaces greater than 200 metres (Figure 1.2). The methodology involves cross-referencing two sources: 1) national population statistics, and 2) satellite images and geo-referenced maps that permit the identification of the physical limits of the agglomeration.

The project builds on a number of methods based on scientific hypotheses developed by quantitative geography and is used by the scientific community since 1991 (Moriconi-Ebrard, 1994, 1993; ANR, 2008). The methodology is based on both the new generation of technologies

Box 1.4

Why a threshold of 10 000 inhabitants?

The minimum threshold of 10 000 inhabitants applied by Africapolis to define “urban” agglomerations can be scientifically debated. Yet, no study can define a precise cut-off after which it is possible to distinguish an urban from a rural settlement. This threshold varies not only in space but also in time. It may even vary between regions within the same country.

Nevertheless, several authors have demonstrated that a qualitative change takes place above the threshold of 10 000 inhabitants, a scale above which new activities and services become possible. In a structurally agricultural context, the “urban” character of an agglomeration is marked by the presence of non-farm activities. Due to a critical mass effect, part of the population leaves the agricultural sector as urban scale increases. Around this

threshold, intermediary and tertiary activities become more important and big rural villages transform into small urban agglomerations. The threshold of 10 000 inhabitants therefore represents a minimum “average” that can be raised according to specific needs and objectives.

In sub-Saharan Africa, where household size tends to be large, an agglomeration of 10 000 inhabitants contains around 1 000 to 1 200 households versus 3 500 to 4 000 in Europe. A smaller number of households translates into lower a share of the economically active population. Also, given the economic importance of the primary sector, there is still a high proportion of farmers in smaller settlements. At this scale, fields are never far from homes.

Table 1.2
List of census data used (published by locality)

Country	1950s	1960s	1970s	1980s	1990s	2000s	2010s
Algeria	1954	1960, 66	1977	1987	1998	2008	
Angola	1950	1960	1970				2014
Benin			1979		1992	2002	2013
Botswana		1964	1971	1981	1991	2001	2011
Burkina Faso			1975			2006	
Burundi			1979		1990	2008	
Cabo Verde	1950	1960	1970	1980	1990	2000	2010
Cameroon			1976			2006	
Central African Republic			1975	1988		2003	
Chad		1968			1993	2009	
Congo (Brazzaville)			1974		1996	2007	
Côte d'Ivoire			1975				2014
Country	1950s	1960s	1970s	1980s	1990s	2000s	2010s
Democratic Republic of the Congo (Zaire)			1970	1984			
Djibouti						2009	
Egypt	1947	1960, 66	1976	1986	1996	2006	2017
Equatorial Guinea	1950	1960	1970	1983	1994		2015
Eritrea				1984	1997		
e-Swatini	1956	1966	1976	1986	1997	2007	2017
Ethiopia				1984	1994	2004	
Gabon			1970		1993	2003	2013
Gambia	1951	1963	1973	1983	1993	2003	2013
Ghana	1948	1960	1970	1974		2000	2010
Guinea	1958				1996		2014
Guinea-Bissau					1991	2009	
Kenya		1962, 69	1979	1989	1999	2009	
Lesotho	1956	1966	1976	1986	1996	2006	2016
Liberia		1962	1974	1984		2008	
Libya	1954	1964	1973	1984	1995	2006	
Malawi	1956	1966	1977	1987	1998	2008	2018
Mali						2009	
Mauritania			1977	1988		2000	2013
Morocco	1951/52	1960	1971	1982	1994	2014	
Mozambique	1950	1960	1970	1980	1997	2007	2017
Namibia	1950	1960	1970	1981	1991	2001	2010
Niger			1977	1988		2001	2012
Nigeria	1952	1963			1991	2006	
Rwanda			1970	1978	1991	2002	2012
São Tomé-et-Príncipe	1950	1960	1970	1981		2001	2012
Senegal			1976	1988		2002	2013
Sierra Leone		1962	1974	1985		2005	2015
Somalia						1975	
South Africa	1950	1960	1970	1980	1991, 96	2001	2011
South Sudan	1956		1973	1983	1993	2008	
Sudan	1956		1973	1983	1993	2008	
Tanzania	1958	1967	1978	1988		2002	2012
Togo	1959		1970	1981			2010
Tunisia	1956	1966	1975	1984	1994	2004	2014
Uganda						2002	2014

Table 1.2 (cont.)

Country	1950s	1960s	1970s	1980s	1990s	2000s	2010s
Zambia	1950	1960	1970	1980	1990	2000	2010
Zimbabwe				1982	1992	2002	2012

Note: Sources available in a comprehensive manner across the country and disaggregated by location. This data may be supplemented from time to time by other sources, such as a municipal census, administrative counts, or official estimates.

Source: Geopolis 2018

linking satellite imagery and GIS databases as well as on the largest documentary collection ever assembled on the continent in terms of localised census data (directories of villages and/or localities, census gazetteers, village directories, etc.).

The combination of these two sources permits the accrual of considerable knowledge about population distribution. This morphological data is keyed to the Earth's sphere and can be verified on Google Earth. Toponymic and demographic data can be checked from census publications and other public sources (Table 1.2).

The Africapolis database combines three types of information: the list of localities of a country, the population by locality, and the continuous built-up area. This information comes from two categories of sources: population data from national and local censuses and tele-detection data of built-up areas from satellite images. The methodology is based on the principles and criteria of FAIR data (*findable, accessible, interoperable, reuseable*), and relies on a scientific protocol:

- Processing of population data by locality: data collection and harmonisation of available national and local population statistics, disaggregation into local units (points), geo-referencing of the local units;
- Processing of satellite images: tele-detection of built-up areas, delimitation of the perimeter of the agglomerations (polygons); manual verifications, geo-referencing of the polygons;
- Crossing of local units (points) and built-up areas (polygons) to identify all the agglomerations of more than 10 000 inhabitants.

Processing of population data by locality

Africapolis compiles the population data of African countries at locality level (municipalities,

towns, cities, etc.) from available official data sources: national censuses, election statistics, parish data, etc. Collected population data cover African localities at the smallest possible scale, with 10-year time series (2000, 1990, 1980, etc.).

Each locality is converted into a geo-referenced local unit (LU). For example, the municipality of Dakar (3.1 million inhabitants) and the small town of Marsabit (30 000 inhabitants) in the centre of Kenya are both one local unit. The population of each locality is estimated at a fixed date (1 July 2015), then retrospectively at ten-year intervals (2000, 1990, 1980, etc.). The population is calculated for each year on the basis of census data. Population data for each LU are harmonised over time. In case of a merging or break-up of an LU, the population is recalculated. The creation of the Africapolis database enabled the geo-referencing of 9 082 LUs. The geographic co-ordinates correspond to the centre of the localities.

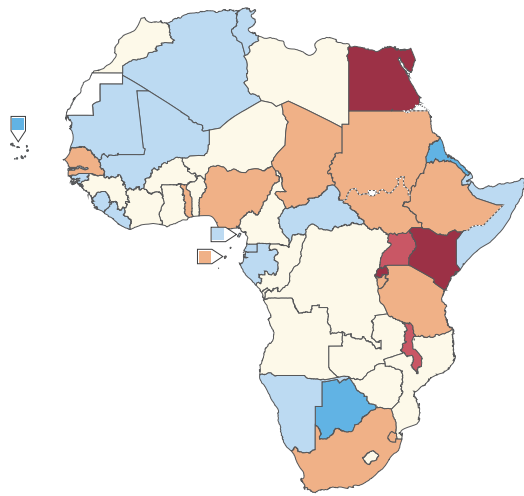
For each LU, Africapolis includes the following information: a unique identifier, name, administrative affiliation within the territorial administrative network, population (number of inhabitants), geographic co-ordinates and possible historical data (old name, former administrative affiliation). Local units constitute a harmonised and geo-referenced ensemble that is comparable at the continental level, between countries and over time.

Processing of satellite images

The processing of satellite images is based on tele-detection techniques, mainly from Google Earth. The algorithm set up for Africapolis detects built-up areas under wet and dry climate conditions (Annex A) and creates polygons to delineate urban areas or "agglomerations" as defined by Africapolis. Polygons are created according to several criteria: The spatial outlines/

Map 1.5

Differences between Africapolis and World Bank levels of urbanisation, 2015



Sources: OECD/SWAC 2018, Africapolis (database); Geopolis 2018; World Bank 2018

limits of the agglomerations are based only on the built-up areas and do not take into account administrative limits

- All constructions are taken into account (residential, commercial, administrative, industrial, etc.)
- Linear interruptions (roads, interchanges, waterways, railways) do not interrupt the built-up area if there are constructions on both sides at a maximum distance of 200 metres.

All agglomerations of more than one kilometre long are systematically vectorised into the shape of a polygon. Each polygon is verified manually, and modified, if necessary, before being geo-referenced. Polygons therefore cover all built-up areas in Africa.

Cross-referencing

Cross-referencing the ensemble of local units with the polygons reveals agglomerations with more than 10 000 inhabitants. Each agglomeration is given the name of the larger LU it encompasses. Africapolis agglomerations include newly obtained information:

- built-up surface area (square kilometre),
- number of LUs over which the built-up area extends,
- population (sum of the population of each LU of the agglomeration).

A complement to national statistics

The sample of cities or urban areas defined by national statistics can be very different from the list of “urban agglomerations” in Africapolis. Yet, with the exception of Djibouti and Mauritania, they overlap in all countries. Firstly, Africapolis contains agglomerations that are not officially recognised as urban, while at the same time there are “official cities” that are not recognised as agglomerations by Africapolis (more than 10 000 inhabitants). Secondly, many agglomerations are composed of officially recognised urban parts, and parts that are not officially recognised outside the administrative boundary.

However, Africapolis also reveals the existence of agglomerations that are not recorded in official statistics, in areas considered to be rural. The extent of this phenomenon is striking, and does not only concerns small towns, or suburbs of big cities, but agglomerations or conurbations of all sizes. Some of these have more than one million inhabitants: Onitsha (Nigeria), Sodo, Hawassa (Ethiopia), Kisii, Kisumu (Kenya), Bafoussam (Cameroon), and Mbale (Uganda). Beyond the statistical aspects, this lack of official recognition reduces the influence that public authorities and national administrations have on their development.

At the macro-level, in 25 of the 50 countries covered, the level of urbanisation¹ estimated in Africapolis are above the officially reported data (Map 1.5). The countries where the level of urbanisation estimated by Africapolis is below the official data are generally sparsely populated countries, with the exception of Ghana and Mali. In these countries the national definition of “city”

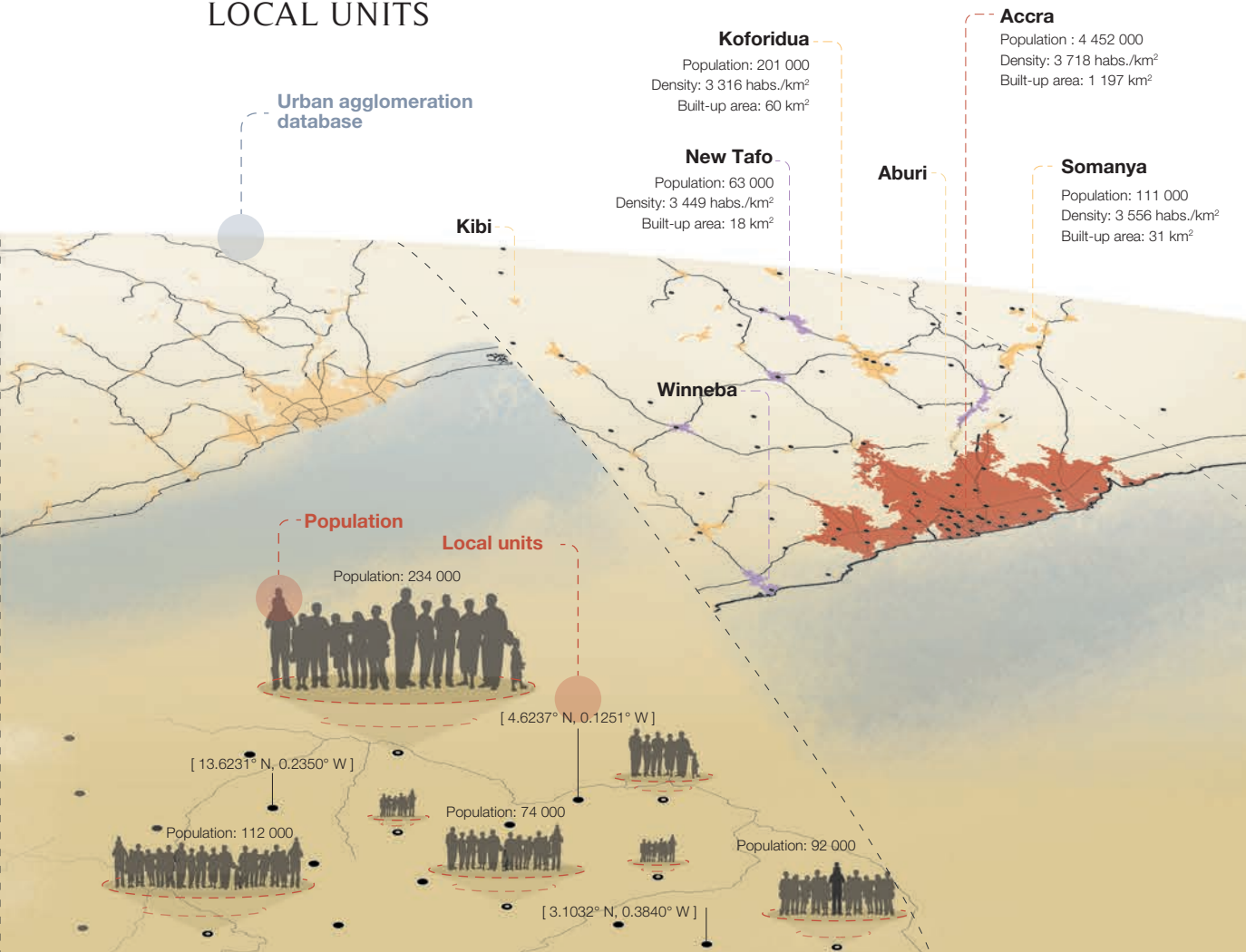
Digitalisation of agglomerations
Processing of census data



3
 GEOREFERENCING
 LOCAL UNITS

Urban agglomeration
 database

4
 OVERLAYING POPULATION
 AND AGGLOMERATION DATA



is generally extended to very small localities, which has the effect of spreading their presence across the territory and increasing the overall size of the urban population.

Urbanisation in 21st century Africa cannot be understood simply through a sample of large cities, or by a juxtaposition of case studies, nor can it be reduced to the opposition of “urban” versus “rural”. Because urbanisation has become a continental and global phenomenon, it is no longer possible to rely solely on official statistical definitions that are too heterogeneous in their approach.

Through the use of spatial data and satellite images, Africapolis highlights the diverse forms of current urbanisation processes in Africa: the emergence of hundreds of small, officially not

recognised agglomerations in the DRC, South Sudan and in the countries of the Sahel; generalised urbanisation in Rwanda; the duality of agglomerations in Zambia that can be both official “cities” and spontaneous developments; the disordered expansion of the built environment in rural Malawi; the emergence of immense and multi-centric conurbations in the Niger delta of Nigeria, in the highlands of Ethiopia, in Kenya and in Cameroon.

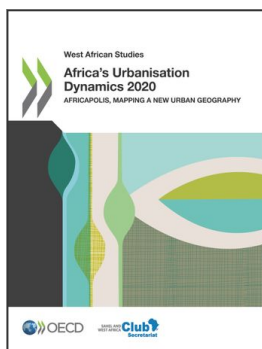
Phenomena observed on one level do not necessarily apply to another. At the local level, phenomena can be superimposed, producing diverse combinations and different outcomes that make up the many facets of African urbanisation.

Notes

- 1 In Africapolis, the “level of urbanisation” is equivalent to the “urbanisation rate” as defined by the World Bank (share of urban population in total population). In this report, “Urbanisation rate” describes the evolution over time.

REFERENCES

- Agence nationale de la recherche (ANR) (2008), Programme *Corpus et Bases de Données*, “e-Geopolis”.
- Awumbila, M. (2017), *Drivers of Migration and Urbanization in Africa: Key Trends and Issues*, Centre for Migration Studies, University of Ghana, Legon, Ghana.
- Bakewell, O. and G. Jónsson (2011), *Migration, Mobility and the African City*, International Migration Institute.
- Baro, J., C. Mering and C. Vachier (2014), “Peut-on cartographier des taches urbaines à partir d’images Google Earth ?” Une expérience réalisée à partir d’images de villes d’Afrique de l’Ouest », *Cybergeo : European Journal of Geography*, Dossiers, document 682, <http://cybergeo.revues.org/2640>.
- Geopolis (2018), E-geopolis (database), <http://e-geopolis.org>.
- Mercandalli, S. and B. Losch (eds.) (2018), *Une Afrique rurale en mouvement. Dynamiques et facteurs des migrations au sud du Sahara*, FAO, Rome and CIRAD.
- Mering, C., J. Baro and E. Upegui (2010), “Retrieving urban areas on Google Earth images: application to towns of West Africa”, *International Journal of Remote Sensing*, Vol. 31, No. 22.
- Moriconi-Ebrard, F., D. Harre and P. Heinrigs (2016), *Urbanisation Dynamics in West Africa 1950–2010: Africapolis I, 2015 Update*, West African Studies, OECD Publishing, Paris, <https://doi.org/10.1787/9789264252233-en>.
- Moriconi-Ebrard, F. (1994), *Geopolis, pour comparer les villes du monde*, Collection Villes, Éditions Economica-Anthropos, Paris.
- Moriconi-Ebrard, F. (1993), *L’urbanisation du Monde depuis 1950*, Collection Villes, Éditions Economica-Anthropos, Paris.
- OECD/SWAC (2018), Africapolis (database), www.africapolis.org.
- République démocratique du Congo-Institut national de la statistique-Programme des Nations Unies pour le développement (2015), *Annuaire statistique 2014*, Ministère du plan et révolution de la modernités.
- United Nations (2018a), *United Nations Demographic Yearbook 2017: Sixty-Eighth Issue*, UN, New York, <https://doi.org/10.18356/50a88046-en-fr>.
- United Nations (2018b), *2018 Revision of World Urbanization Prospects*, Population Division of the UN Department of Economic and Social Affairs (UN DESA).
- Wa Kabwe-Segatti, A. (2009), “Les nouveaux enjeux des migrations intra-africaines”, in *L’enjeu mondial. Les migrations*, Annuels, Presses de Sciences Po, Paris, pp. 115-122.
- World Bank (2018), World Development Indicators (database), <https://databank.worldbank.org/source/world-development-indicators>.



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