West African Studies

Africa's Urbanisation Dynamics 2020

AFRICAPOLIS, MAPPING A NEW URBAN GEOGRAPHY

OECD

SAHEL AND WEST AFRICA Club Secretariat

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Under the direction of
François Moriconi-Ebrard, Philipp Heinrigs
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OECD
BETTER POLICIES FOR BETTER LIVES

SAHEL AND WEST AFRICA Club Secretariat

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The Sahel and West Africa Club (SWAC) is an independent, international platform. Its Secretariat is hosted at the Organisation for Economic Co-operation and Development (OECD). Its mission is to promote regional policies that will improve the economic and social well-being of people in the Sahel and West Africa. Its objectives are to improve the regional governance of food and nutrition security and improve the understanding of ongoing transformations in the region, including urbanisation, and their policy implications. SWAC Members and partners are Austria, Belgium, Canada, CILSS, the ECOWAS Commission, the European Commission, France, Luxembourg, the Netherlands, Norway, Switzerland, the UEMOA Commission and the United States. SWAC also has a memorandum of understanding with the University of Florida (Sahel Research Group).

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www.oecd.org/swac
www.africapolis.org

Foreword

Africa has the fastest urban growth in the world. The continent's population is projected to double between now and 2050. Two-thirds of this growth will be absorbed by urban areas and, in the next 30 years, cities will be home to an additional 950 million people. This offers great opportunities, but also challenges for African citizens, businesses, governments and their partners. The political development agenda needs to be revamped as policy decisions taken today will have lasting consequences for generations.

At the continental level, the ongoing transition towards a mainly urban Africa is part of the African Union's Agenda 2063. At the global level, the strong interplay between urbanisation and development has been acknowledged and put at the heart of the UN-Habitat New Urban Agenda. The emphasis on urbanisation in the 2030 Agenda for Sustainable Development reflects the pivotal role of cities in achieving the sustainable development goals (SDGs). Moreover, cities are becoming key actors in combating climate change and ensuring sustainability, and African urban centres will be instrumental in this regard.

The OECD is supporting this transition through a wealth of new knowledge and the world's first continent-wide comparable database on urbanisation produced by the Sahel and West Africa Club (SWAC) through Africapolis.org, a unique platform that portrays Africa's urbanisation dynamics. By including all agglomerations with more than 10 000 inhabitants, Africapolis has identified over 7 600 agglomerations in 50 countries so far, depicting a vivid image of Africa's rapid urban growth. The platform also contributes to a new and more realistic vision of existing urbanisation trends on the continent and the challenges they present for sustainable urban development in the future.

Africa's Urbanisation Dynamics 2020 analyses the drivers, trends and forms of urbanisation based on Africapolis data. It proposes more inclusive and targeted territorial policy options that integrate the social and environmental impacts of urban development and acknowledge the determining role of cities as economic drivers. It notably finds that Africa is already largely urban, with more than 50% of Africans living in agglomerations. It also finds that, in the coming decades, existing cities will continue to grow and many new ones will emerge through processes that defy common assumptions about urbanisation.

The spatial dimension adopted in this analysis helps to identify unprecedented, multiscale territorial transformation processes: the development of metropoles and intermediary cities, the merging of villages into mega-agglomerations and the formation of new transnational metropolitan regions. These processes are unique and diverse, and they call for tailored policies connected to the realities of urban Africa.

These realities are reflected in the staggering urbanisation numbers that Africapolis has revealed. Specifically, it identifies 67 national metropoles, accounting for one-third of the total urban population (183 million) and 74 urban agglomerations with more than 1 million inhabitants (equivalent to the United States and Europe combined).

Ninety-seven percent of Africa's urban areas have fewer than 300 000 inhabitants. Many of these are not officially recognised as urban areas, highlighting the very fragmented nature of African urbanisation.

These realities also reflect a persistent imbalance, particularly in terms of wealth and resource allocation, between metropolitan agglomerations and intermediary agglomerations, both of which play a key role in shaping the social agenda and reducing inequalities.

Many intermediary agglomerations are unaccounted for in major international databases. However, they represent a major opportunity to consolidate urban networks and connect local communities to continental and global economies. Still, much data and knowledge gaps — at local and national level — exist and hinder effective policy making. Time has come for policymakers and development partners to harness the potential of these spectacular urban dynamics for policymaking. We must invest in intermediary agglomerations and seek to unleash their potential for sustainable urban and economic growth.

Africa's urban transition offers tremendous opportunities to develop new social, economic, environmental and political development models and to address critical challenges, such as digital transformation and climate change. In order to contribute to shaping an inclusive African urban future together, to improve countries' abilities to manage the urban transition and to help build better cities for better lives, we must provide improved data for better decision-making, innovative tools for stronger qualitative analysis and the leveraging of new technologies. *Africa's Urbanisation Dynamics 2020* sets the foundation on which these important policy decisions and necessary changes can be made.

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Acronyms and abbreviations

ANR	Agence nationale de la recherche (France)
CAPMAS	Central Agency for Public Mobilization and Statistics (Egypt)
COP	Conference of the Parties (United Nations)
DRC	Democratic Republic of the Congo
FAIR	data Findable, Accessible, Interoperable and Re-useable data
FAO	Food and Agriculture Organization of the United Nations
GDP	Gross domestic product
GILA	Greater Ibadan-Lagos-Accra
GIS	Geographic information system
GNI	Gross national income
INE	National Institute of Statistics (Mozambique)
INSEE	National Institute of Statistics and Economic Studies (France)
LGA	Local government area (Nigeria)
LU	Local unit
OECD	Organisation for Economic Co-operation and Development
RPHC	Rwanda Population and Housing Census (Rwanda)
StatBel	Statistics Belgium
SWAC	Sahel and West Africa Club
UN	United Nations
UN DESA	United Nations Department of Economic and Social Affairs
UNDP	United Nations Development Programme
USCB	United States Census Bureau
WUP	World Urbanization Prospects (United Nations)

Measurement units

km	Kilometre
km^2	Square kilometre
m	Metre
ha	Hectare

Executive summary

The pace of urbanisation in Africa over the last 60 years is without precedent. In 2015, Kenya had more urban dwellers than the entire continent combined in 1950. Africa's urban population in 2015 was 567 million people, compared to 27 million in 1950. Africa will continue to have the fastest urban growth in the world. The continent's population is projected to double between now and 2050 and two-thirds of this growth will be absorbed by urban areas. This means that in the next 30 years Africa's cities will be home to an additional 950 million people. This urban transition is profoundly transforming the social, economic and political geography of the continent. Urban management is a key development challenge and policy agendas need to refocus on the opportunities and challenges that cities and urbanisation present. A key element of this agenda is the need to better understand the reality and diversity of ongoing transformations. *Africa's Urbanisation Dynamics 2020* highlights the diversity of contexts and sources of urban growth and their impact on current urbanisation patterns and forms.

Africa's urban diversity is rarely captured in existing analyses and narratives. This is explained in part because urbanisation is developing beyond the capacity of statistical measurements that are based upon administrative divisions and therefore only reflect a partial understanding of urban phenomena. The term "city" is globally understood to refer to a politico-administrative unit whose boundaries and legal status are defined by national governments according to varying administrative, political and functional criteria, contexts and objectives. The boundaries of administrative units are precise and fixed. Cities, however, are alive; they evolve, develop and grow, often beyond their administrative boundaries. Africapolis data which is standardised, systematic and comparative, sheds new light on the singular reality of African urbanisation and urban growth. 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. Unlike cities whose boundaries are fixed, the urban agglomerations defined by Africapolis are units whose exact shape, contents and limits vary over time and are functions of their built environments. (Chapter 1)

Although the majority of the 7 617 urban agglomerations identified by Africapolis overlap with a city, as defined by national authorities, the spatial approach applied integrates the many 'spontaneous' extensions and neighbourhoods that are emerging beyond administrative boundaries; areas that are not officially recognised as wholly or partially "urban".

Africapolis also reveals the existence of hundreds of urban agglomerations that are not recorded in official statistics, in areas generally considered to be rural. The extent of this phenomenon is striking, and does not only concern small towns, or the suburbs of big cities, but agglomerations of all sizes. Some have more than one million inhabitants: Onitsha (Nigeria); Sodo, Hawassa (Ethiopia); Kisii, Kisumu (Kenya); Bafoussam (Cameroon)

and Mbale (Uganda). Their emergence is driven by rural demographic transformations which lead to widespread *in situ* urbanisation. 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 fact, in many current urbanisation hotspots, it is the absence (or weakness) of rural migration that drives urbanisation.

In 2015, more than 50% of Africans lived in urban agglomerations. Africa had 74 urban agglomerations with more than 1 million inhabitants, similar to the European Union and the United States combined. In almost half of the 50 countries covered by Africapolis, the level of urbanisation exceeds 50%, while only Niger has a level of urbanisation below 20%. But beyond this snapshot, what makes Africa's urban transition truly unique is the pace and scale of the ongoing urbanisation processes. The urban population increased by 2 000% since 1950, and the number of urban agglomerations grew from 624 to reach 7 617 in 2015, massively transforming Africa's urban geography. In the space of decades, new capitals emerged and a few other urban centres have grown far beyond their initial sizes, dominating national urban systems. They are also quickly moving up in the global urban hierarchy. Today, Kinshasa, Abidjan and Dakar are the largest francophone agglomerations in the World after Paris; Cairo the largest agglomeration in the Arab World; and Lagos and Johannesburg are among the ten largest English-speaking agglomerations.

However, it is the continued emergence of thousands of small towns and intermediary cities that is profoundly transforming African societies. These new urban agglomerations, many rooted in rural transformations, play a vital part in reducing distances between urban and rural populations, in structuring urban networks, and in connecting the local and regional to the continental and global. This heightened proximity between rural and urban environments, gives rise to new and unique urban forms increasingly blurring the lines between rural and urban. Anticipating the future of Africa's urban evolution cannot be built solely upon observations of its current urban landscape but will also need to take into consideration the dynamics that drive rural transformations. (Chapter 2)

Africa's rapid urban growth can only be understood by framing it as a multidimensional process comprising historical, environmental and political factors, each of which dynamically interacts at different stages of the urban transition. The spread and density of the urban network has its origins in Africa's ancient settlements and agricultural expansion. The location and growth of many modern metropoles can be linked to the colonial and post-independence periods. Environmental constraints, like the availability of water or land, have major influences on urban growth and urban forms as seen, for example, by the agglomerations of the Nile River valley or in Rwanda. However, the greatest influence on shaping urban phenomena has been political. The impact of urban planning and policies, or the lack thereof, is visible in most of Africa's

urban agglomerations. Integrating these contextual circumstances is essential to better understand the sources and intensity of current urban growth, but also to model future urban dynamics. (Chapter 3)

The diverse and multifaceted nature of Africa's contemporary urban transition gives rise to new dynamics, new urban forms and new scales of urban development. In several countries, new settlement and mobility patterns lead to the emergence of large metropolitan regions around metropoles in areas of high urban concentration. This regionalisation of urban dynamics, in some cases across borders (e.g. the Greater Ibadan Lagos Accra corridor), displays strong functional integration at scales beyond the agglomeration, while at the same time reinforcing a spatial decoupling from the rest of the territory and increasing discontinuities within national urban systems.
A new urban form specific to Africa is emerging in densely populated, traditionally rural areas. Increasing densities and the merging of small and intermediary agglomerations drive widespread agglomeration processes that are giving rise to a new type of mega-agglomeration. Their spontaneous nature combined with the fact that many are emerging in the interior of the continent often results in a lack of up-to-date statistical information and political recognition. More broadly, the ongoing redistribution of population densities and the emergence of new urban centres in the interior of Africa are shifting the urban balance from coastal to inland Africa. (Chapter 4)

Africa's Urbanisation Dynamics 2020 describes the profound urban transformations occurring in Africa. They raise larger questions on urbanisation and its relation to the environment. Expanding spontaneous urbanisation, densification of territories and strong demographic growth mount pressure on existing policies protecting the environment and require the development of new ones, reconciling urban and sustainability concerns by building on existing adaptation strategies. This is becoming a major challenge for development policies in Africa. The design of appropriate and efficient policy interventions depends on recognising and better understanding these realities.

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 (*markaz*). The definition of urban areas for the 2006 Census is "*shiakha*", 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 reinstituted 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.

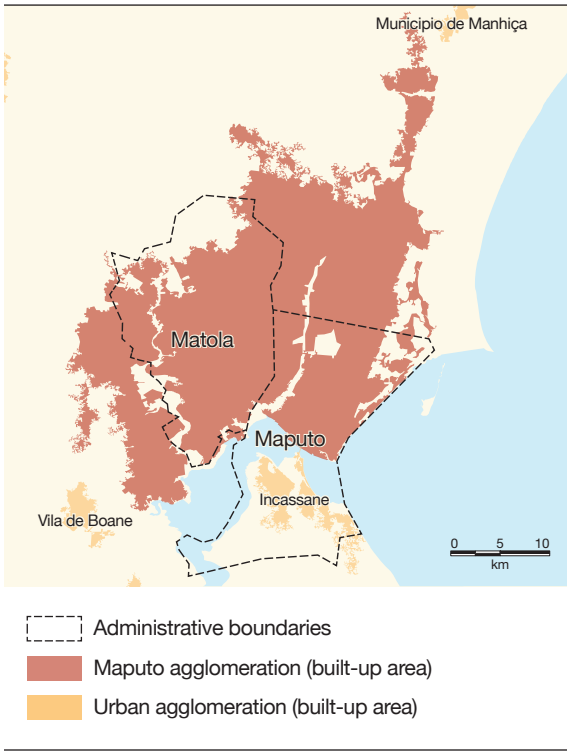
Arbitrary administrative boundaries

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 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.

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"*

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).

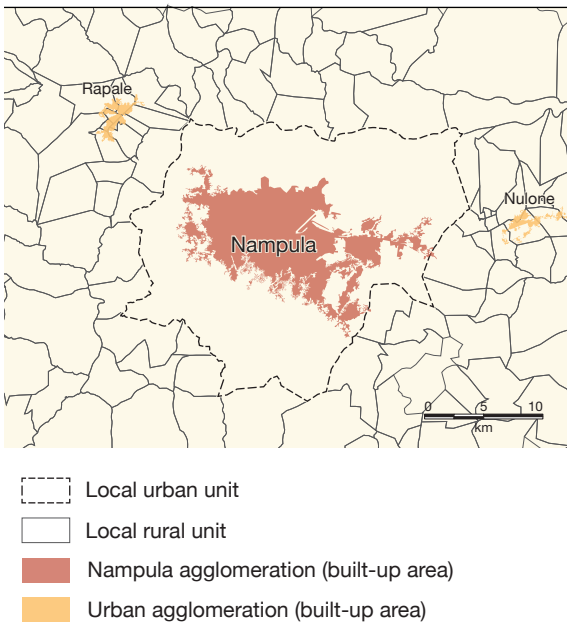
In Mozambique, the use of the Africapolis morphological criteria to measure the urban perimeter modifies the ranking of cities by population, with potentially important consequences for political representation.

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 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.

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*"

Box 1.1

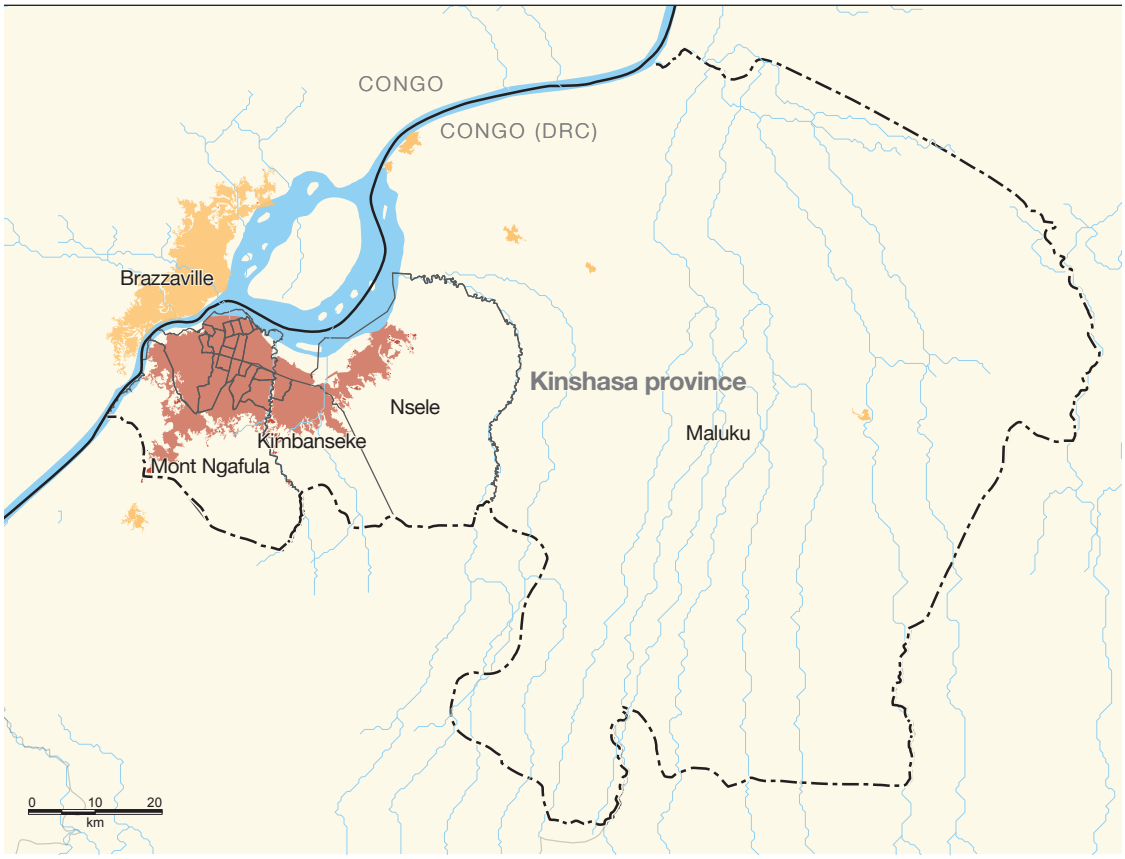
The administrative boundaries of Kinshasa (DRC) versus actual urbanisation

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



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

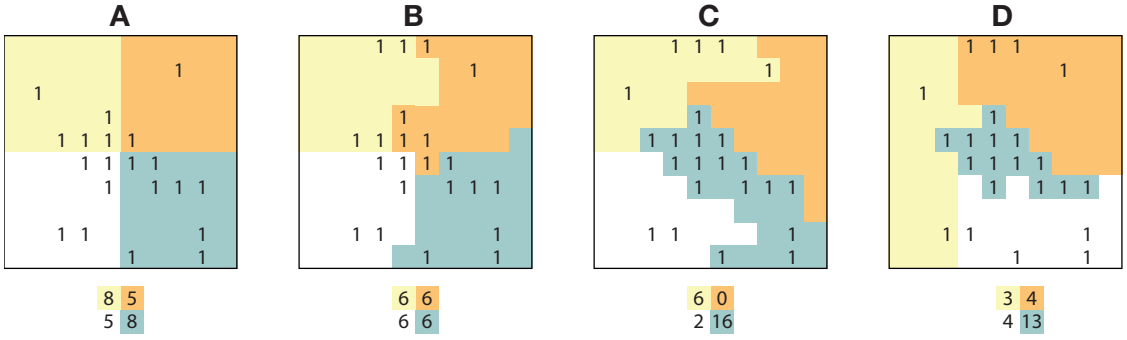
Territorial boundaries and political power

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.

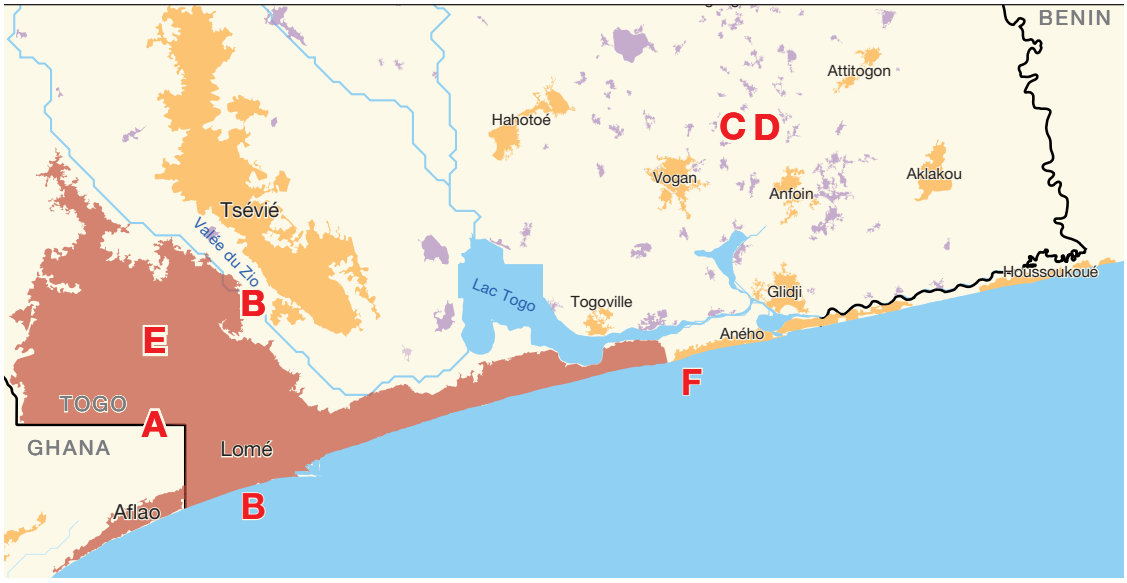
The extent of in-situ urbanisation across Africa also challenges the influence still attributed to rural exodus and residential migration in driving urban growth. In many current urbanisation hotspots, it is actually the contrary: the absence (or weakness) of rural migration drives densification and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

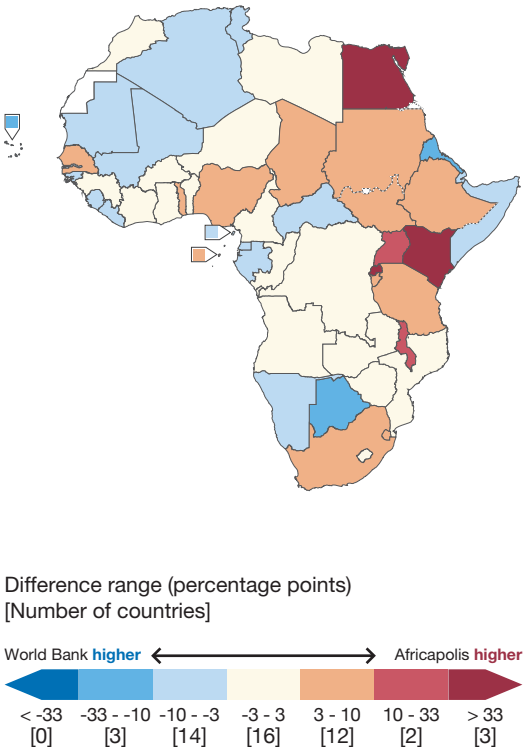
For each LU, Africapolis includes the following information: a unique identifier, name, administrative affiliation within the territorial administrative network, population (number of inhabitants), geographic co-ordinates and possible historical data (old name, former administrative affiliation). Local 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).

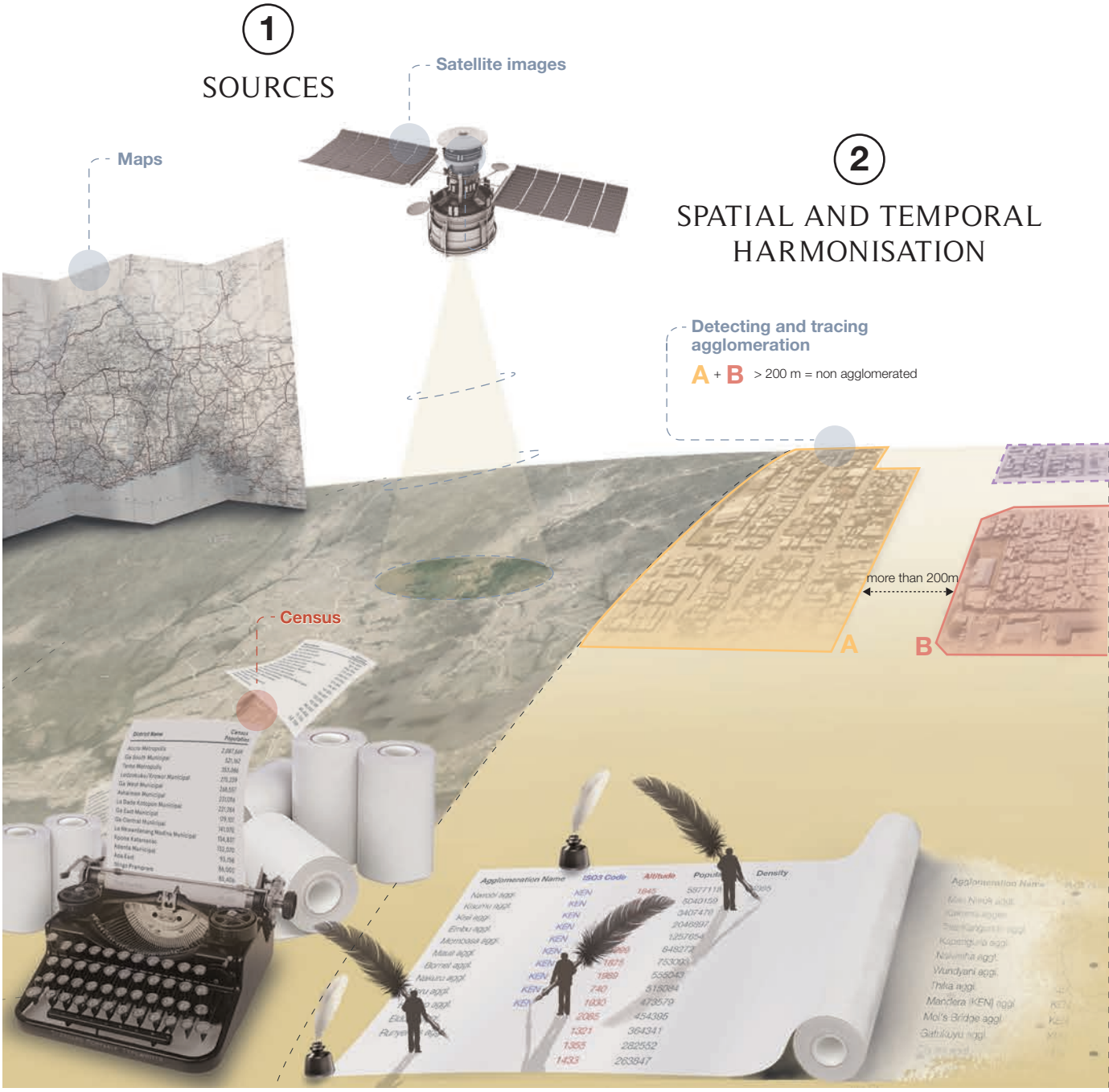
A complement to national statistics

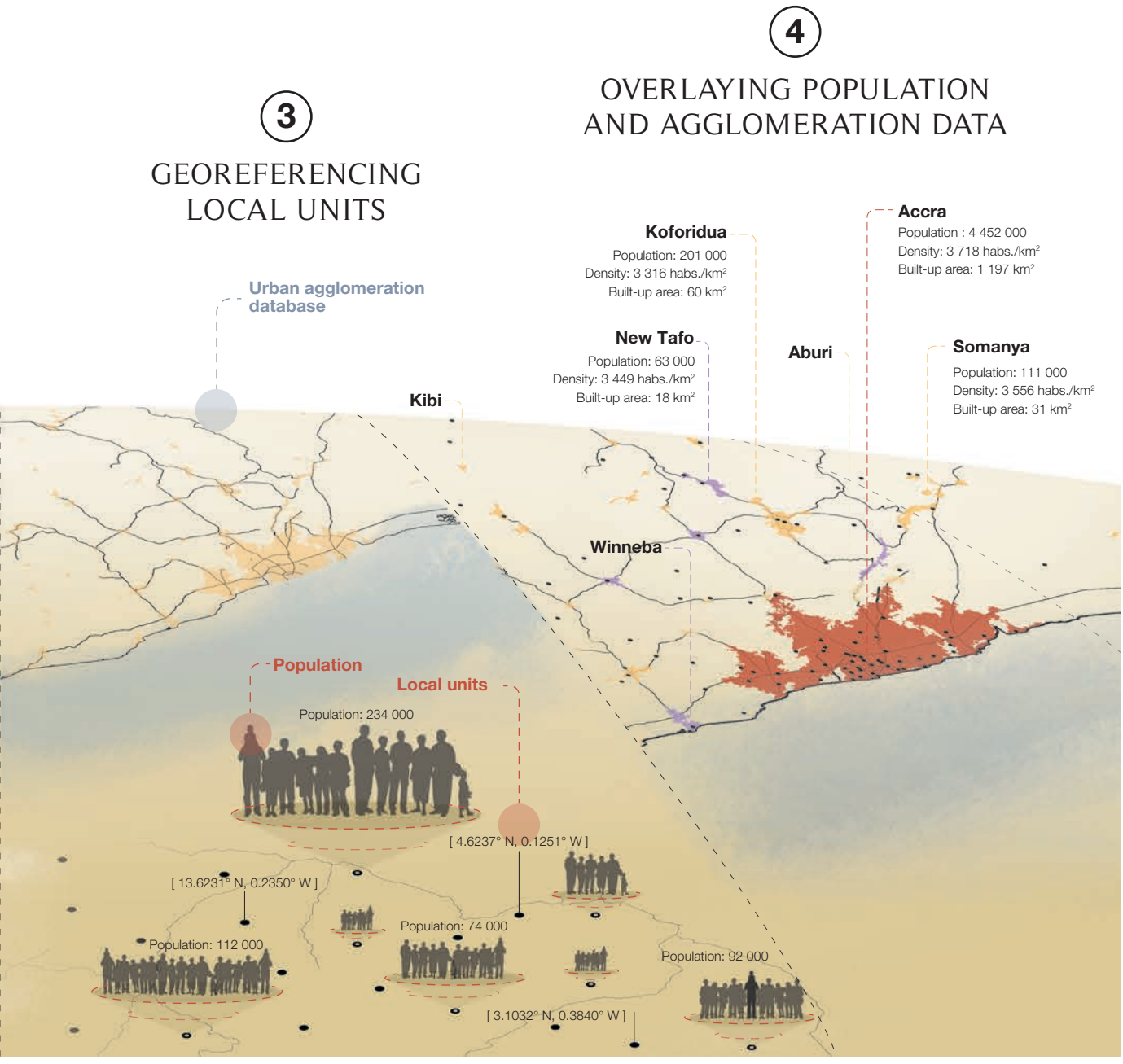
The sample of cities or urban areas defined by national statistics can be very different from the list of "urban agglomerations" in Africapolis. Yet, with the exception of Djibouti and Mauritania, they overlap in all countries. Firstly, Africapolis contains agglomerations that are not officially recognised 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 urbanisation[1] 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
4
OVERLAYING POPULATION AND AGGLOMERATION DATA
Urban agglomeration database
Koforidua
Population: 201 000
Density: 3 316 habs./km²
Built-up area: 60 km²
Accra
Population : 4 452 000
Density: 3 718 habs./km²
Built-up area: 1 197 km²
New Tafo
Population: 63 000
Density: 3 449 habs./km²
Built-up area: 18 km²
Aburi
Somanya
Population: 111 000
Density: 3 556 habs./km²
Built-up area: 31 km²
Kibi
Winneba
Population
Local units
Population: 234 000
[4.6237° N, 0.1251° W]
[13.6231° N, 0.2350° W]
Population: 74 000
Population: 112 000
Population: 92 000
[3.1032° N, 0.3840° W]

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.

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Chapter 2

Geo-statistical analysis of urbanisation dynamics in Africa

With 7 617 urban agglomerations of more than 10 000 inhabitants identified by Africapolis in 2015, Africa is urbanising at an astounding pace. Africa's urban transition is more diverse and multifaceted than commonly conceptualised. Its drivers, patterns and outcomes are not following uniform and past processes. The absence of more comprehensive data has clearly contributed to current misconceptions about urbanisation in Africa. Yet, the design of appropriate policy interventions depends on better understanding the realities and contextual differences of African urbanisation dynamics.

Africapolis provides a comparable data set covering the evolution of the entire urban network between 1950 and 2015 in 50 African countries. This more systematic and homogenous data provides a unique base to better understand the current dynamics, identify the drivers and intensity of urban growth and anticipate future trends. In particular, Africapolis' spatial approach helps apprehend the less appreciated and more unexpected transformations that are taking place.

LEVEL AND PACE OF URBANISATION

Africapolis highlights the staggering pace of the ongoing transformation. Africa's urban population grew from 27 million in 1950 to 567 million in 2015, a 2 000% increase. In 2015, Kenya had more urban dwellers than the whole of Africa in 1950. Fifty percent of Africa's population live in one of the continent's 7 617 urban agglomerations. In nine countries the level of urbanisation is above 66% and a further 30 countries have an intermediary level of urbanisation between 33% and 65%. In 1950, only four countries had a level of urbanisation above 33%, while 35 countries were below 10%.

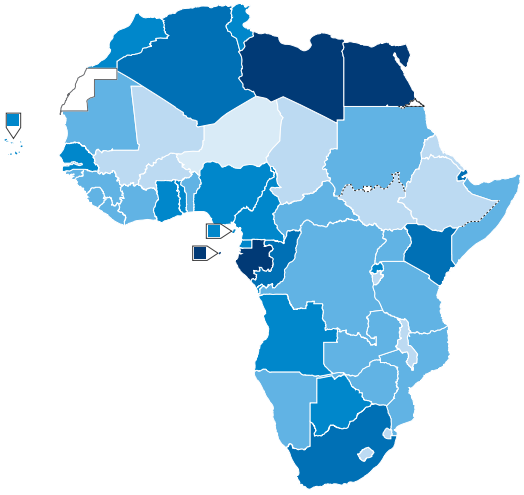
The level of urbanisation

In 2015, half of Africa's population (50.4%) lived in an urban agglomeration with more than 10 000 inhabitants. North Africa is the continent's most urbanised region (78%), and Egypt and Libya the two countries with the highest levels of urbanisation[1] with 93% and 81% respectively (Map 2.1). The other two countries with a level of urbanisation above 80% are Gabon (81%) and Sao Tome and Principe (80%). The countries with the lowest levels are Niger (17%), Burundi (21%), Eritrea (24%), Lesotho (26%) and South Sudan (27%) (Annex D). Outside Africa the only other large countries with similar low levels of urbanisation are Nepal, Cambodia and Sri Lanka. Overall in 2015, 22 countries have a level of urbanisation exceeding 50%.

Overall, countries with higher income levels tend to have higher urbanisation levels. The only two low-income countries (Gross National Income per capita) with a level of urbanisation above 50% are Rwanda, the country with the highest population density and Gambia, a country with one of the smallest land areas. Similarly, the countries with the highest levels of urbanisation, Djibouti, Egypt, Gabon and Libya, are all middle-income countries, and countries whose land areas are almost entirely desertic or with large forest areas, like Gabon. In these countries the share of the agricultural population—the main activity of the rural population— is low. The size of the agricultural population also decreases with income level due to mechanisation and intensification of production, as in South Africa where the level of urbanisation is 70%. The ten countries with the lowest levels of urbanisation are all low-income countries, except Lesotho and Eswatini.

Urbanisation dynamics are influenced by a variety of structural and socio-economic factors, such as geography and climate, population

Map 2.1
Level of urbanisation in Africa, 2015



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

growth, size and density, income levels and economic structure, policies and institutions and cyclical factors such as environmental disasters, conflict and economic cycles. These factors are not of equal importance and vary over time depending on country contexts and interrelations. Certain factors are more important at lower levels of urbanisation in contributing to urbanisation than when countries are more developed (Bairoch and Goertz, 1986; Farrell, 2018). Also, the diversity in observed outcomes and trends highlights the decisive importance of states, institutions and national contexts on observed dynamics. Hence, while there are general trends, contextual and structural analyses remain necessary to grasp the drivers of urbanisation dynamics at country level.

The pace of urban transition in Africa

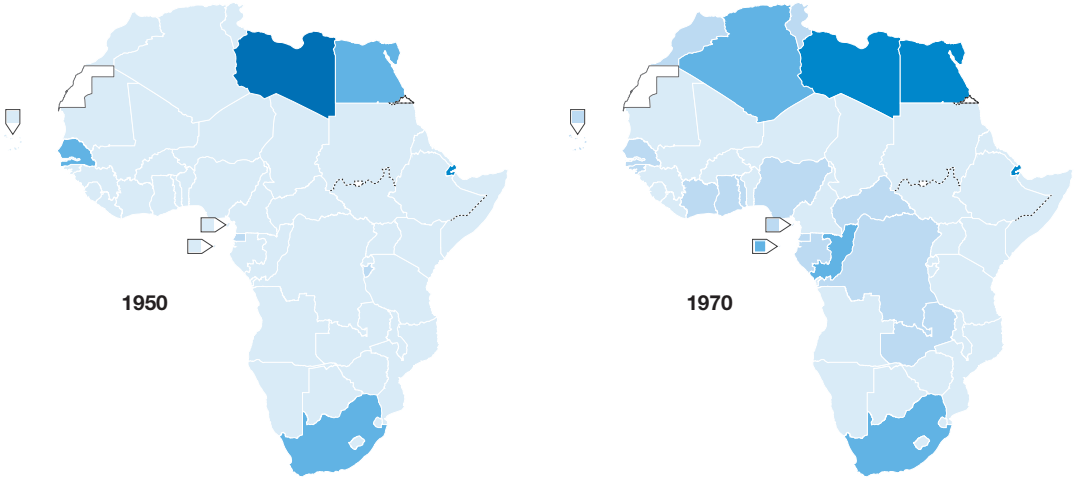
A key feature of Africa's urbanisation dynamic is the pace of the ongoing transformation. In 1950, most African countries were essentially agrarian societies with a few urban centres acting as trading, administrative, religious and cultural hubs. Only eight countries had a level of urbanisation above 20%, while in 26 out of 50 countries the level of urbanisation was less than 10% (Map 2.2).

In particular, the last 25 years have seen spectacular transformations. For the continent as a whole, the level of urbanisation increased from 31% in 1990 to 50% in 2015. In 1990, 31 countries still had a low level of urbanisation below 33%, 17 of which were below 20%. By 2015 this dropped to 11 countries, with only Niger below 20%. Rwanda went from only 5% of its population living in urban agglomerations to an urbanisation level of 56%, a level similar to Morocco. Kenya's level of urbanisation increased by 49 percentage points, from 16% to 65%, and Angola's by 37 percentage points, from 26% to 63% in only 25 years (Figure 2.1).

Since the 1990s the major driver of urbanisation has been high population growth which contributes directly to the natural increase of urban populations. However, indirect contributions in terms of reclassification of rural settlements – through the growth of rural settlements beyond the urban population threshold, through absorption of rural population by the expansion of urban areas and by merging of settlements and through their cumulative contributions - explain a significant part of the growth. For instance, Rwanda's population density doubled between 1990 and 2015, favouring the widespread merging of settlements and the reclassification of rural areas. As a result, the increase in the level of urbanisation was strong and non-gradual. Similar dynamics are observed across the continent, notably in parts of Kenya, Nigeria and Uganda. The importance of rural reclassification in recent urban transitions has also been documented in other parts of the World. In China for instance, the reclassification of rural areas as urban is estimated to have accounted for 40% of total urban population growth between 1978-1990 (Farrell, 2017). In contrast, the absence of accounting for rural reclassification can in some cases explain stationary official levels of urbanisation and large differences with Africapolis data, as in the case of Egypt where official urban parameters have not changed since the late 1960s.

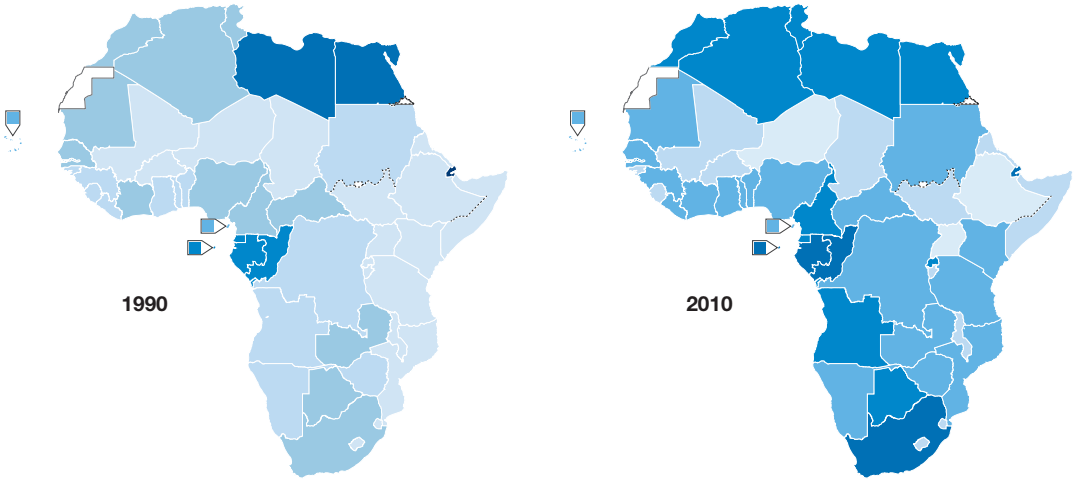
Map 2.2

Evolution of urbanisation in Africa, 1950, 1970, 1990 and 2010



Share of urban population in total (%)
[Number of countries]

	< 20%	20-32	33-49	50-65	66-79	> 79%
2010	[3]	[12]	[20]	[8]	[5]	[2]
1990	[17]	[14]	[13]	[3]	[2]	[1]
1970	[30]	[13]	[4]	[3]	[0]	[0]
1950	[42]	[4]	[2]	[1]	[1]	[0]



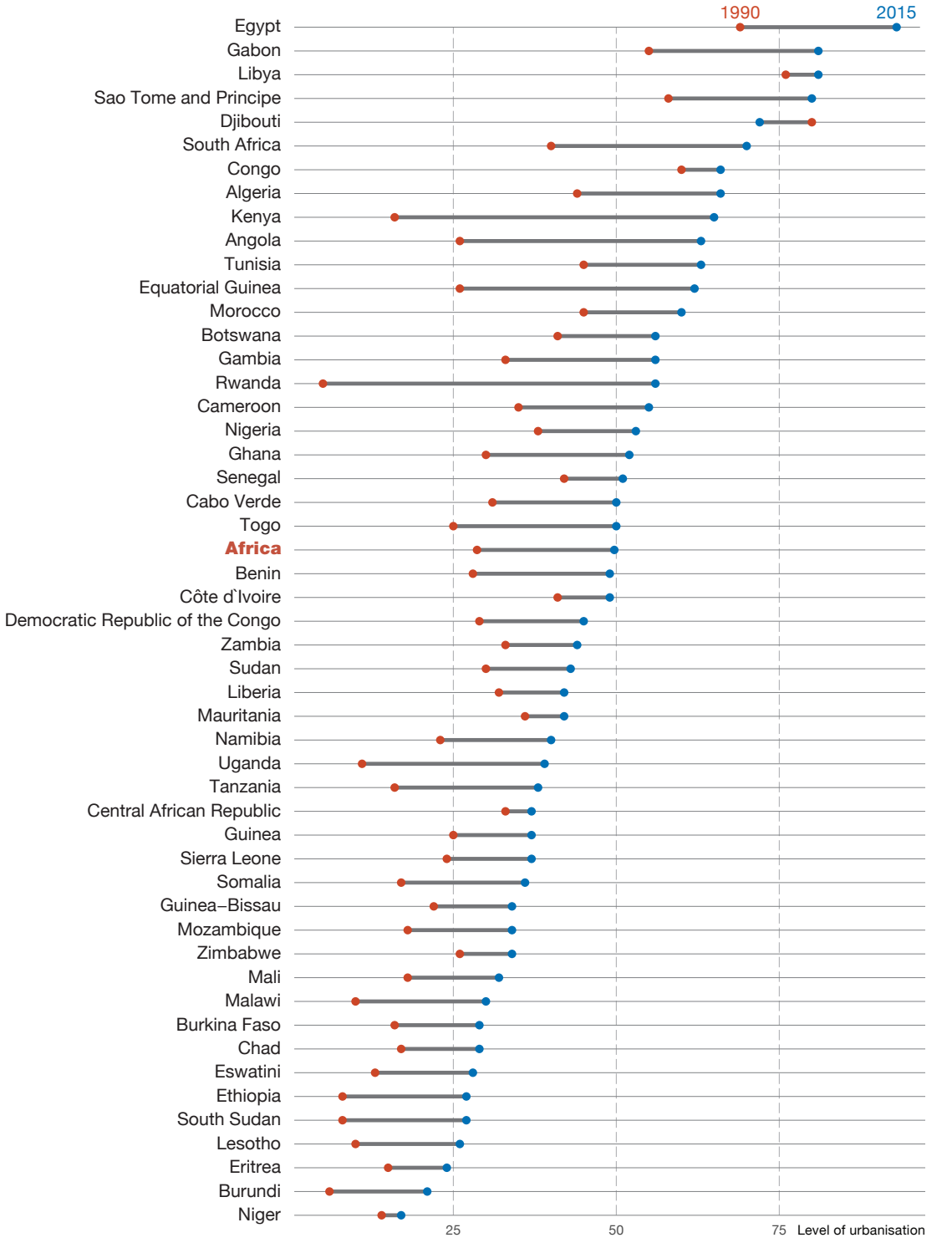
Sources: OECD/SWAC 2018, Africapolis (database); Geopolis 2018

Urban population growth

Probably the most spectacular aspect of Africa's urbanisation dynamic is the growth in urban population. Africa's urban population grew from 27 million in 1950 to 567 million in 2015, a 2 000% increase. In 2015, Kenya had more urban dwellers than the whole of Africa in 1950. Dakar, the capital of Senegal, counts as many inhabitants—3.1 million—as the whole country half a century ago, similar to Abidjan in Côte d'Ivoire, Lomé in Togo, etc. Since 2010, the urban population of Africa grows by 21 million people per year.

Figure 2.1

Change in level of urbanisation in Africa from 1990 to 2015

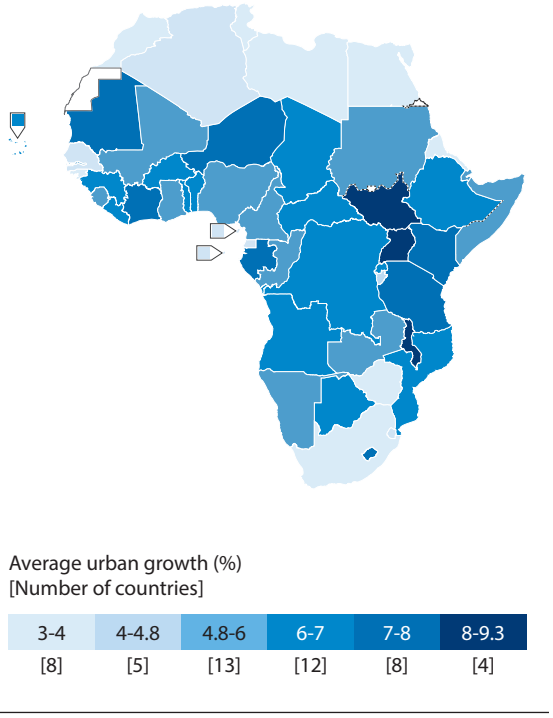


Sources: OECD/SWAC 2018, Africapolis (database); Geopolis 2018

Africa's urban population growth also highlights the dynamic interplay of its different components — natural urban population increase, migration and rural reclassification. Between 1950 and 2015, Africa's urban population grew 4.8% annually. However, in 37 out of 50 countries, the urban growth rate exceeded 4.8% and in 12 countries the urban population growth was 7% and above, implying a doubling in size every ten years (Annex C). These 12 countries include five countries with the lowest levels of urbanisation on the continent (Burundi, Lesotho, Malawi, Niger, and South Sudan) and only one country with a high level of urbanisation above 66% in 2015 (Gabon) (Map 2.3). Some countries with the highest levels of urbanisation in 2015, Egypt, Libya, Sao Tomé and South Africa, are among the countries with the lowest urban growth rates. This apparent contradiction highlights the multifaceted dimensions of the urban transition in Africa and distinguishes it from historical urbanisation processes. Whereas rural-urban migration was historically the major contributor to urban growth, in the case of contemporary Africa the intensity of the natural population increase is a main source of urban growth.

Map 2.3

Urban population growth in Africa, 1950 - 2015



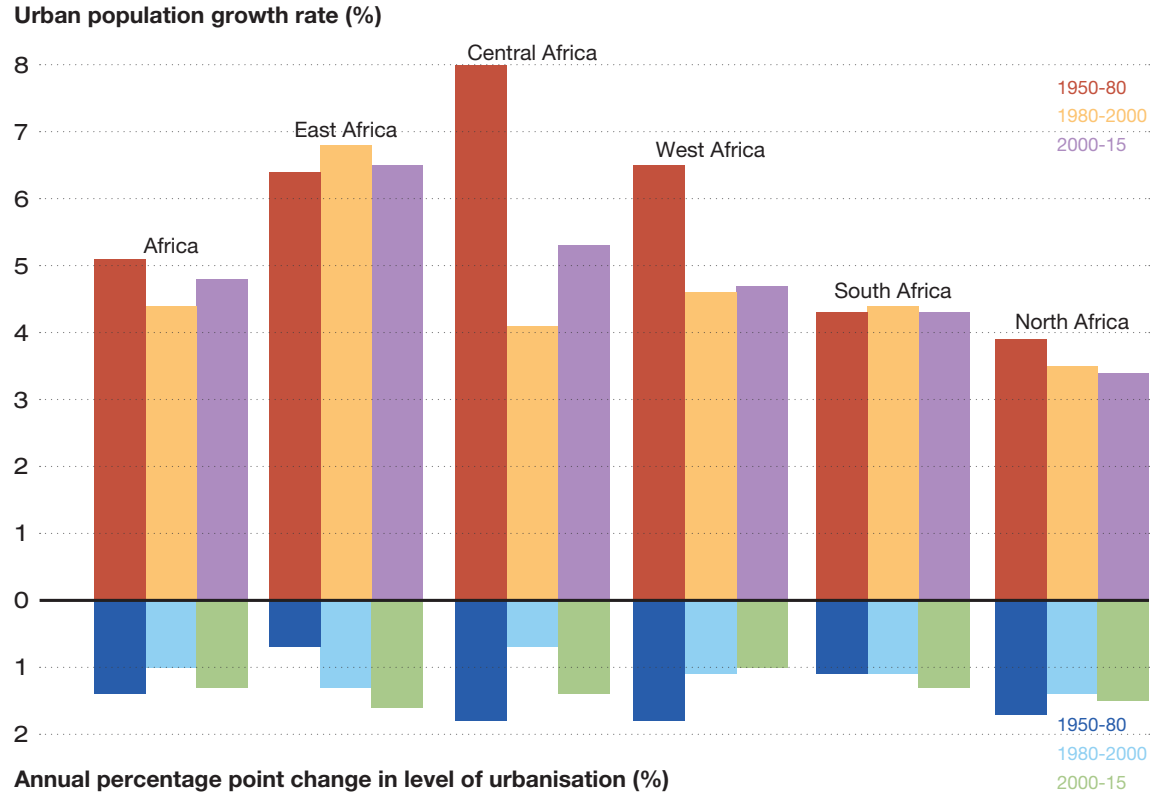
Sources: OECD/SWAC 2018, Africapolis (database); Geopolis 2018

The period between 1950 and 1980 saw the fastest urban growth with Africa's urban population increasing 5.1% annually. Especially in the least urbanised regions of Central Africa, East Africa and West Africa this period was marked by very high urban growth rates, averaging between 6.4% and 8% (Figure 2.2). Between 1980 and 2000, urban growth decelerated to 4.4% for Africa as a whole and increased again to 4.7% for the period 2000–2015. Between 2000 and 2015, urban population growth was particularly high in East Africa at 6.5%, averaging more than 9% in Burundi, South Sudan and Uganda. Urban population growth was lowest in North and Southern Africa, averaging 3.6% and 4.4% respectively. In all regions except West Africa, the increase in the level of urbanisation was fastest during the 2000 to 2015 period. For Africa as a whole the level of urbanisation increased by 0.9 percentage points annually between 2000 and 2015, with the fastest growth in East Africa and North Africa, at 1.1 percentage points and 1 percentage point respectively.

AGGLOMERATION SIZE AND URBAN SYSTEMS

The political division of Africa into nation states played a fundamental role in urban development. This is best observed in the rapid emergence of hierarchical national urban systems, dominated by huge agglomerations, in view of national scales and time. In the space of decades, new national capitals and a few other urban centres have grown significantly beyond their initial sizes. The growth of big cities continues, concentrating a growing share of the continent's population. They are also quickly moving up in the global urban hierarchy, driven not only by their demographic size but also by their economic weight. Today, Kinshasa, Abidjan and

Figure 2.2
Urban population growth and growth in level of urbanisation in Africa by period, 1950–2015



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

Dakar are the largest francophone agglomerations in the World after Paris Cairo is the largest agglomeration in the Arab-speaking world, and Lagos and Johannesburg are among the ten largest English-speaking agglomerations. The quantitative and qualitative discontinuities between the largest agglomeration and the rest of the urban network are huge in most countries and linked to complex social, economic and political relations. Official statistics have a tendency to minimise the existence of such discontinuities through administrative subdivisions and definitional categorisations. However, understanding how national urban systems are structured and connected are important issues for regional policy and socio-spatial equity. Africapolis data show the structure and the large imbalances in national urban networks by capturing the dynamics of individual agglomerations and the entire urban network over time.

The distribution of urban networks

In Africa, as elsewhere, there are many small cities and only a few large ones. In 2015, the continent counted 25 agglomerations with more than 3 million inhabitants and 5 000 with less than 30 000. The combined population of the 10 largest agglomerations equals that of the 5 000 smallest (90 million people). The differences in size across the urban distribution underline the crucial dimension of scale in urban issues. In Nigeria, Lagos is more than 1 000 times larger than Bunkure with 11 600 inhabitants (a difference in scale similar to comparing the size of China's GDP to that of Guinea's). Beyond the differences in size, the qualitative differences are in many cases even more pronounced.

In 2015, the distribution of Africa's urban population was characterised by a large and increasing share of people living in the

continent's largest cities (40%) (here defined as above 1 million inhabitants) and a large share in small urban agglomerations (32%) (here defined as between 10 000 and 100 000 inhabitants) (Figure 2.3). This also highlights another important feature in the urban distribution, the relative weakness of intermediary agglomerations (here defined between 100 000 and 1 million inhabitants). Only 27% of the urban population live in intermediary agglomerations. In a perfect power law distribution, such as Zipf's rank-size distribution, this figure would be 33%. Clearly these distributions vary from country to country, yet the characteristics are similar across most countries.

The distribution of urban population according to agglomeration size has inverted since 1960. In 1960, almost half of the total urban population lived in small agglomerations (47%), while only 15% lived in an agglomeration with more than 1 million inhabitants. The increasing share of people living in large agglomerations is explained by the continued growth of large agglomerations, but also by the growth of intermediary agglomerations that over time become large agglomerations (exceeding 1 million inhabitants) increasing this category, while at the same time reducing the share in intermediary agglomerations. This gradual expansion into higher-size classes is visible across all size categories. The number of agglomerations at the top of the distribution are increasing rapidly over time (Figure 2.3). For instance, in 2015 there were more than 700 agglomerations with more than 100 000 agglomeration, compared to 44 in 1950; 222 agglomerations with more than 300 000 inhabitants, compared to 10 in 1950; and 74 with more than 1 million inhabitants, compared to 2 in 1950. However, driven by the continued emergence of new agglomerations, the overall distribution in the number of agglomerations by size bracket has remained very stable over the past six decades.

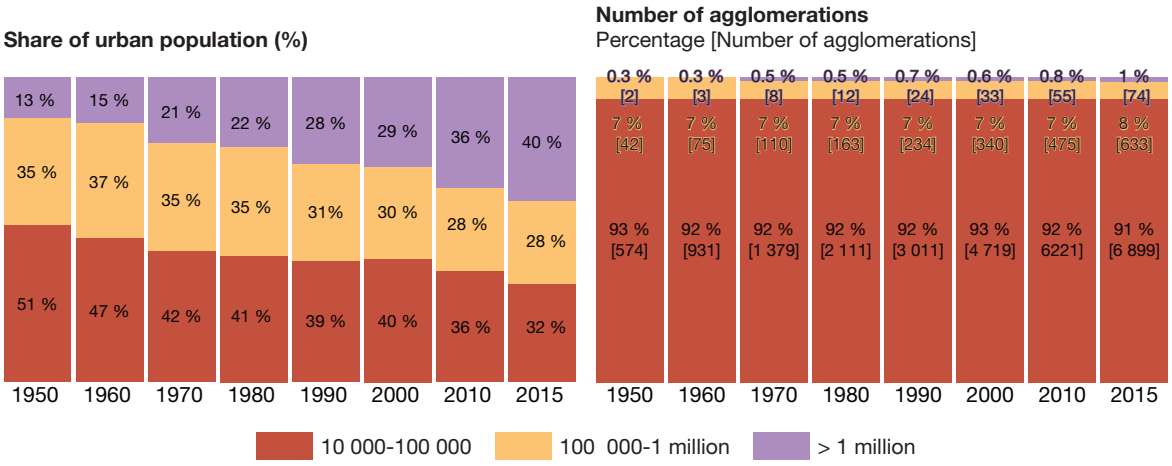
The overall number of urban agglomerations has surged from 624 in 1950 to 5 142 in 2000, and increased by another 2 475 agglomerations between 2000 and 2015. This emergence continues to feed the lower end of the urban distribution and thereby balances the growth of agglomerations into higher size brackets. Hence, although the number of urban agglomerations between 10 000 and 100 000 inhabitants increased from 570 in 1950 to 6 910 in 2015, their share in the total number of agglomerations barely changed, and actually declined from 93% to 91% of all agglomerations (Figure 2.3). Of the remaining 9% of agglomerations in 2015, the 100 000 to 999 999 inhabitants category account for 8% (versus 7% in 1950) and the above 1 million inhabitants category for 1% (versus 0.3% in 1950). An additional consequence is the slow growth in the average size of agglomerations. While the urban population increased by more than 1 000% over the 1960-2015 period, the average size of urban agglomerations increased by only 63%, from 46 000 to 74 000 inhabitants.

Urban primacy, discontinuities and continuities

Most African countries' urban networks are dominated by huge agglomerations, in view of national scales and time. The largest agglomeration, in some countries two (e.g. Burkina Faso, Congo, Ghana), or three agglomerations (South Africa), dominate national urban hierarchies based on the huge quantitative and qualitative disparity with the rest of the urban network. In Angola, the population of the capital Luanda (7 million) equals the combined population of the next 27 largest agglomerations. In Sudan, Khartoum has as many inhabitants, 5.3 million, as the country's 248 smallest agglomerations combined (out of a total of 301 agglomerations). In some countries, more than half of the total population lives in only one agglomeration (Djibouti, Sao Tomé).

A statistical measure of urban hierarchy in national urban systems is urban primacy. Urban primacy is the ratio between the largest and the second largest agglomeration in the case of monocephalic urban systems, or second and third largest in the case of bicephalic urban systems. This statistical measure is based on the rank-size distribution of urban agglomerations (Zipf's Law). The ratio between the largest and the second largest agglomerations (primacy 1) should be 2 and between the second and third largest (primacy 2), 1.5. In half of the countries (24), one agglomeration stands out by its size (monocephalic) and 10 countries have two agglomerations (bicephalic) that stand out in the

Figure 2.3
Change in distribution of urban population by agglomeration size, 1950-2015



Source: OECD/SWAC 2018, Africapolis (database)

urban network (Table 2.1 and Table 2.2).

In several African countries urban primacy is among the highest recorded in the world. Liberia has the highest urban primacy (primacy 1) with the capital Monrovia (1.2 million inhabitants) more than 21 times larger than the second agglomeration Buchanan (58 000 inhabitants). Another eight countries have a primacy 1 of ten and above (Table 2.1). Morocco, Rwanda and Somalia are the only three monocephalic countries, besides South Sudan, with an urban primacy around two. The average urban primacy in the 24 countries with one dominant agglomeration is 8.7. In countries with bicephalic urban networks, the primacy 1 is generally low, whereas the discontinuity is between the next biggest agglomerations, with an average primacy 2 of 5. Congo has the highest primacy 2, with Pointe Noire (850 000 inhabitants), the second largest agglomeration, almost nine times larger than the third-ranked agglomeration, Dolisie (97 000 inhabitants). Other countries that show a similar structure in their urban systems include Burkina Faso, Equatorial Guinea, Ghana and Uganda (Table 2.2)

In Africa, urban primacy continues to increase in most countries. In some cases, notably capital cities, this highlights the important role of policy on urban growth and urban hierarchy. However, it also shows the inability of intermediary agglomerations to position themselves as genuine sub-regional metropoles, defying the dominance of the largest agglomeration. The growth in intermediary agglomerations is slower, but importantly less sustained, more irregular and highlighted by the fact that in many countries the "second" agglomeration changes over time. In Togo, the second agglomeration was Sokodé in 1960, then Kara in 2010 and Tsévié since 2015. In Chad, the second rank was taken by Sarh (1960-70), Moundou (1990), then Abéché (2010) and again Moundou (2015). In Sierra Leone, it changed between Bo (1960), Koidu (1970), again Bo (2000), and Kenema (2010). Yet, in only two countries has the position of the largest agglomeration changed in the past 60 years. In Cameroon and Burkina Faso, Yaoundé and Ouagadougou become the political capitals post-independence and their growth started to exceed that of Douala and Bobo Dioulasso, their respective former largest cities.

Metropolitan discontinuity and rural-urban continuity

The high urban primacy observed in Africa underlines the strong quantitative (population size) and qualitative (socio-economic and political) discontinuity between metropoles and intermediary agglomerations. The 'urban' classification or network is often perceived as a

Table 2.1

Urban primacy in some monocephalic national urban systems in Africa

Country	Largest agglomeration	Primacy index « Prim1 »	Share in the national urban population
Liberia	Monrovia	20.4	69%
Djibouti	Djibouti	12.5	81%
Angola	Luanda	11.3	44%
Burundi	Bujumbura	10.9	51%
Guinea	Conakry	10.8	54%
Togo	Lomé/Aflao [TGO]	10.7	51%
Sao Tome and Principe	Sao Tome	10.3	84%
Mali	Bamako	10.0	49%
Central African Republic	Bangui	9.9	52%
Guinea-Bissau	Bissau	9.3	78%
Sudan	Khartum	9.3	33%
Lesotho	Maseru	8.8	58%
Côte d'Ivoire	Abidjan	8.5	46%
Mauritania	Nouakchott	8.2	69%
Chad	N'Djamena/Kousséri [TCD]	7.6	31%
Sierra Leone	Freetown	7.3	56%
Gambia	Serrekunda	7.0	70%
Tanzania	Dar es Salaam	6.4	29%
Gabon	Libreville	6.2	59%
Mozambique	Cidade de Maputo	5.1	30%
Namibia	Windhoek	5.0	40%
Eritrea	Asmara	4.7	40%
Tunisia	Tunis	4.3	35%
Zambia	Lusaka	4.0	52%

Source: OECD/SWAC 2018, Africapolis (database)

Table 2.2

Urban primacy in some bicephalic national urban systems in Africa

Country	Largest agglomeration	Second-largest agglomeration	Prim1	Prim2	Share in the national urban population
Congo	Brazzaville	Pointe Noire	1.9	8.7	78%
Equatorial Guinea	Bata	Malabo	1.2	6.5	75%
Burkina Faso	Ouagadougou	Bobo-Dioulasso	3.4	6.0	56%
Uganda	Kampala	Mbale	1.7	5.1	43%
Eswatini	Manzini	Mbabane	1.2	4.6	82%
Zimbabwe	Harare	Bulawayo	3.4	4.3	61%
Ghana	Accra	Kumasi	1.6	4.1	51%
Malawi	Lilongwe	Blantyre	1.0	3.7	45%
Cabo Verde	Praia	Mindelo	2.0	3.3	85%
Somalia	Mogadisho	Hargeisa	2.4	3.0	53%

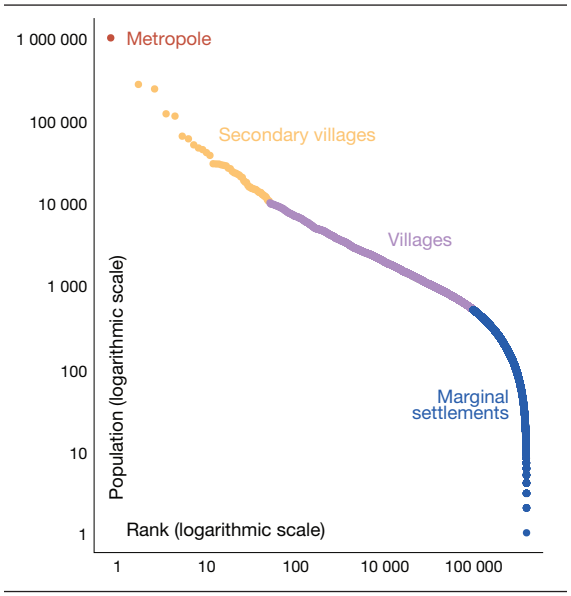
Source: OECD/SWAC 2018, Africapolis (database)

homogenous continuum, yet in Africa the urban network is composed of strata separated by important discontinuities. This is made apparent by the high primacies within urban networks and their systematic character across Africa. The discontinuity between metropolitan agglomerations and intermediary agglomerations is further underlined by their contrasting growth patterns. Africapolis data highlights that the major discontinuity that characterises current African settlement structures is between a metropolitan and urban strata, and not between urban and rural. The four settlement strata that can be identified are:

- "Metropolitan" strata, often made up of one agglomeration, most often the political capital,
- "Urban" strata, that follows a rather linear distribution,
- "Rural" strata, also linearly distributed, but not in continuity with the urban strata,
- "Marginal/scattered" strata, following a concave distribution. (Figure 2.4)

Therefore, the network of "urban agglomerations" does not appear as one homogeneous system, consisting of two clearly identifiable subsets (metropolitan and urban). The assumption of a hierarchical continuum of population settlements biases political strategies by favouring homogeneous action in nonhomogeneous urban areas.

Figure 2.4
Discontinuities and continuities in population settlement strata in Niger, 2012



Source: Geopolis 2018

Box 2.1
Rural-urban discontinuity

Definitions of urban imply a discontinuity between "cities", which represent the urban world and "villages" which represent the rural one. This highly political and qualitative boundary is represented by a minimum population threshold for localities that are viewed as urban. It is an incomplete illustration of the transformations observed and the development of certain rural areas into urban areas through densification.

The hierarchical distribution of rural settlements is poorly understood. However, understanding the characteristics of rural settlement is important given the prevalence of urban sprawl and high densification in rural areas, which lead to the emergence of new agglomerations. The low interest given to rural settlements is reflected in national statistical definitions, where "rural" is not defined intrinsically, but as the "non-urban" population, or "rest of the population". Rural is often misunderstood as "agricultural". This report highlights two layers within the "rural" category.

On the one hand, the rural layer is made up of villages with little hierarchy between them. On the other hand, there are very small settlements ranging from one individual to a few households linked to agricultural, pastoral, forest, artisanal or mining holdings; or to temporary occupation by itinerant populations.

THE EVOLVING GEOGRAPHY OF URBAN AGGLOMERATIONS

These transformations have also massively transformed the geography of the urban network and the density of urban clusters. The patterns of this emergence however are not homogenous and highlight the importance of rural transformations and demographic growth in driving African urbanisation. These processes, made apparent by Africapolis' spatial approach, and their implications in explaining the emergence and creation of certain types of urban agglomerations have been largely absent from research and policy debates. Anticipating the future of Africa's urban evolution will also depend on better integrating these dynamics.

Transnational and national patterns in urban clusters

Patterns in urban growth and urbanisation dynamics can also be understood through the evolving geography of urban agglomerations. The number of agglomerations in Africa continues to grow rapidly through the emergence of new agglomerations. Yet, the patterns of emergence are not homogeneous. Highly dense urban clusters are emerging, while other areas maintain low densities, which lead to clear differences in terms of densities across and within territories.

The two countries with the most extensive urban networks, Nigeria (1 236) and Egypt (1 061), account for 30% of the 7 617 identified urban agglomerations, followed by the Democratic Republic of the Congo (DRC), Ethiopia, South Africa and Algeria which account for another 25% of Africa's urban agglomerations (Map 2.4). The other 44 countries account for the remaining 45% of agglomerations (3 280), with several countries having less than ten urban agglomerations (Sao Tome and Principe, Cabo Verde, Eswatini, Guinea-Bissau, Djibouti) (Annex F). However, many national urban networks are part of larger transnational urban clusters and corridors.

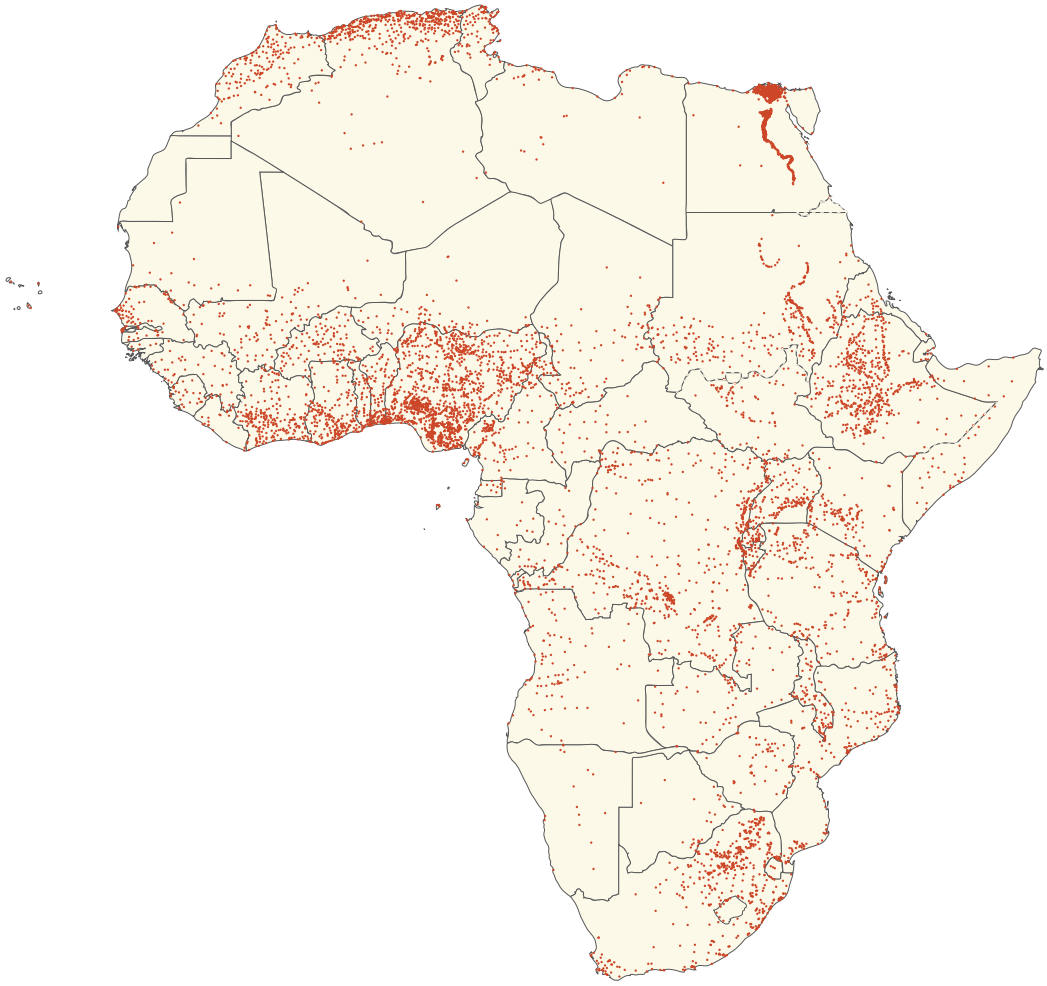
At the continental level six major urban clusters are observable: (1) North African cluster, (2) Nile River cluster, (3) West African cluster, (4) Ethiopian Highland cluster, (5) Great Lakes cluster, and (6) South African cluster (Map 2.5). Together, these urban clusters cover only 10% of the continent's land area (2.7 million km2), but account for 60% of urban agglomerations and 65% of the total urban population (370 million) in 2015[2]. The majority of the remaining 3 000 agglomerations are part of less dense clusters and territories, like the Sahel corridor, the eastern steppe and savannah between Somalia and Mozambique and the Congo Forest Basin.

The West African cluster is the largest in terms of the number of agglomerations (1 700), total urban population (134 million) and area (1.2 million square kilometres). The Nile River cluster, the only single country cluster, is the second largest in terms of urban population (83 million) and the densest with an average distance between agglomerations of four kilometres. The Ethiopian cluster, which stretches into parts of Eritrea, is the smallest in terms of total urban population (23.5 million) and least dense with an average distance between urban agglomerations of 16 kilometres. The Ethiopian and Great Lakes clusters have a similar number of agglomerations, (around 440), yet in the Great Lakes cluster the urban population is twice as large (53 million versus 23 million). Both are located in the interior of the continent without a coastal front, also highlighting a broader emerging aspect of Africa's urban geography: the relatively minor coastal orientation of its urban network.

Outside these clusters, less dense clusters are distinguishable — such as the Sahel Corridor, an ancient home of nomadic pastoralism stretching from Senegal to Eritrea. Other areas with less dense clusters include the areas associated with forest agriculture around the Congo Forest basin and the eastern savanna region which stretches from Somalia to Mozambique.

The emerging urban patterns and their hetereogeneity are not random, but underline Africa's settlement history. This history has been shaped by migratory patterns, settlement logics and land use structures. The location and emergence of urban clusters is the product of multifaceted interactions between the environment, socio-economic conditions, population growth and urbanisation. The areas with the

Map 2.4
Distribution of agglomerations in Africa, 2015



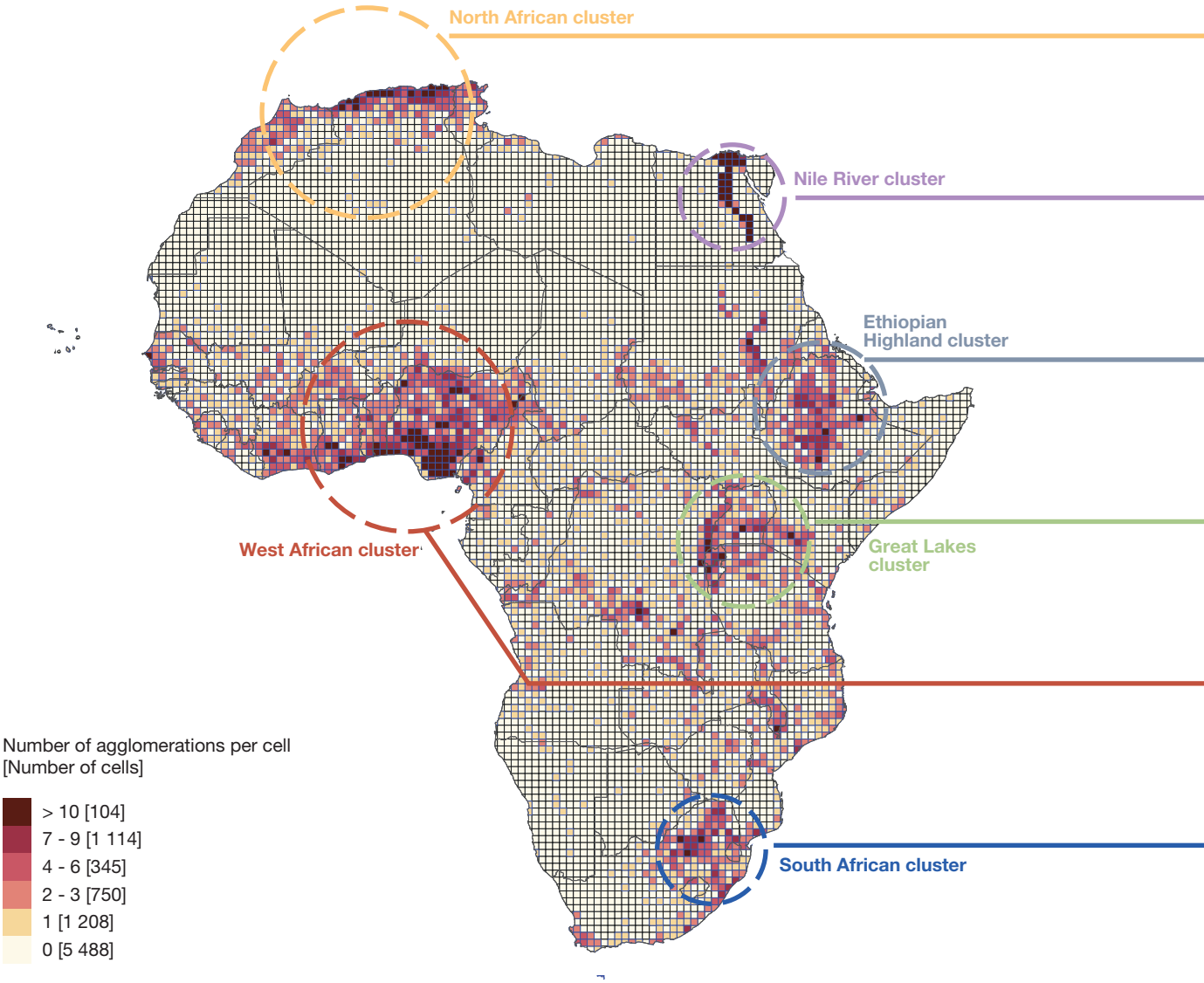
Source: OECD/SWAC 2018, Africapolis (database)

highest numbers of urban agglomerations in sub-Saharan African are found in southeastern Nigeria, corresponding to the Yoruba settlement area with an ancient presence of agricultural activities (Image 2.1). Similarly, the Ethiopian Highland, Great Lakes and South African urban clusters, are all densely populated rural areas in temperate highland areas (between 1 200 and 2 500 metres in altitude), with a long history of agricultural activities. The South African cluster also comprises intense and longstanding mining and industrial activities.

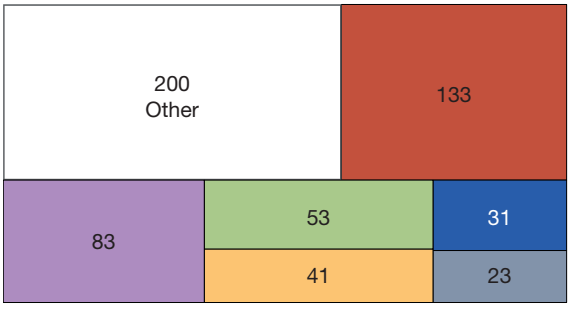
The continued emergence of new agglomerations

In 1950, Africa had 624 urban agglomerations with more than 10 000 inhabitants. By 2000, the number had increased eight-fold reaching 5 142 and has since increased by another 2 475 agglomerations to reach 7 617 in 2015 (Map 2.6). In 2015, Nigeria had twice as many urban agglomerations than the whole continent in 1950; Sudan had as many agglomerations as the whole of sub-Saharan Africa in 1950. The continued emergence of new agglomerations is an important component of Africa's urbanisation dynamic. The new

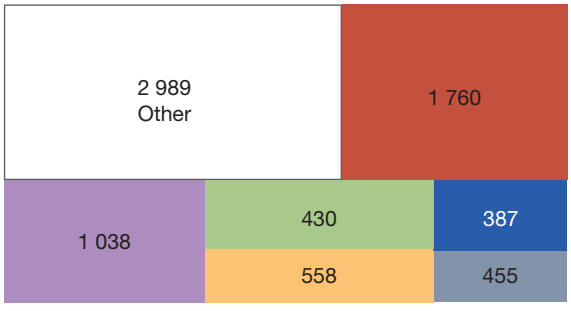
Map 2.5
Major urban clusters in Africa, 2015

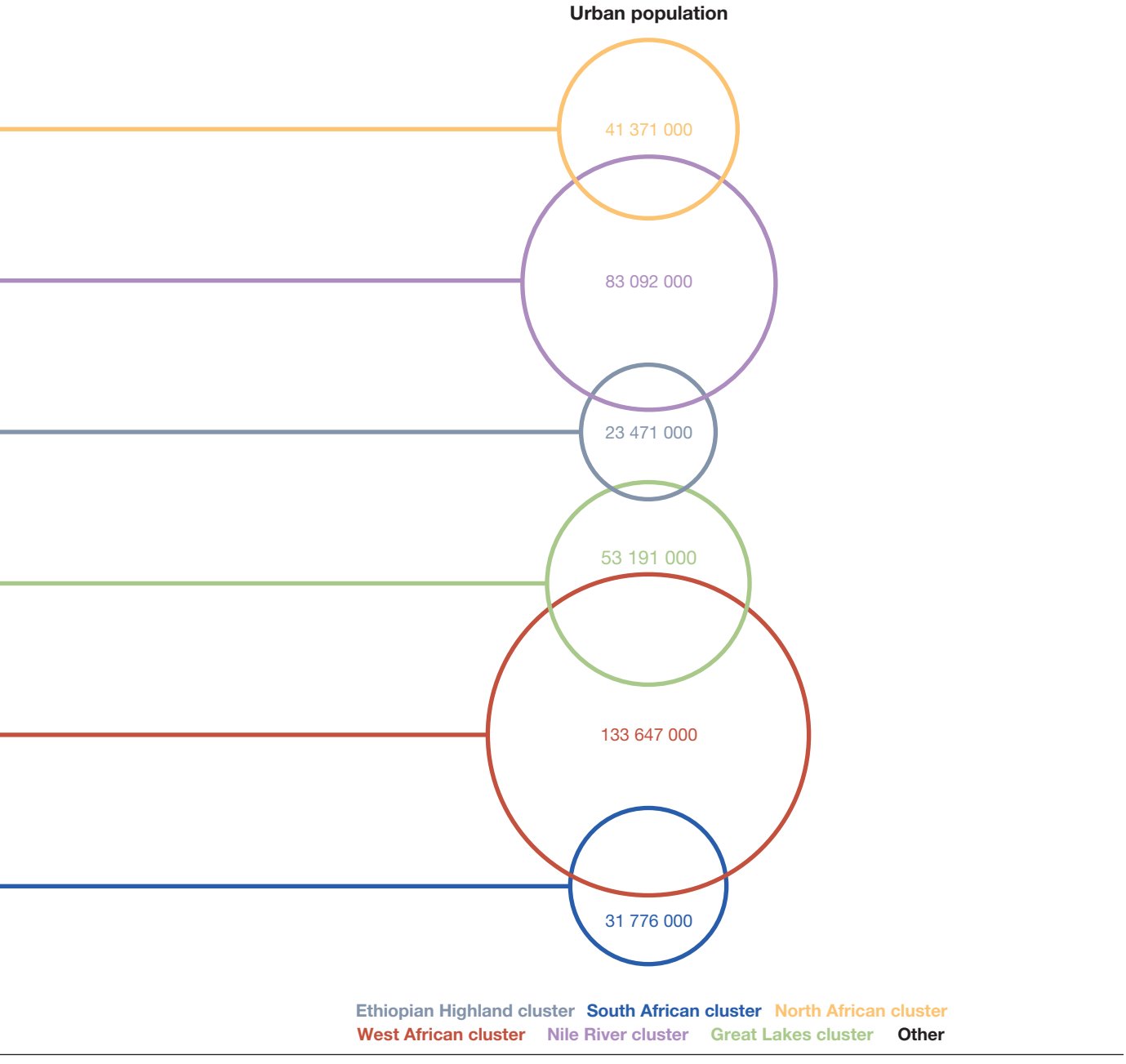


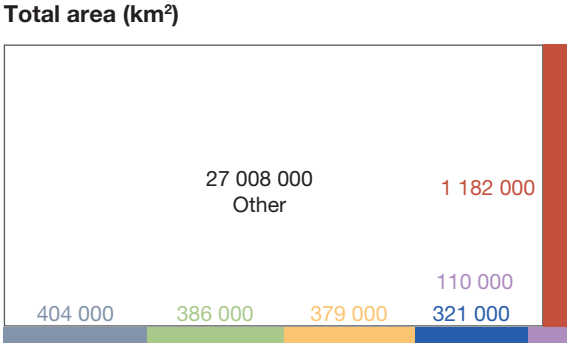
Urban population (in millions)

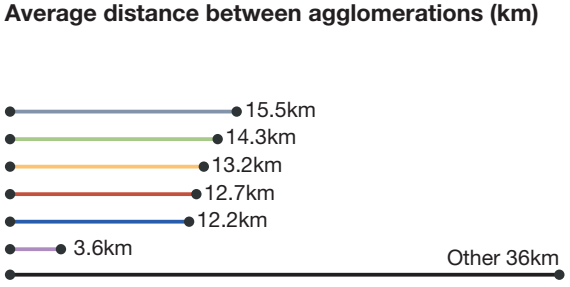


Number of agglomerations





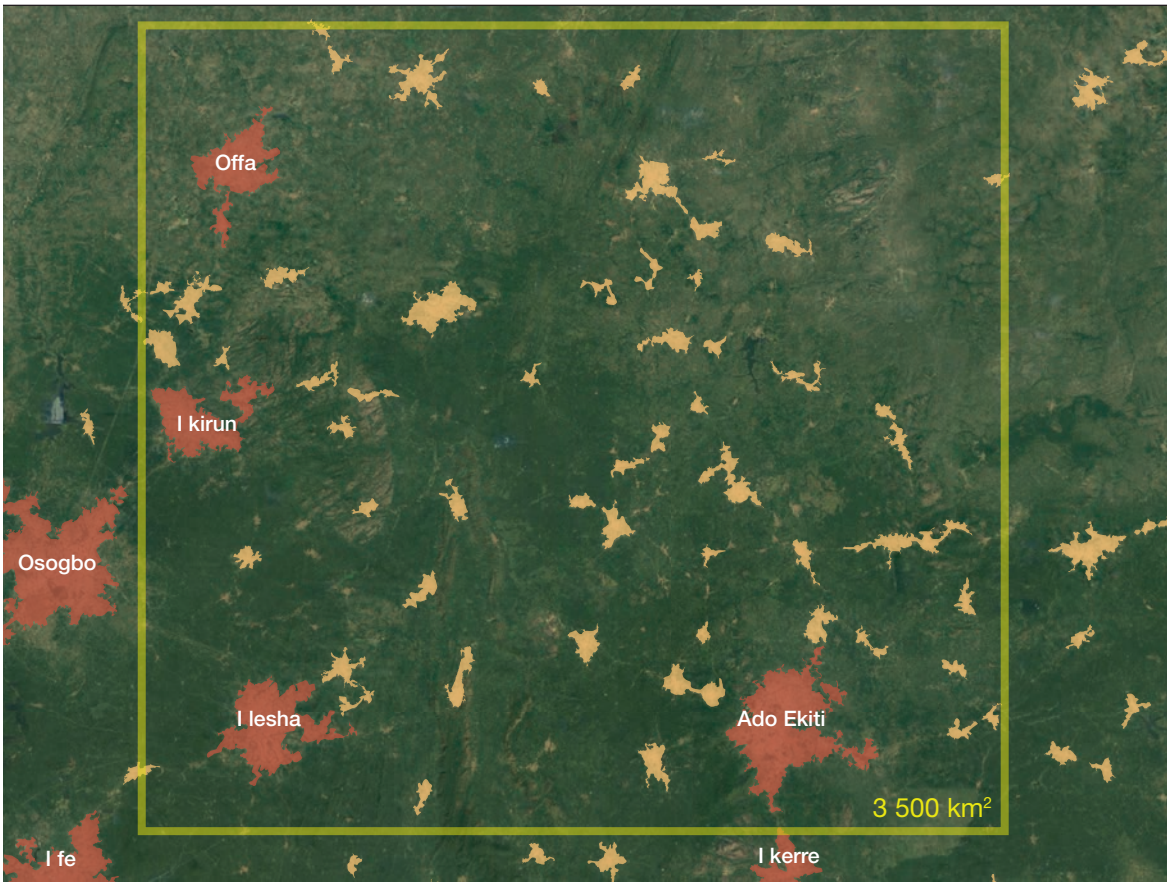




Sources: OECD/SWAC 2018, Africapolis (database); Geopolis 2018

Image 2.1

Density of the urban cluster in the Yoruba settlement area (Nigeria)



Note: The square covers an area of 3 900 square kilometres and contains 38 agglomerations with more than 10 000 inhabitants each.

Sources: *Google Earth* (accessed October 2015); OECD/SWAC 2018, Africapolis (database); Geopolis 2018

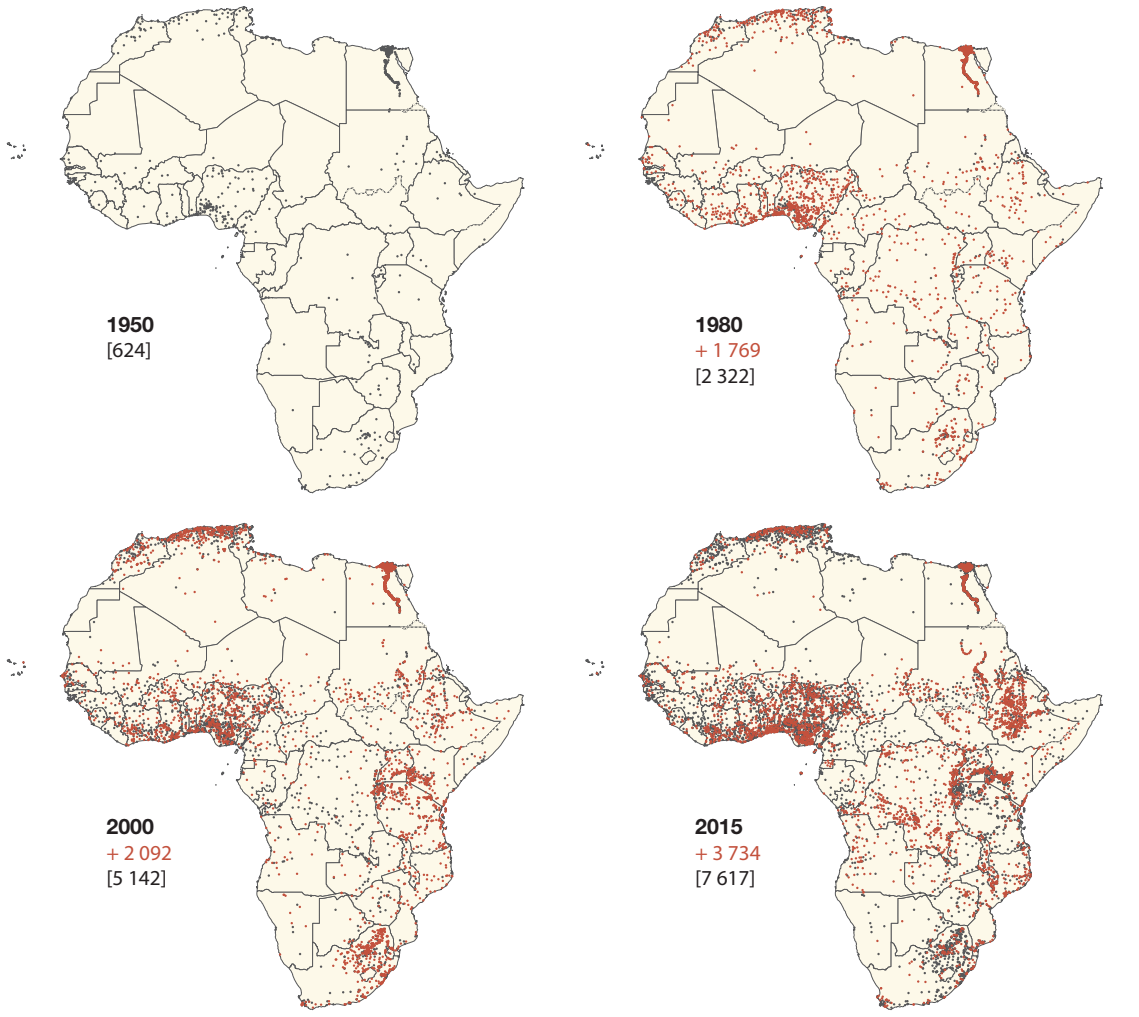
agglomerations translate into the forming of a denser urban network increasing the proximity between agglomerations and between urban and rural environments.

Most countries saw a spectacular increase in the number of agglomerations since 1950. In 32 countries the number of agglomerations increased by at least 1 000% between 1950 and 2015. The strongest increases in the number of agglomerations were recorded in South Sudan (from 1 to 90), Ethiopia (from 6 to 510) and Mozambique (from 2 to 167). The largest increase in the number of agglomeration occurred in Nigeria and Egypt, which had 1 137 and 851 agglomerations respectively in 2015. Nigeria and Egypt are also the two countries that have the largest urban network. Nigeria is the most populous country in Africa, and Egypt is the third most populous country on the continent. There is a very strong correlation between the total population and the number of urban agglomerations, with notable exceptions: Uganda, Burundi and Kenya have relatively fewer agglomerations compared with their total populations while Sao Tome and Principe, Botswana and Algeria have relatively more agglomerations compared with their total populations.

Between 2000 and 2015, the number of agglomerations increased by more than 50% in 33 countries and more than doubled in 16. The fastest increases, above 300%, were in Djibouti, Burundi, South Sudan and Malawi. In many

Map 2.6

Emergence of new agglomerations in Africa, 1950, 1980, 2000, 2015



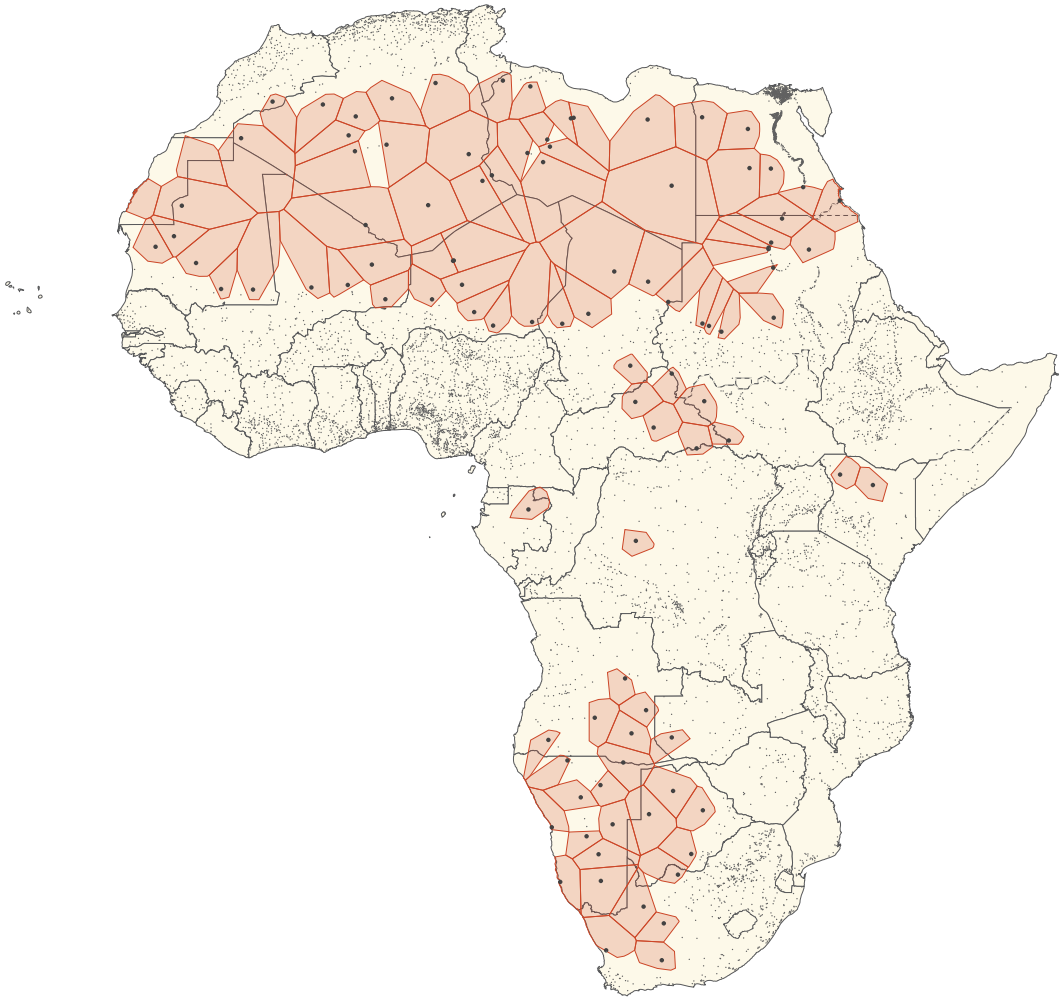
Sources: OECD/SWAC 2018, Africapolis (database); Geopolis 2018

cases, new agglomerations emerge as the result of the ongoing transformation of rural areas leading to a reclassification from rural to urban. This in-situ urbanisation process results in very different configurations depending on local contexts, notably the form of rural settlement structures adapted to the local environment. The emerging agglomerations are the result of an increasing population density that is accompanied by a gradual reorganisation of activities, people and space and notably by a reduction of agricultural activities. During this process, the distinctions between rural and urban are increasingly blurred.

In addition, an increasingly observed feature is the emergence of agglomerations within larger metropolitan regions. This recent reality reflects a growing diversity of mobility pattern, urbanisation processes and urban policies. An increasing number of people looking to move to the continent's capitals and metropoles are moving to the 'metropolitan area'. People leave expensive and congested centres and resettle in satellite towns and suburbs. In several countries,

Map 2.7

The 100 least-connected urban agglomerations in Africa



Note: This map shows the 100 least-connected urban agglomerations in Africa. Eighty percent of the least-connected agglomerations are in the Sahara and the Kalahari Desert.

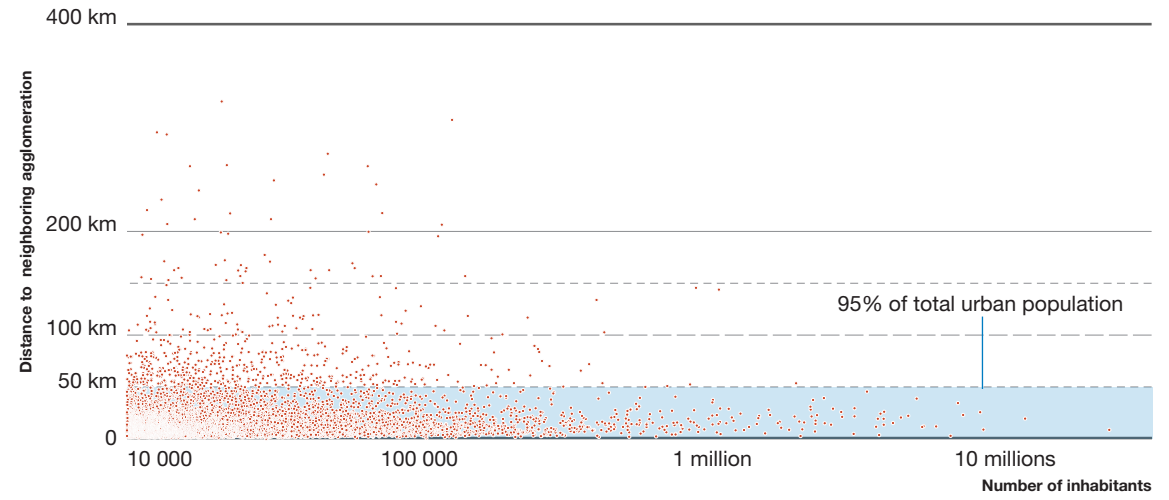
Source: OECD/SWAC 2018, Africapolis (database)

urban planning strategies favour this process by developing and investing in housing and services in commercial-industrial areas outside congested city centres.

Correlatively, in Egypt, Kenya, Libya and Rwanda, the number of agglomerations decreased between 2000-15. This decline is due to the spatial growth of existing agglomerations leading to the merging of two or more agglomerations to form one continuous agglomeration. The merging and absorption of agglomerations is observed in all countries. In total, 1 260 agglomeration merged between 2000 and 2015. However, since the number of emerging agglomerations exceeds the number of merged agglomerations, the total number continues to increase. Between 2000 and 2015, 3 800 agglomerations emerged, resulting in a net-increase of agglomerations. Both processes—emergence and merging— are functions of density increases (demographic growth or population inflows) and distance (proximity to other urban areas), explaining their correlation with existing urban clusters. Sixty percent of the newly emerged agglomerations between 2000 and 2015 and 84% of merged agglomerations are situated within one of the six urban clusters.

Figure 2.5

Distance to nearest neighbouring agglomeration and agglomeration size in Africa, 2015



Source: OECD/SWAC 2018, Africapolis (database)

Proximity and distance

The average distance between agglomerations dropped from 58 kilometres in 1950 to 20 kilometres in 2015. Although, these averages mask strong differences across countries and regions, a large majority of Africa's urban population lives close to neighbouring agglomerations. This proximity between urban agglomerations has strong implications for inter-urban mobility, connectivity and regional integration.

In 2015, 368 million Africans (or 65% of the total urban population) lived in an urban agglomeration less than 20 kilometres distant from a neighbouring agglomeration. In comparison, only 31 million urban dwellers (5% of the total urban population) live in an agglomeration more than 50 kilometres from the closest neighbouring agglomeration (Figure 2.5). In 13 countries the average distance between agglomerations is below continental average (20 kilometres). The average distance between agglomerations within the six major population clusters is 12 kilometres. Only three countries have lower average distances (Egypt, Gambia and Sao Tomé).

Only 53 agglomerations, with a combined population of 2.1 million people, are more than 150 kilometres distant from another urban agglomeration. The largest agglomerations at such levels of remoteness are Port-Gentil in Gabon (130 000 inhabitants), Nouadhibou in Mauritania (130 000 inhabitants), Agadez in Niger (120 000 inhabitants), Tamanrasset in Algeria (117 000 inhabitants) and Boosaaso in Somalia (116 000 inhabitants). The most isolated agglomeration is al-Jawf in Libya with 43 000 inhabitants at a distance of 565 kilometres from the nearest neighbouring agglomeration. Similar cases of isolation exist in the desertic and semi-desertic areas of the Sahara and the Kalahari Desert. These least-connected urban agglomerations also emerge by mapping the 100 largest Voronoi cells of an agglomeration[3] (Map 2.7). Each of these Voronoi cells exceeds 35 000 square kilometres. Hence, there are 100 regions in Africa the size of Belgium with only one urban agglomeration. In many cases, these agglomerations emerged from political and administrative reasons (military and state control of national territories, or decentralising the provision of health, education and other public services). They can also arise from economic activity and the exploitation of natural resources, as well as from agricultural development projects in dry areas. In such cases, natural population growth and settlement trends are not the primary drivers of urban growth.

Box 2.2

Africa's border cities

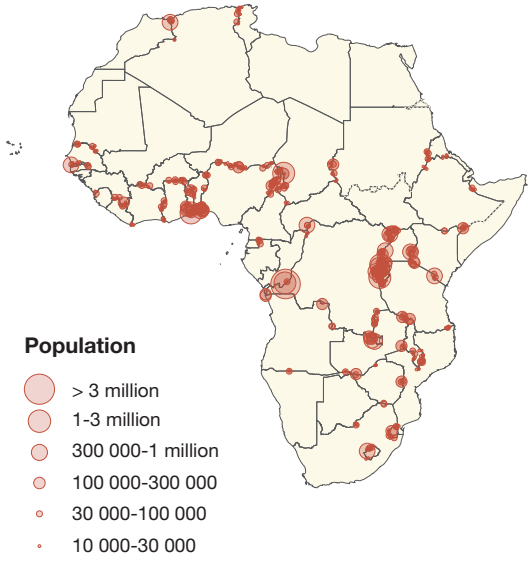
A remarkable feature of Africa's urban network is the prevalence of border cities. Lomé and Aflao, at the border between Togo and Ghana, are one agglomeration separated by just 50 metres. The same for Cinkassi/Cinkansé between Togo and Burkina Faso; for Pweto (DRC) and Chilengi (Zambia); Busia (Uganda) and Busia (Kenya); with many other cases at the border between Nigeria-Niger, Chad-Cameroon, Zambia-Tanzania, Uganda-Sudan, Senegal-Mauritania, etc. There are 47 border cities at less than ten kilometres from another urban agglomeration in a neighbouring country. In total, there are 635 border cities that are less than 40 kilometres from another. More than 42 million people (similar to the population of Spain) or almost 8% of the total urban population of the continent live in these agglomerations. Six of these have more than one million inhabitants, including Kinshasa, the continent's fifth largest city with 7.3 million inhabitants. The others are Lome (Togo), Brazzaville (Congo), N'Djamena (Chad), and Bujumbura (Burundi). Africa has nine national capitals that are located at a national border: Bangui, Brazzaville, Gaborone, Kinshasa, Lomé, Maseru, Mbabane, N'Djamena and Porto Novo.

However, this border dimension is very unequally distributed across Africa. North Africa has only 19 border cities in total and large swatches of southern Africa have only a few smaller ones. In the Great Lakes region and in West Africa, border agglomerations are an important feature of the urban network. In Burundi, 27 out of all 33 agglomerations are cross-border. In Benin, Gambia, Lesotho, Eswatini, and Togo, more than half of all agglomerations are in proximity to a border.

This feature of Africa's urban network, also the result of its colonial and political past, highlights the growing inter-urban proximity across countries. Urban policies that reduce the friction generated by the 32 000 thousands kilometres of land borders in Africa, by facilitating the mobility of people, goods, capital and ideas will increase the contribution of cities and their inhabitants to the continental integration process.

Map 2.8

Africa's border agglomerations



Source: OECD/SWAC 2018, Africapolis (database)

Notes

1 The term 'level of urbanisation' refers to the share of the urban population in the total population and is used to differentiate more clearly between the process of urbanisation and urban growth. The former refers to an increase in the share of people living in urban areas, while the latter refers to the growth in the number of people living in urban areas.

2 The method used consists in dividing the area of Africa by the number of agglomerations. The whole area covers 29.7 million square kilometres and has 7 617 agglomerations. If the distribution of agglomerations was even, each agglomeration would be in the centre of a square of 29 700 000/7 617, or about 3 900 square kilometres, giving a side of about 62.5 kilometres. A grid resulting from this calculation is created and then superimposed on a map of the agglomerations.

3 A Voronoi cell is based on a nearest neighbour calculation, where each cell corresponds to the area that is closest to the agglomeration inside the cell. Larger cells indicate a less dense urban network.

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Chapter 3

History, politics, environment and urban forms in Africa

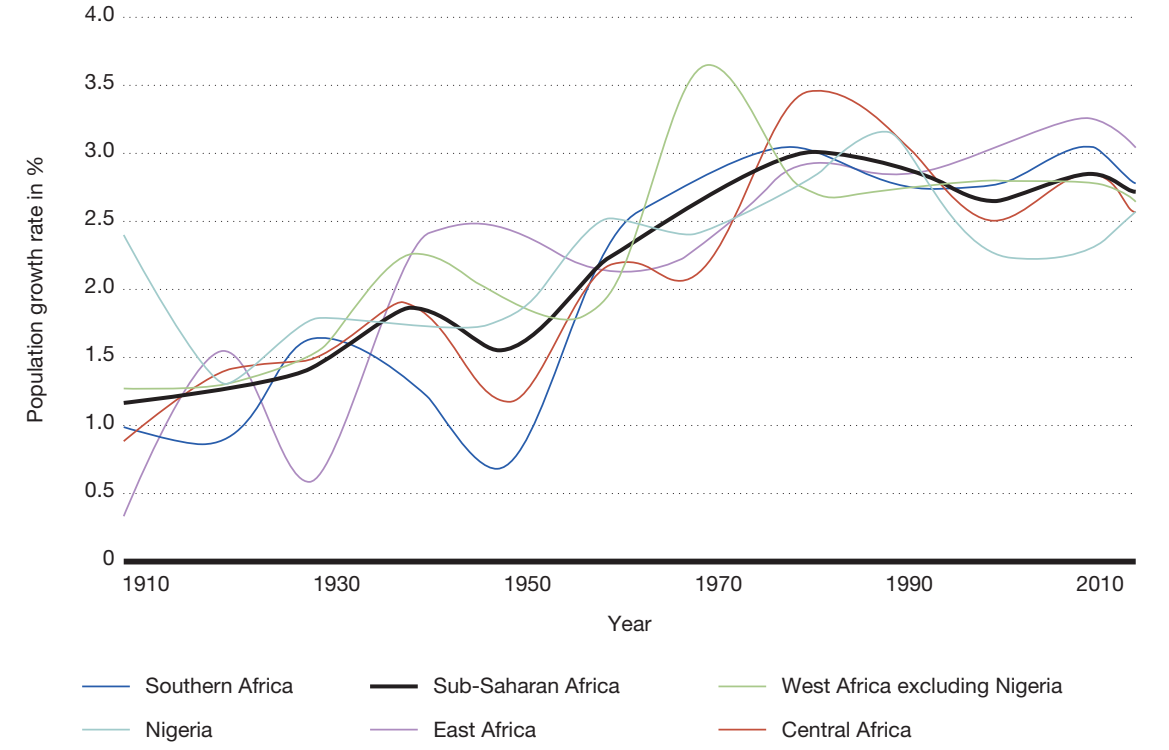
The first part of Chapter 3 analyses the demographic, political and environmental factors that influence urban growth in Africa. Africa has transitioned from a period of demographic stagnation dating to the pre-colonial era to a period of positive growth in the colonial era, followed by exponential growth after independence. Since the beginning of the 2000s, globalisation has left its mark on settlement patterns. Political conditions have shaped urban phenomena — the impact of urban planning (or its absence) is visible in satellite imagery, and administrative boundaries often do not match those of existing agglomerations. Finally, environmental constraints like the availability of water or land have major influences on urban growth, as demonstrated by the agglomerations of the Nile River valley or in Rwanda. In the second part, this chapter highlights different "spatial attractors" (points, lines and surfaces) used to model urban dynamics. The analysis of growth factors and modelling reveals new aspects of urban growth in Africa: the increasingly blurred distinction between urban and rural, dispersed urbanisation and chaotic forms of agglomeration.

HISTORICAL, POLITICAL AND ENVIRONMENTAL CONTEXT

Historical, political and environmental factors affect urban forms, hierarchy and concentration, the development of agglomerations and, therefore, urban indicators. The continent has experienced several demographic phases influenced by history and characterised by uninterrupted growth since the middle of the 20th century. However, the analysis of demographic dynamics provides little information on settlement patterns. Settlement patterns are essentially governed by political contexts and their interactions with the economic and environmental conditions and the use of resources. These can be the result of planned urban growth such as the creation of a new cities (e.g. in Libya or Egypt) or economic triggers such as the development of mining operations; for instance, Lubumbashi became the second largest agglomeration of the Democratic Republic of the Congo (DRC) with the development of extractive industries. African societies are particularly dependent on agriculture and therefore on environmental factors such as climate, soil quality and topography. The adaptation strategies of people to environmental characteristics are critical determinants of settlement patterns and urban dynamics. These patterns can result from spontaneous or planned mobilities, and are adaptations to topographical features such as ridges or protected natural areas.

Stimulated by an increase in density, the often-spontaneous agglomerations express increasingly strong demands for access to public services and facilities. By identifying these areas and new forms of urbanisation rarely captured by statistics, Africapolis highlights the gap between urban policies and functional realities. Beyond the necessary investments needed to make these territories sustainable and to support their development, this information raises the question of decentralisation and policy co-ordination between local and national decision-making levels. In several African countries, newly emerged agglomerations do not display either clearly urban or rural characteristics. Yet, as population density continues to increase the balance inexorably shifts in favour of the urban. The transformation in which urban and rural characteristics converge gives birth to processes specific to each territory. Managing this diversity of situations requires strategies that mediate between local and national interests

Figure 3.1
Phases of population growth in Africa by region, 1910-2015



Source: Geopolis 2018

and an integration of spatial dimensions. It also must consider the local realities of reasoned and resource-efficient management that certain areas have developed to accommodate the rapid transformations linked to urbanisation.

Demographic conditions of urban growth

In contexts with zero demographic growth, settlements patterns would depend solely on migration and local differentials between birth rates and mortality. Only long-term and coherent policies could influence the spatial distribution of populations. In Africa, however, with high population growth (3% per year) and a doubling of the population over the past 25 years, policy impacts could be all the more significant, as is already evident in some urban developments.

In sub-Saharan Africa, there have been three historical and political phases with varying influences on settlement patterns. The first, precolonial phase was characterised by negative population growth that resulted in the destruction of most of the pre-existing urban networks. The second, more stable era, corresponded to the appropriation of African territories by colonial powers. It was characterised by the establishment of cities, foundations of today's large metropolises and regional centres, often located along the coast. The third is the period of national independence, during which the structure of urban systems emerged, in particular small cities through which states reconquered the interior of their territories (Figure 3.1).

The two last phases had a major impact on the configuration of current urban systems, notably driven by strong demographic growth. In the 21st century, a fourth phase emerged: globalisation, still embryonic in some countries, but already impacting the emergence of vast "metropolitan regions" (Chapter 4) and "urban corridors".

A declining population

Only some countries have population statistics from before independence, such as former British colonies dating from the end of the 19th century (1871, 1881 and 1891). For protectorates, data emerged two to three decades later. The French administration did not conduct censuses in Africa with the exception of Algeria (1861 and 1872) and Morocco (1936 and 1951). In contrast, in other colonies, such as the Portuguese colonies, the populations of administrative divisions and main agglomerations were tallied and published by the colonial administration from 1900 and became widespread around 1921.

The narrative advanced by many historians for periods prior to 1920 is of stable population size. This view is now increasingly being contradicted by many studies. For example, Louise Marie Diop-Maes (1996) states that Africa had no reason to be less dense than India, which would imply a decline in African population during the first population counts, as a result of the various repression and military interventions. The slave trade probably contributed to a long-term decline in the African population, as well as the raids carried out by Arabs.

Some examples of urban depopulation seem to confirm this thesis. The population of Kouka (Nigeria) was estimated at 100 000 inhabitants around 1830, 80 000 inhabitants around 1850, then between 50 000 to 60 000 in 1870. In Algeria, the French censuses of 1861 and 1872 show a decline in the population of 20%, notably among Muslims, from nearly 3 million to 2.4 million inhabitants. In Libya, a population loss of 40% was also likely due to consecutive wars, rebellions and Italian colonisation.

Although in pre-colonial times sub-Saharan Africa was home to large cities such as Djenne, Gao, Dia and Timbuktu in present-day Mali, very little evidence of these cities remains within current urban systems. The only real networks remaining in sub-Saharan Africa are the Yoruba city-states in Nigeria. In East Africa, ancient trading posts along the Indian Ocean were replaced by colonial cities, which despite the trading presence of Omanis and Portuguese, were never major cities.

The expansion of cities during the colonial period

African demographic growth became positive again at the end of the 19th century, although it was marked by strong regional differences (Table 3.1). Between 1900 and 1940, growth was fastest in southern Africa with a doubling of the population. From the beginning of the 20th century, the future metropolises of Johannesburg, Durban and Cape Town emerged as the three main cities. West Africa's population grew more moderately, with population doubling only by the 1950s, with certain metropolises emerging on the coasts. The railway linking the coast to the interior of the continent leads to the emergence of a string of intermediary cities, such as Bobo Dioulasso and Ouagadougou in Burkina Faso. In Côte d'Ivoire, apart from the new capital, Yamoussoukro and San Pedro, the six largest cities in 2015 were the same as in 1960. In Central Africa, the population grew slightly faster. Certain mining and administrative cities were the first historically recognised urban areas, which does not imply that other urban centres did not exist.

In general, the period of colonial occupation that followed that of conquest was a period of intense population concentration in some cities (Algiers, Lagos, Tripoli, Tunis). New colonial districts were grafted onto existing settlements. Other urban centres were established where ancient villages once stood. These cities still make up almost all of today's big agglomerations, and especially the centres of political and economic decision making. Everywhere, the centralisation and hierarchy of administrative networks and the economic structure constitute the fundamental factors of a true "urban revolution". The emergence of major urban centres was not limited to the coast (Table 3.1).

Exponential post-independence growth

The period following the Second World War has had the most influence on the current structure of urbanisation. Between 1960 and 2015, the African population increased five-fold, from 263 million to 1 126 million. In 2015, Dakar had as many inhabitants as the whole of Senegal did half a century earlier. The situation is the same for Abidjan in Côte d'Ivoire, Lomé in Togo, Ouagadougou in Burkina Faso and Bamako in Mali. In

Table 3.1
Growth of cities during the colonial period

Agglomeration	Initial population (in thousands)	Base year	Population in 1960 (in thousands)	Average annual growth
Alger	62.9	1860	738.7	2%
Oran	30.5	1860	349	2%
Casablanca	8.5	1880	965.3	6%
Accra	15.5	1890	337.8	5%
Tunis	120	1890	485.3	2%
Bamako	4.3	1900	128.3	6%
Bobo Dioulasso	7.8	1900	52.6	3%
Dakar	10.8	1900	315.7	6%
Lomé	3.7	1900	126	6%
Mogadisho	8	1900	101.5	4%
Monrovia	4	1900	64.9	5%
Nairobi	9	1900	295.2	6%
Niamey	0.6	1900	33.4	7%
Ouagadougou	3	1900	60.2	5%
Porto-Novo	19	1900	64	2%
Abidjan	1.2	1910	224.6	11%
Conakry	6.5	1910	124.4	6%
Cotonou	2	1910	78.3	8%
N'Djamena	4	1910	65.6	6%
Tripoli	50	1910	288	4%
Bouaké	3.5	1920	59.3	7%
Brazzaville	4	1920	94	8%
Bulawayo	6.6	1920	279.1	10%
Hararé	5.8	1920	375.6	11%
Kinshasa	1.6	1920	451.1	15%
Bangui	11.9	1930	84	7%
Blantyre	5.7	1930	76.3	9%
Kampala	7.3	1930	134.8	10%
Lusaka	2.1	1930	113.1	14%
Bujumbura	7.5	1940	49.2	10%

Note: Cities are ordered chronologically from the beginning of the colonisation of their territory. Coastal cities are in blue. those of the interior in red. The fact that there are more coastal cities at the beginning of the period reflects the chronology of the development of the continent: certain cities were already colonial trading posts before being officially integrated. Growth rates were higher for cities of the interior. which began with lower levels of urbanisation

Source: Geopolis 2018

2015, there were more agglomerations with more than 10 000 inhabitants in Côte d'Ivoire than in sub-Saharan Africa in 1945. These demographic dynamics are changing the continental configuration and balance. At country level they also illustrate the decoupling between large metropolises and intermediary cities, still marked today (Chapter 4).

The demographic pressure stimulates a re-organisation of local societies. The existence of urban planning, or its absence, is a political choice. Urbanisation can also be structured by institutions not controlled by the state that fill the gap of an absent or overburdened administration, ranging from village chiefs to multinational mining companies. Therefore, the political dimension includes more than the State.

A new phase?

Globalisation has precipitated a new era with new actors and, significantly, with a change in the direction of trade flows. Today, driven by multinational companies farmers in Kenya, Egypt, and Mozambique produce fruits and vegetables for European and Chinese consumers. Leather processing companies in Aba (Nigeria) supply fashion companies in Italy. In many African countries educated French-, English- or

Portuguese-speaking workers are employed by Western client services companies. These new activities lead to particular locational strategies, explaining the sudden development of an agricultural region, a city, or even a whole regional urban network. Agglomeration dynamics could be transformed yet again, as suggested by the formation of metropolitan areas (Chapter 4).

Political contexts and urbanisation

The impact of national policies – or their absence – on urbanisation processes are complex and varied and hence difficult to analyse. Some states promote, or have for a long time promoted, a rural ideology and try to slow down urban development. Others, by contrast, promote cities and urbanisation as engines of development and support urban concentration and decentralisation. In some cases, States can also have a strategic interest in not recognising the development of certain agglomerations or spontaneous urban expansions. Africa's urban landscape underlines the heterogeneity of local contexts, highlighting the importance of multidisciplinary contextual awareness, of scalar characteristics and the need for designing territorial policies that link the national and local levels.

Heterogeneous effects of political models on urban systems

Border populations frequently belong to similar ethnolinguistic groups and share common characteristics. However, that is not the same for institutions. A comparison between apparently similar countries like Togo and Benin, Rwanda and Burundi, or Congo and the DRC, highlights radical differences in policy approaches to decentralisation and administrative divisions, to defining urban and to urban policies. On the ground, crossing a border provides ample evidence of differences in the policy treatment of urban dimensions, even if some general spatial features generalise the influence of the natural environment and anthropological characteristics on agglomeration logics. However, the dominant explanatory factor of observed disparities is the national political context in terms of urban planning and access to land, its influence can also be characterised by its absence.

For example, in Togo in 2015, an individual can acquire land, start the construction of a dwelling and then ask the local authority to recognise the facts. Similarly, a group of landowners can then ask for an official status as 'community'. The 2010 official community gazetteer of Togo lists more than 14 000 localities, the record in Africa given the country's size. This absence of land planning results in a chaotic sprawl of settlements around agglomerations and villages, reducing urban densities. This is clearly visible on a map and explains the differences in settlement patterns between Togo and neighbouring countries. However, the absence of planning does not always lead to low densities and inversely urban planning does not always translate into high urban densities. In terms of urbanism, diametrically opposed national policies exist.

In Uganda for instance, driven by increasing population density urban agglomerations are rapidly emerging outside the planned trading centres, municipalities and towns councils. This is notably the case in the south of the country, on the hills overlooking Lake Victoria. In 2015, 310 communities form an agglomeration with more than 10 000 inhabitants each and do not have official "urban" status. 117 of these communities are in the Mbale agglomeration, divided into two municipalities and six town councils. In comparison, there are 62 town councils, officially urban, which do not have an agglomeration with more than 10 000 inhabitants and lower population densities than not recognised agglomerations.

The urbanisation process of Mbale illustrates the unclear distinctions between urban and rural. With an average density of 2 200 inhabitants per square kilometre in 2015, it is low-density urban space, but already too dense to be considered rural. With population growth continuing at a rate of 2.8%, Mbale appears more urban than dozens of official "cities".

In a sense Mbale is already urban, while urbanity will follow with economic and social development. Africapolis identifies many agglomerations that despite their low density can no longer be considered rural. Although emerging spontaneously, a rational spatial logic is apparent in most cases. Most of them are not

Box 3.1

Urban planning according to the Chinese model

In Tanzania and Mozambique, the last decades have been marked by very strong demographic growth and proved a decisive phase for the establishment of the architecture of the nation's territory. The administrative division of the territory is inspired by the model of China. Large rural areas are thus placed under the jurisdiction of a city. Tanzania distinguishes between 'urban' wards, the city's dense urban core, 'rural' wards, and 'mixed' wards, outskirts intended for future extensions (Image 3.1). In mixed wards, the spread of buildings is not anarchic and roads and lots are aligned and planned. At a time "t", the built-up character of urbanisation is particularly extensive, manifesting itself in the blending of infrastructure, houses, workshops, schools, farms and fields. When their densities increase and they satisfy the Africapolis agglomeration criteria, the "mixed wards" blend into the urban form of existing agglomerations. One of the consequences is the low average density of agglomerations. However, in this case this is not explained by spontaneous sprawl, but by the planning strategy, which is applied as soon as an agglomeration emerges on the territory.

In Mozambique, the policy environment also leads to low density agglomerations, but the process differs from Tanzania, due to the lack of creating new formal "cities". Besides the capital, two hierarchical levels co-exist: *cidades* (cities) similar to Chinese *jiedao* (街道), and *vilas* (cities) equivalent to *zhen* (镇). With the economic recovery and population growth since the end of the civil war, the number of planned *cidades* is insufficient to structure the territory. The *vilas*, too small and poorly serviced, are not capable of effectively creating distinct urban settlements. Multiple spontaneous settlements thus fill the voids in the territory. Most consist of chains of villages connected through scattered constructions along roads and tracks. This process is also observable on the outskirts of the official cities with the expansion of unplanned constructions forming interminable threads in the countryside. The official *cidades* and *vilas* are the urban development priorities, but their number is insufficient to consolidate the extent of the national territory and the government is struggling to recognise the growing spontaneous developments.

Image 3.1

"Mixed" ward, western periphery of Babati (Tanzania)

Note: The road network is prepared to accommodate future urban extensions and plots can be easily serviced and connected to the networks. As some blocks are not yet occupied, the urban density is provisionally very low. Tanzania has one of the fastest urban growth rates in the world and the government is anticipating the growth of small towns.

Source: *Google Earth* (accessed September 2017, y = -4.219, x = 35.722, Alt. 1 740 metres)

officially recognised and their development has been neglected by political strategies and statistics. Africapolis makes it possible to grasp this reality and its characteristics and to highlight the effects of their development on the economy, land planning and access to services.

The statistical erasure of agglomerations

Zambia is divided into nine regions, subdivided into districts, then into constituencies and wards, which are the electoral units. The country publishes an official list of urban localities, which are however independent of the different subdivisions and their functionality. In 2015, the number of people living in neighbourhoods outside the planned perimeters equalled, or even exceeded, the populations of the official "cities". Their generally poorer inhabitants are not captured by urban statistics, portray the effect of a political administrative view on the apprehension of the territory and urban development.

This bias does not apply only to official urban localities, but can mask entire agglomerations. Particularly, in cases where the emergence of agglomerations is not associated with any existing, officially recognised city, entire agglomerations are invisible from official statistics. In Zambia, the agglomerations bordering Lake Mweru are not part of the official category of cities and therefore do not appear in "urban" statistics (Map 3.1). Some of the agglomerations have more than 40 000 inhabitants extending more than 20 kilometres in length with population densities frequently exceeding 3 000 inhabitants per square kilometre. These agglomerations originate from the merging of several small settlement units, dominated by a circular settlement pattern. Although the road along the edge of the plateau that dominates the lake guides the expansion of the built-up area, these agglomerations are not comparable to the "street-village " on the hills of Rwanda and Burundi, but rather comparable to the agglomerations of the DRC. In the absence of planning and regulation, agglomerations will continue to form from pocket to pocket and this process will accelerate as the population grows.

Map 3.1

Agglomerations along Lake Mweru, Zambia

Sources: OECD/SWAC 2018, Africapolis (database); Geopolis 2018; Demarcation Board (borders in 2010)

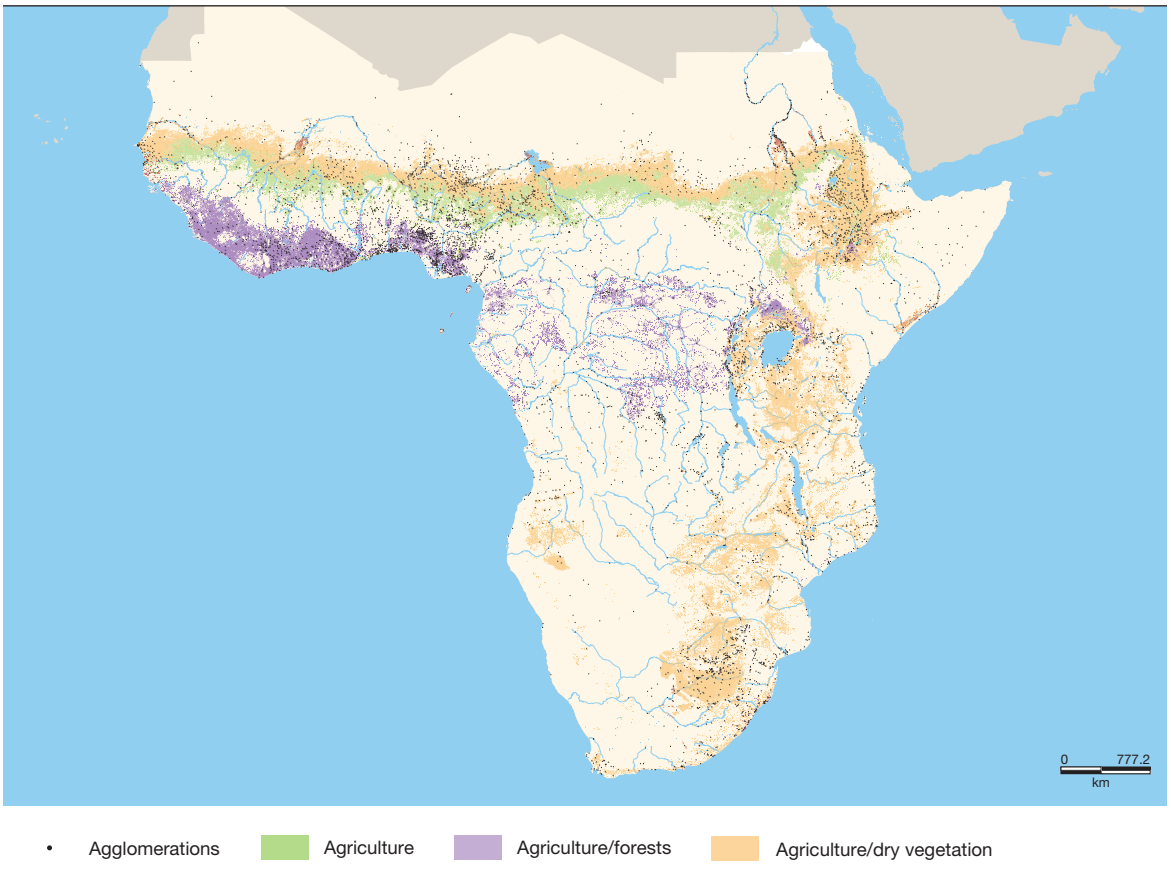
Map: François Moriconi-Ebrard 2017

Environmental context

Environmental, climatic and geographical factors influence the spatial configurations of settlements and their temporal evolutions. Their effects are even greater in societies that are more dependent on agriculture, as in Africa. Each environment imposes a type of development, and thus social organisation and settlement patterns: sedentary, semi-sedentary or nomadic. Some territories favour livestock, others agriculture, or both. Local knowledge produces a greater or lesser degree of specialisation or a diversity of productions, with consequences on trade, agricultural and land tenure systems and the organisation of work. Each territory has optimal densities for supporting local systems and

Map 3.2

Land use and the network of agglomerations in sub-Saharan Africa



Note: The distribution of human densities in Ethiopia or the Nile Valley illustrates the influence of natural constraints related to rainfall, altitude, and slopes on settlements.

Sources: OECD/SWAC 2018, Africapolis (database); Geopolis 2018; European Commission 2003 - Map: Hervé Gazel

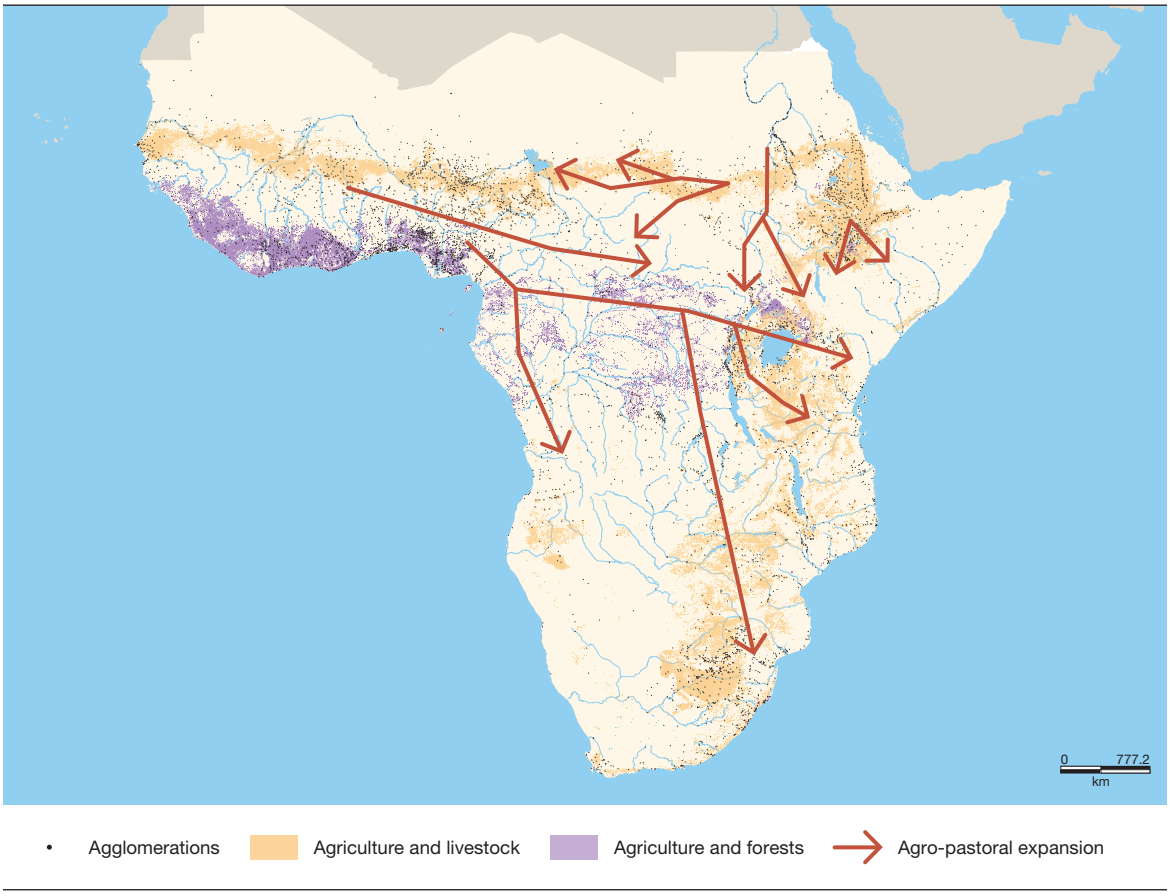
conditions more or less favourable to urbanisation. Agricultural systems are thus more or less conducive to producing urbanisation.

Certain types of settlement favour the regular distribution of numerous small regional markets across the territory, which are destined to become urban centres. Others are more suited to centralisation in larger marketplaces that are fewer and more distant from each other. Others still are not characterised by any type of agglomeration but by the scattering of households in the countryside or a linearisation around a structuring feature such as a road, a river or lakeshore, the slope of a mountain range or a forest. Finally, often the succession of economic or political cycles —colonisation then independence, apartheid and its abandonment—and technological innovations can lead locally to a layering of historical settlement patterns. Because of these superimpositions, the urbanisation landscape sometimes appear chaotic. However, some methods make it possible to isolate the different scales, actors or temporalities to understand their influence on contemporary urban forms.

The historic areas of urbanisation

Despite rapid population growth, the spatial organisation of settlements continues to follow patterns based on settlement logics and land use strategies adapted to distinct territories, along homogeneous climate zones, rivers, mountain environments. Agriculture and livestock rearing in Africa spread from the northeastern part of sub-Saharan Africa westwards, between arid zones consisting of dunes, sandy deserts, rocky or bare rocks, vast spaces unsuited to agro-pastoral

Map 3.3
2 000 years of African urbanisation



Sources: OECD/SWAC 2018, Africapolis (database); Geopolis 2018; European Commission 2003 - Map: Hervé Gazel

practices, and forest areas or areas deprived of pastures that demanded land clearance that was technically infeasible until the invention of iron. Technical progress, particularly in terms of resource management, has opened up new prospects for expansion, trade and mobility, which has influenced urban dynamics. The general pattern of settlement dynamics is still visible today by superimposing the location of agglomerations of more than 10 000 inhabitants with land cover (GLC, 2000) (Map 3.2). The three main prehistoric settlement areas, best suited to agro-pastoral and agricultural activities, are apparent on the map:

- "Sudanese" settlements in the middle Nile valley,
- Settlements in the highlands of Ethiopia,
- Settlements in the Niger-Cameroon mountains.

While the first and third were formed by "climate refugees" of the Saharo-Chadian basin following the desertification of the Sahara that began 5 000-7 000 years ago, the second resulted from the migration of Cushitic peoples from Yemen via the Red Sea.

Using a land use approach to understanding African territories reveals a very long history of settlement. It identifies the formation of highly contrasting regions in terms of density and urbanisation. Several rationales for settlement (foraging, agro-pastoralism, colonisation) succeeded one another, the cumulative combination of which explains the formation and evolution of contemporary transnational urbanisation territories. This history focuses on the migratory past of the African peoples and the geographical distribution of the major linguistic families. This perspective on settlement and the

founding of urban spaces provides a narrative that is distinct from national or local processes, relying on the temporal (history) but also the spatial.

Mapping the complete set of agglomerations in the Africapolis database highlights the heterogeneous pattern of agglomeration clusters, with varying densities and distances. (Map 3.3). This heterogeneity is also tributary to the original settlements and certain spatial configurations underlying todays agglomerations. The region with the highest density of agglomerations in sub-Saharan Africa is in the Yoruba settlement area characterised by very old agricultural practices in forest areas. A settlement area around this dense cluster spreads from Côte d'Ivoire in the west to Cameroon, covering almost all of Nigeria. In addition, the Ethiopian, Great Lakes and South African clusters are easily identifiable. These are mostly in the highlands, where the climate is tempered by an altitude between 1 200 and 2 500 metres. All are very strongly associated with dense rural areas that have had significant agricultural activity for centuries, including in South Africa, which also had intense mining and industrial activity and European colonial settlement.

Urbanisation and agriculture

The human race has long understood how to adapt to and benefit from natural constraints, as long as there is sufficient political will and capital to carry the costs. This capacity of adaptation is manifest at all scales. Locally, rural exodus has for long periods reduced demographic pressures on arable land, by increasing the levels of urbanisation. These constraints manifest differently depending on the natural environment, but also depending on the size of countries. In Sudan, the impact of natural constraints on population settlement is clearly visible (Map 3.5).

Further, it is important to distinguish contexts where the main issue is not lack of space, but rather water. Some countries, supported by international funding, are developing ambitious regional and even national agricultural development projects, using water from new dams and aquifers to increase irrigated land areas. These projects drive extensive internal displacement of populations to enlarge arable land. Beyond agriculture, they have an impact on urbanisation to the extent that new towns are created to accommodate displaced populations like New Bussa in the Niger valley (Nigeria. Dams are being built, uncultivated swamps and saline land are being improved in the deltas, and extensive irrigation schemes[1] are being set up for intensive agriculture to replace agro-pastoralism. New agricultural fronts are open in Sudan, Chad (Salamat) and in North African countries. Some projects include downstream activities such as industrial processing and distribution of agricultural products, located in new urban centres. Other cities have been created in the desert areas of Niger (Arlit, Akokan), Mauritania (Zouerat, Nouakchott) and the countries of North Africa (Algeria, Egypt and Libya) responding to military security, police control, administrative services or mining.

In contrast to these large projects, there are areas where space is limited and where agriculture is rainfed. Communities faced by limitations of local land and water resources have long adapted appropriate methods of development and organisation. High rural density is a result of successful adaptation to micro-local environmental constraints. Nevertheless, the exponential increase in rural population density inevitably reaches a critical threshold. At present, new agglomerations are emerging from the intensification of constructions in rural areas. This process creates vast landscapes that are between rural and urban and mark entire regions of the Ethiopian highlands, the Lake Victoria basin, south-eastern Nigeria and the lower Nile valley.

Land scarcity remains a real problem at the national level in countries such as Rwanda and Burundi, where the entire national territory is becoming saturated. Here, urbanisation and agriculture are in competition for scarce resources, which in certain cases is further heightened by the conservation of natural areas for the protection of wild flora and fauna. These territories lock up considerable cultivable areas in countries like Botswana, Côte d'Ivoire, Kenya, Malawi, Namibia, South Africa, Tanzania, Togo and Uganda, increasing 'real' population densities (Table 3.3). Withdrawn from agriculture and urbanisation by political decision and not by natural constraint, these territories have a

Box 3.2
The Sahelian corridor

Table 3.2
Urbanisation in the Sahelian corridor, 2015

Area (km²)	3 000 000
Urban population (inhab.)	69 242 923
Number of agglomerations	1 289
Population of largest agglomeration (inhab.)	3 888 582
Average size of agglomerations (inhab.)	53 718
Average distance between agglomerations (km)	21.3

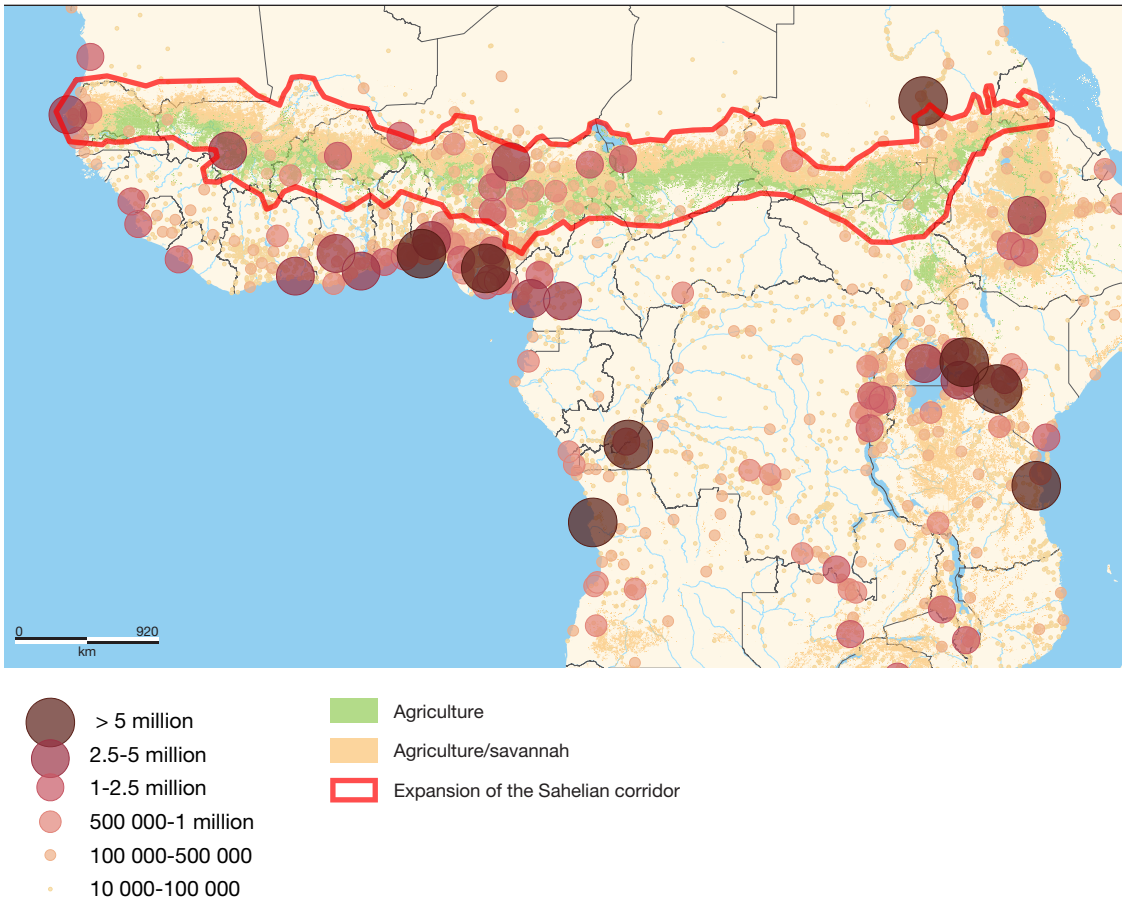
The Sahelian corridor runs from east to west, from Ethiopia and Sudan to Lake Chad and beyond in West Africa. Two main corridors are distinguishable:

- The northern band where the steppes and sub arid pseudo-steppes meet, but also open grassy savannahs. This is the space of breeders and their livestock.
- The southern band with its wooded savannahs, forests, shrubs and dense grasslands where rainfed agriculture dominates.

These two regions complement each other: trade between pastoralists and farming communities are regular and give rise to intense meridian (perpendicular) mobility. Conflicts over land use occur at the rhythm of the inter-annual rainfall variations and thus the advances and retreats of the grazing and cultivation zones. Sahelian rainfall patterns are characterised by its pronounced inter-annual variability. During droughts, herders move further south in search for pastures. After a few wet years, farmers tend to extend cultivated land to the north.

For centuries, the "Sahel" or "shore" has had its ports—its doors to the desert—on the trading roads to the north. In Mauritania, Mali, Niger, Chad, Sudan and the Red Sea, these caravan routes structured trans-Saharan trade, creating urban centres and destroying agro-pastoral communities. The Sahelian corridor crosses 18 countries in West, Central and Eastern Africa: from west to east, Gambia, Senegal, Mauritania, Mali, Burkina Faso, Ghana, Togo, Benin, Niger, Nigeria, Cameroon, Chad, South Sudan, Sudan, Ethiopia and Eritrea. It is 6 000 kilometres long and 500 kilometres wide and covers an area of 3 million square kilometres. Its centre is not a "point" but a "line" to the north. Here, the vegetation cover becomes less dense, in parallel with the density of inhabitants, fields, herds and agglomerations. Moving south, sparse shrubs become trees; they grow more and more densely, then become forest. Agro-pastoral practices give way to agroforestry. Rural densities drop markedly, agglomerations are rare, and the urban constellation is less dense. The population of the Sahel corridor is still predominantly rural although urbanisation is progressing rapidly. In 2015, the corridor had 1 289 agglomerations with more than 10 000 inhabitants (70 million inhabitants). The largest agglomeration is Kano in Nigeria, with 3.9 million inhabitants. Kano is located at the intersection of the Lake Chad basin (more than 4 million square kilometres) and the Niger River basin (more than 4 million square kilometres). It is also a junction of roads towards the north, to Agadez, Tassili, Aïr, and roads to the south to lower Niger and the Gulf of Guinea coast. Kano, centre of the Hausa land, was a regional hub well before colonisation. The other major agglomerations are located in the western half of the corridor: Dakar (3.1 million inhabitants), at the most western end and Bamako (2.8 million inhabitants) on the Upper Niger. Both are colonial creations that numbered little more than 10 000 inhabitants a century ago, before becoming the capitals of Senegal and Mali. To the east, from Kano to the Red Sea (3 300 kilometres), the main cities in the region are N'Djamena (1.3 million inhabitants including Kousséri in Cameroon), Nyala (570 000 inhabitants) and Asmara (470 000) at the eastern end of the corridor.

Map 3.4
The Sahelian corridor

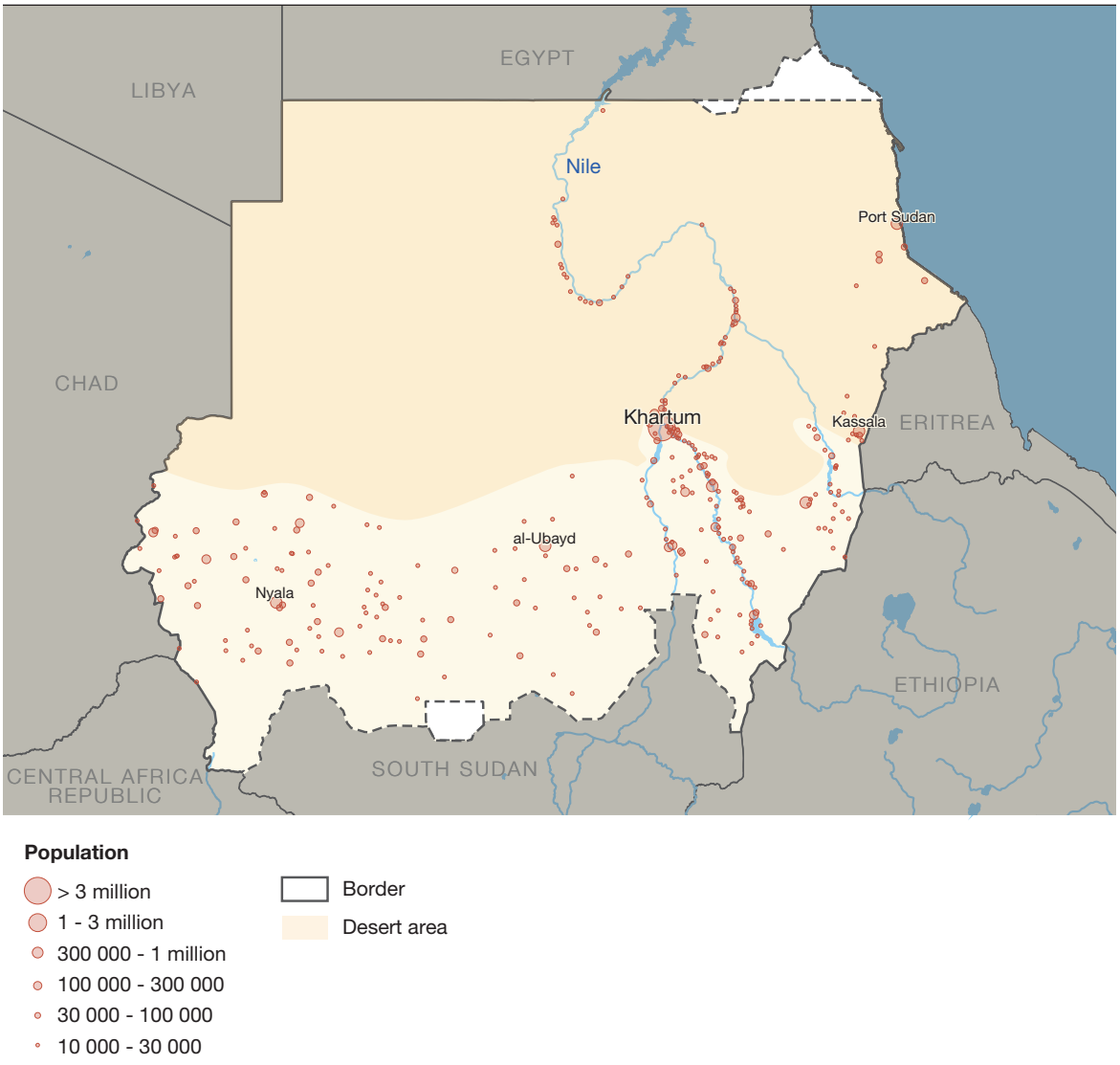


Sources: OECD/SWAC 2018; Geopolis 2018; European Commission 2003 - Map: Hervé Gazel

Here again, the influence of history is clearly visible. N'Djamena resulted from the French colonial rationale. The Italian colonial rationale was superimposed on that of the Sahelian corridor at Asmara which, at an altitude of 2 350 metres, also falls within the confines of the "Ethiopian settlement". Among the agglomerations of the now relatively dense urban network of the Sahelian corridor, there are also ancient secular trading centres of trans-Saharan slave trade networks such as al-Ubayd (360 000 inhabitants, and already numbering 40 000 in 1800).

Map 3.5

Distribution of agglomerations and extension of hyper-arid zones in Sudan, 2015



Note: Urban agglomerations are present only in the arable areas of the south. In the deserts (in yellow on the map), they line the Nile River and some piedmont (base of mountain) oases to the east.

Sources: OECD/SWAC 2018, Africapolis (database); Geopolis 2018 - Map: François Moriconi-Ébrard

fragile future. The forbidden status of land can be contested by populations in search of available land.

Between these two strategies (large-scale irrigation schemes or rainfall dependence), some countries favour community-managed micro-reservoir water projects that increase local agricultural production. These activities, which are more respectful of the environment and closer to local societies, encourage the persistence of populations in rural areas. The largest villages are quickly growing into small urban agglomerations according to a logic of in situ urbanisation. Urbanisation is born not of rural exodus, but of its absence.

Everywhere urban growth is strongly linked to the availability of water and land, as well as agricultural productivity. The African continent has considerable resource potential, the exploitation of which depends on the political will and the ability of societies to organise themselves. The main adaptation strategies are managed

Table 3.3

Apparent and real population density of certain African countries, 2015

	Land area (square kilometres)				
Country	**Total**	**Of which is bare soil**	**Inland water**	**Apparent density**	**Real density**
Egypt	987 360	903 366	8 561	92	1203
Rwanda	25 505	0	1 604	444	473
Djibouti	21 792	19 067	304	44	395
Burundi	26 857	0	1 971	364	393
Cabo Verde	4 255	1 379	469	124	219
Gambia	11 151	15	939	180	197
Uganda	243 233	4	37 433	148	175
Algeria	2 317 761	2 087 811	1 744	17	174
Malawi	119 473	124	24 373	135	170
Tunisia	155 651	89 037	838	71	169
Ethiopia	1 136 063	72 537	7 704	79	85
Libya	1 627 227	1 561 685	766	3	84
Erythrea	121 799	48 952	742	40	68
Tanzania	946 838	2 551	60 915	52	55
Niger	1 189 491	798 879	412	16	48
Sudan	1 854 608	981 912	4 734	21	44
Mali	1 259 401	700 409	3 851	14	32
Somalia	637 794	55 079	1 033	20	22
Chad	1 270 972	637 040	3 613	11	21
Mauritania	1 043 962	846 013	713	4	21

Notes: Surface waters include coastal areas, tidal flats, lakes, ponds and streams identified by remote sensing and included within the official boundaries of the national territory recognised by the United Nations (UN).

Sources: Geopolis 2018; OECD 2015

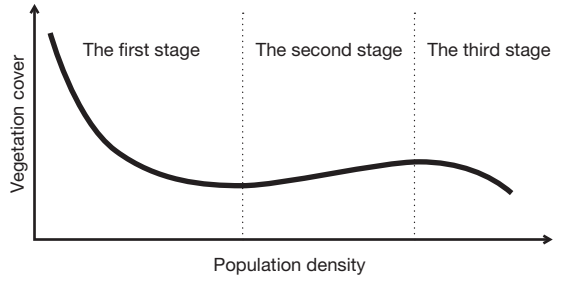
at three territorial scales, from large-scale national planning projects to local know-how and community projects. Each of these strategies generates the emergence of new urban agglomerations, under various conditions related to migration and financial and environmental costs. These differentiated forms of urbanisation in terms of population size, extension of built-up area or population density require a balancing of national and local interests.

Urbanisation and adaptation to the environment

Long before the advent of modern urban planning regulations, local communities preserved the most fertile lands that ensured the survival and development of populations. However, these practices were established at a time when the population of the Nile valley, from Khartoum to the Mediterranean, oscillated for centuries between 5 million and 12 million inhabitants. Are these modes of urban and agricultural occupation still sustainable today with a population that has grown 10 and even 20-fold?

Several positions challenge the ability of societies to ensure economic development sufficient enough for high population growth. Ester Boserup's work shows that increasing population density is a constraint that pushes societies to radically reorganise their modes of production and organisation; Malthus argued that the population of a country always increases faster than the production of the resources necessary for its sustenance. The term "space consumption" is primarily Malthusian. It involves the destruction of farmland and, today, the disappearance of natural ecosystems. However, many counterexamples exist. In the United States, Los Angeles was created in the semi-desert. Today, the extension of the agglomeration is described as sprawling, but urbanisation has been accompanied by an increase in vegetation cover at the

Figure 3.2
Relationship between density and vegetation cover



Source: Chao Li, Yaoqiu Kuang, Ningsheng Huang and Chao Zhang 2013

regional scale. Trees, parks, lawns and irrigated agriculture have grown in correlation with urban growth so that the area is greener than when there were no cities. Similarly, in China, research shows that the impact of anthropogenic pressure on green cover does not follow a linear relationship. This relationship would be positive or negative depending on the population density following an inverted n-shaped curve (Figure 3.2).

The Egyptian case illustrates this example. As early as 1990, Cairo had as many inhabitants as Egypt in 1900. The areas of the Nile delta and valley are the most fertile and therefore have the highest rural densities. Population and urban growth were expected to destroy agricultural land, however, the cultivated areas of Egypt and Sudan did not regress (Image 3.2). On the contrary, they increased while at the same time being more water-efficient than traditional irrigation techniques. Nowadays, reclamation of desert land is possible through the introduction of advanced technologies. However, they are extremely costly in capital and require a skilled workforce, which profoundly transforms rural societies and marginalises traditional agriculture. Urbanisation is not necessarily incompatible with either increased agricultural production, or an unreasonable consumption of water resources, or even with decreasing vegetation. Although development patterns raise new problems, urbanisation can and should serve as a lever for the modernisation of production methods and deep political and social reorganisations.

Image 3.2
Chain of agglomerations along the Atbara desert region in northern Sudan

Sources: *Google Earth* (accessed April 2018); OECD/SWAC 2018, Africapolis (database); Geopolis 2018

This is also true for the arid regions of Africa, where urbanisation does not necessarily destroy agricultural lands and green spaces but can instead increase them. In the Sahel, the green spots in the yellow immensity of the steppes make it possible to pinpoint the location of villages and cities on satellite images. The spatial footprint of agglomerations is surrounded by family farming production, which contrasts with the aridity of the surrounding area. In these highly localised cases, but repeated across millions of square kilometres, African "towns" do not consume

agricultural land but contribute to photosynthesis where previously only dry vegetation unfit for human consumption used to grow. The population density of these agglomerations is relatively high (between 3 500 and 6 000 inhabitants per square kilometre).

At the continental scale, the Nile Valley can be described as a super oasis. Local populations have conserved irrigable land by building their homes and necropolises, as much as possible, on the uncultivated edges of the desert for millennia. Driven by population growth, this practice is reflected today in urbanisation that takes the form of chains of agglomerations, from Khartoum to the Mediterranean (Image 3.2). These practices also prevail in the Limpopo Valley (Mozambique), the Senegal River (Senegal and Mauritania), and more generally along the *mayo* and *wadis* of the southern Sahelian borders (Chad, northern Cameroon, Nigeria, Morocco) and Somalia. These agglomerations along the desert border, consume land which in any case was uncultivable.

Interactions sometimes develop between political factors, the environment and forms of settlement. Thus, in Egypt, the desert is not only uninhabitable "naturally", but placed under the ownership of the army. As such, it is declared off-limits to settlement by policy and can be closed to circulation in wartime (as with Israel). This prohibition is gradually being lifted on the outskirts of the cultivable lands of the Nile valley, with their release to the market generating tremendous financial resources for the military.

Order or chaos? Scalar dimensions of urbanisation

The study of Rwanda's local urbanisation processes reveals a local strategy of environmental adaptation that is extremely rational and orderly. The use of space, circulation and preservation of agricultural land as well as natural areas are optimised at the local level. However, at the regional level, this policy generates the emergence of large agglomerations that may seem chaotic. This contradiction illustrates the need to understand the scalar dimensions of the urban reality and the articulation of the levels of organisation of the territory. The population of the country increased from 2 to 11.3 million inhabitants between 1950 and 2015. At the beginning of the 21st century, the rural density became such that, guided by a linear attractor, hundreds of "street-villages" joined together, forming strings of agglomerations. The Rwandan government has protected vast areas of land (2 600 square kilometres) to protect the last natural reserves of flora and fauna (Map 3.6). As a result, the actual density of the country (calculated by subtracting the areas under protection from urbanisation) is even higher than the apparent density, which is already 444 inhabitants per square kilometre. When the habitable territory is reduced to 21 300 square kilometres, it has an average density of 531 inhabitants per square kilometre (Table 3.4).

The basic unit is called a *hill* and not *village*, as in Burundi. Locally the use of land is determined by the qualities and natural constraints of topography, soils, drainage, etc. This rationale is local. Dependent almost exclusively on agriculture, Rwandans opt for a linear settlement along the ridgelines (Images 3.3 and 3.4). Mobility and constructions occur at the top of the interfluves, on the watershed between two sides, reserving the top of the slopes for food crops, the bottom for cash crops (tea, banana) and any flat valley for irrigated crops. The linear form favours trade between hills.

Rwandan urbanisation illustrates the collision between the local and regional scales. In a context of high population growth, this linear settlement system generates a particular urban form. As the number of households increase new homes are built and the agglomerations lengthen disproportionately. The hills end up interconnecting whole massifs. The agglomerations that develop through such merging quickly exceed 10 000 inhabitants. In contrast to African regions characterised by grouped settlements, there is a deficit of agglomerations of less than 20 000 inhabitants. Although, these Rwandan agglomerations, emerging from a rural context, are statistically urban according to Africapolis, raises the question of urbanity —or perceived "urban" character—of its population. The morphological origin of the urbanisation is fundamentally local. Yet, eventually the sprawl of agglomerations will lead to generalised urbanisation similar to that of Belgium and the plains of

Images 3.3 and 3.4

The spatial configuration of a hill in Rwanda

Note: The central track is lined with rectangular houses along its length. The upper slopes are occupied by commercial plantations (tea, bananas) and the lower parts by food crops. The hill is surrounded by valleys with flat bottoms, damp and impregnated by alluvium. On the right, the population overflows toward the nearby hill. The habitat along the street is dense and continuous. There is no free space from one end to the other of the image, to the point that the new constructions must now be built on the second line, in particular the infrastructure (newer white roofs visible in the image). This pattern is multiplied by some 2 000 examples in Rwanda. It is also observed in neighbouring regions of Burundi, eastern DRC and Uganda.

Source: *Google Earth* (accessed November 2012), 60 ° inclined view.

Table 3.4

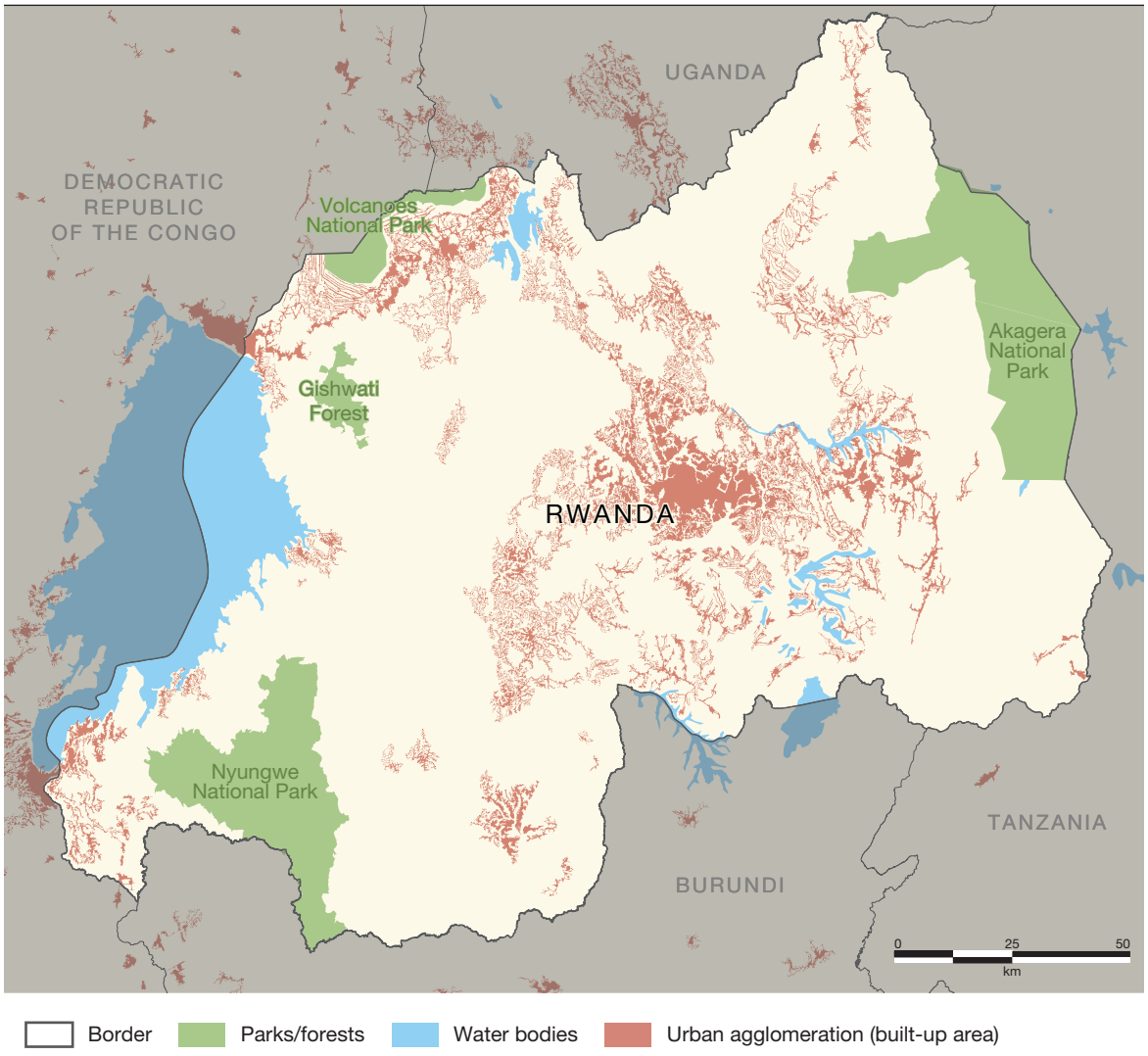
Territories in Rwanda

Type	Area in square kilometres	Source
Protected land	2 597	Land registry
Inland water bodies	1 604	FAO (*Waterbodies*), Land registry
Available land area	21 304	

Source: Informal calculations by SIG *Geokhoris*

Map 3.6

Agglomerations and protected areas in Rwanda



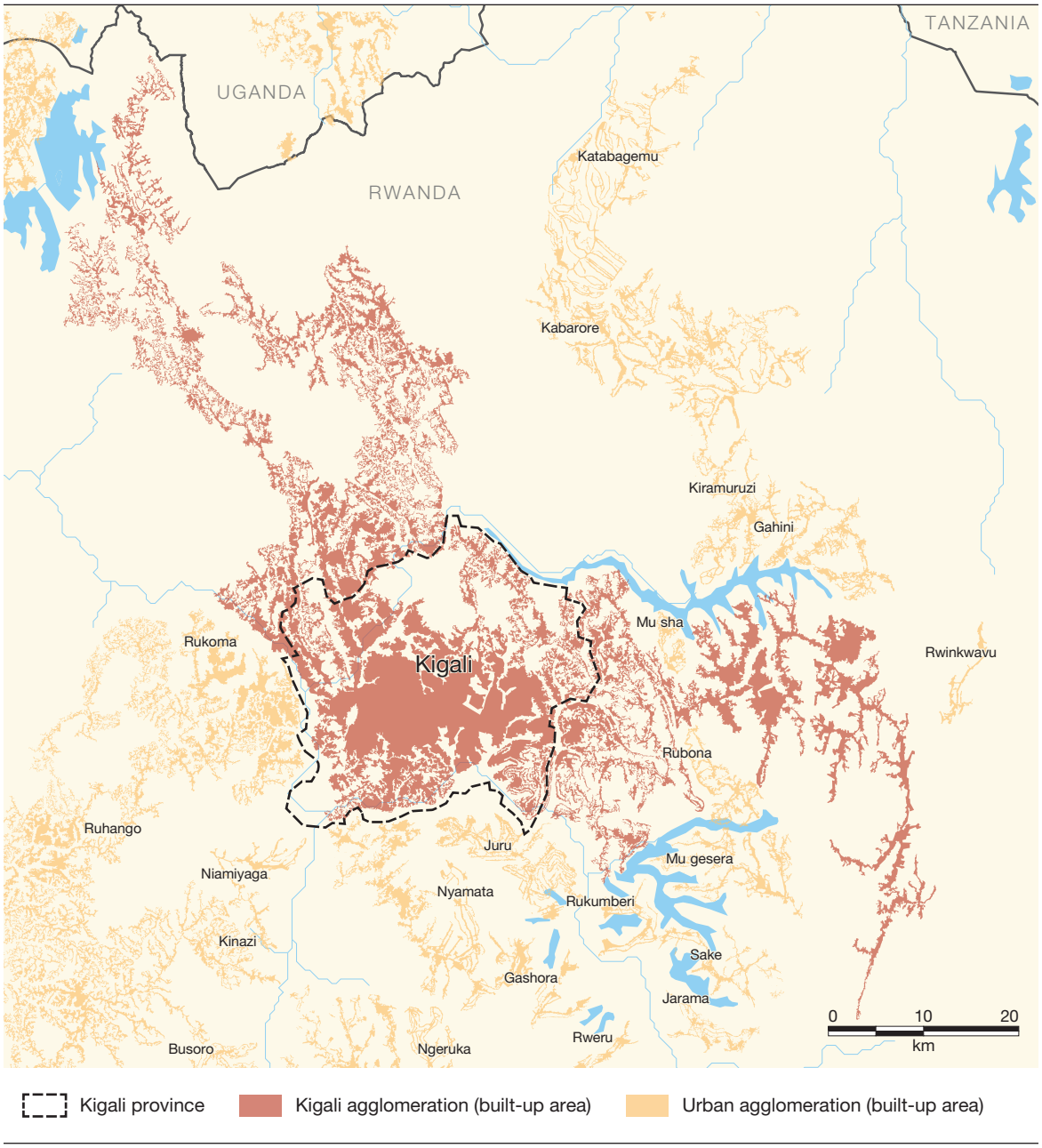
Sources: Food and Agriculture Organization (FAO); Government of Rwanda (land registry); OECD/SWAC 2018, Africapolis (database); Geopolis 2018; Map: François Moriconi-Ebrard

Southern Asia. Rwanda is another example of an African territory where the growth of agglomerations is not based on rural exodus. It is the decrease in rural out-migration, that maximises the risk of widespread urbanisation of the territory, especially when the national territory is small. The density of agglomerations, certainly lower than the African average, remains high. The population density of Kigali is 2 550 inhabitants per square kilometre.

The "chaotic" form of the urban footprint (Map 3.7) becomes understandable at the local scale. It shows post-urbanity emerging from a singular rurality that produces particularly rational forms of urbanisation in terms of "consumption" of agricultural land. Urbanisation that is observable and identifiable on the ground, precedes an urbanity that will manifest itself with the economic and social transformations linked to development. The dynamics of Rwandan urban forms have a clearly identifiable spatial characteristic (linear). When diagrammed, it is easy to understand how the country transitioned from a completely rural society in 1960, with no agglomeration of more than 10 000 inhabitants, to a country with a level of urbanisation of 56%.

Map 3.7

Spatial footprint of Kigali agglomeration and Kigali province



Sources: OECD/SWAC 2018, Africapolis (database); Geopolis 2018; - Map: François Moriconi-Ebrard

Until around 1990–2000, constructions rarely spilled over the high parts of hills in less dense areas, explaining one of the lowest urbanisation rates in the world at 5% in 1990.

LOCAL URBAN FORMS

Modelling urban growth requires an understanding of historical, political and environmental factors and their interactions. Settlement patterns linked to the environment are more easily modelled, in particular because they can be related to spatial attractors. These patterns or forms are closely linked to the organisation of local societies and, in the case of Rwanda, to a rational use of space and especially agricultural land. Spatial attractors thus result more from trends than mechanics, as illustrated by the adoption of a linear form along the hills of Rwanda. Spatial attractors illustrate the successful adaptation of societies to natural conditions and resources.

The main spatial attractors

Three types of spatial attractors coexist and explain grouped, linear and dispersed forms of population settlements (Table 3.5). They affect the size, density, shape and hierarchy of agglomerations. In modelling, these attractors can be represented by three basic geometric forms (point, line, surface) that guide locally the growth of an agglomeration. Modelling these three forms makes it possible to predict and anticipate the growth of urban agglomerations.

Grouped settlement

Grouped settlements are structured from a point attractor. A population positions itself in such a way to minimise its distance from the "centre" point. Each centre tends to bring together, on a minimal area, all forms of public and private power, services, transport connections, shops, and housing. At the regional scale, the grouped settlement is made up of a network of dense settlements separated by agricultural areas devoid of any dwelling. This type of settlement characterises all Sahelian and Sudanian zones, but also other regions such as the Tanzania-Mozambique border or southern Côte d'Ivoire. They can be spontaneous or planned and the general shape of villages is spontaneously circular. When there is planning, the settlement may adopt a checkerboard plan. The built environment is compact, the road area is narrow and unoccupied parcels in the centre of agglomerations are rare. The density of buildings frequently reaches 1 000 dwellings per square kilometre in small towns, creating an average population density of 6 000 to 8 000 inhabitants per square kilometre in towns.

Table 3.5

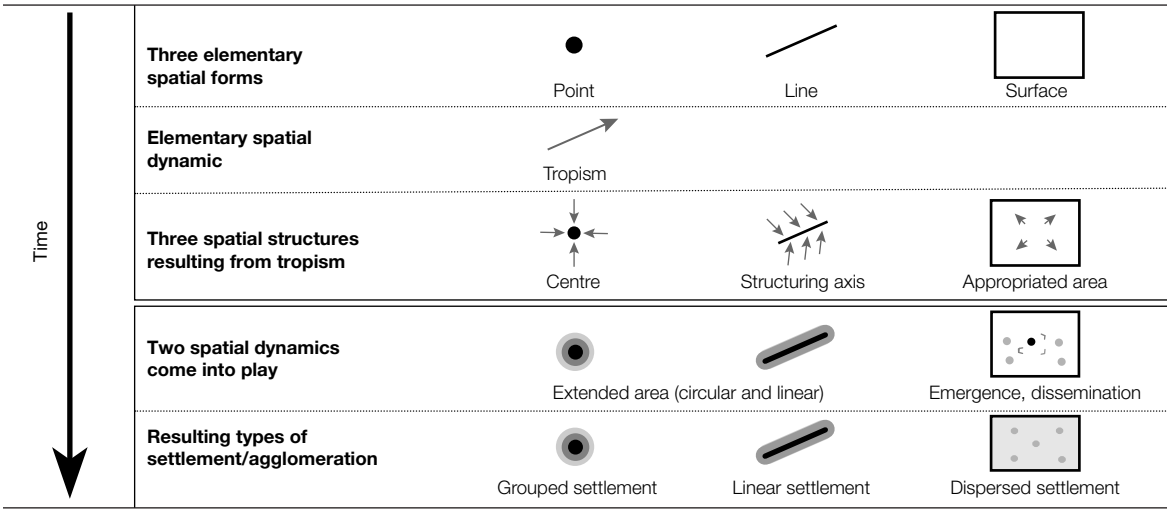
Spatial attractors and settlement distribution

Attractor	Geographic location and constraints	Examples
Point	Central (no spatial constraint)	Dan Kori (Niger)
	Marginal (with spatial constraint)	Dakar (Senegal) : Constraint grouped settlement
Line	Coastline	Alexandria (Egypt)
	Ridgeline	Ethiopia, Rwanda, Burundi
Surface	Bounded on edges	Virungu National Park
	No constraint	Nkwerre (Nigeria)

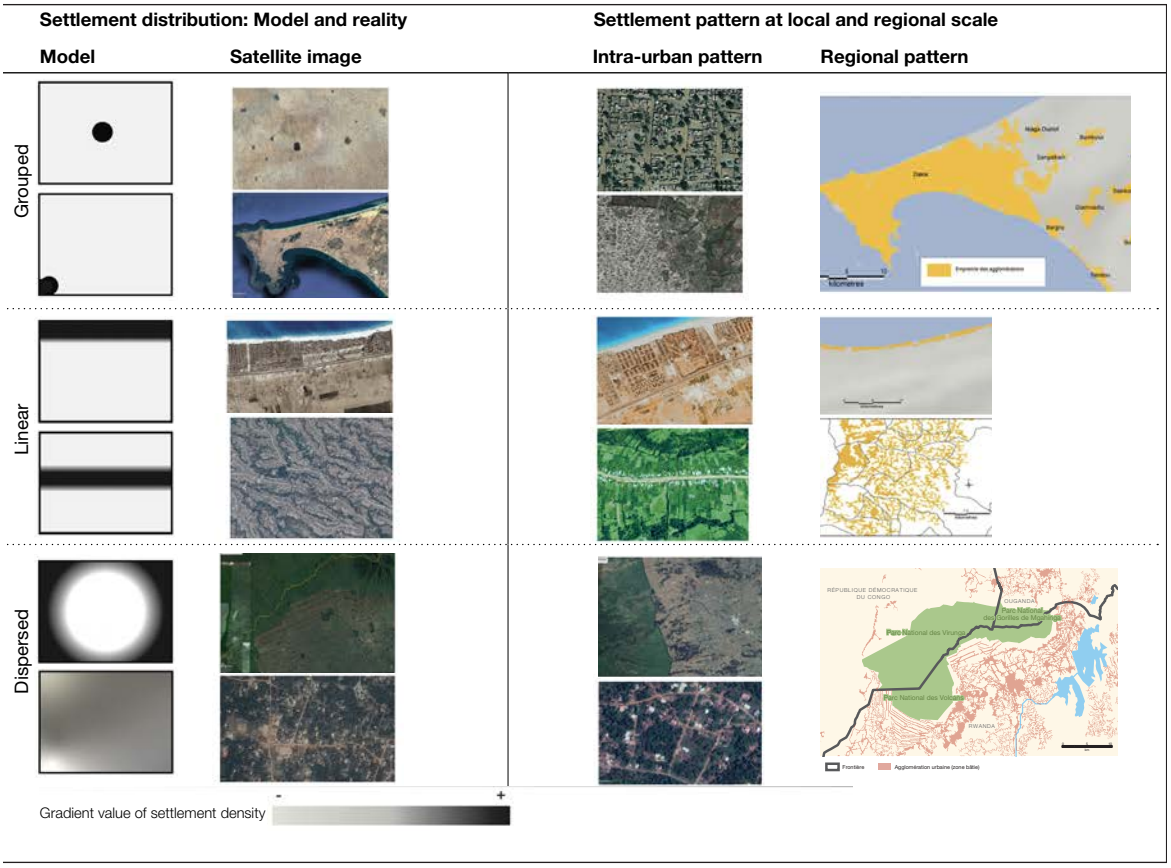
Sources: Geopolis 2018; Chatel 2012; *Google Earth*

Table 3.6

Examples of the evolution of spatial attractors



Sources: Geopolis 2018; Chatel 2012; *Google Earth*


Settlement distribution: Model and reality
Settlement pattern at local and regional scale
Model
Satellite image
Intra-urban pattern
Regional pattern
Grouped
Linear
Dispersed
Gradient value of settlement density
-
+

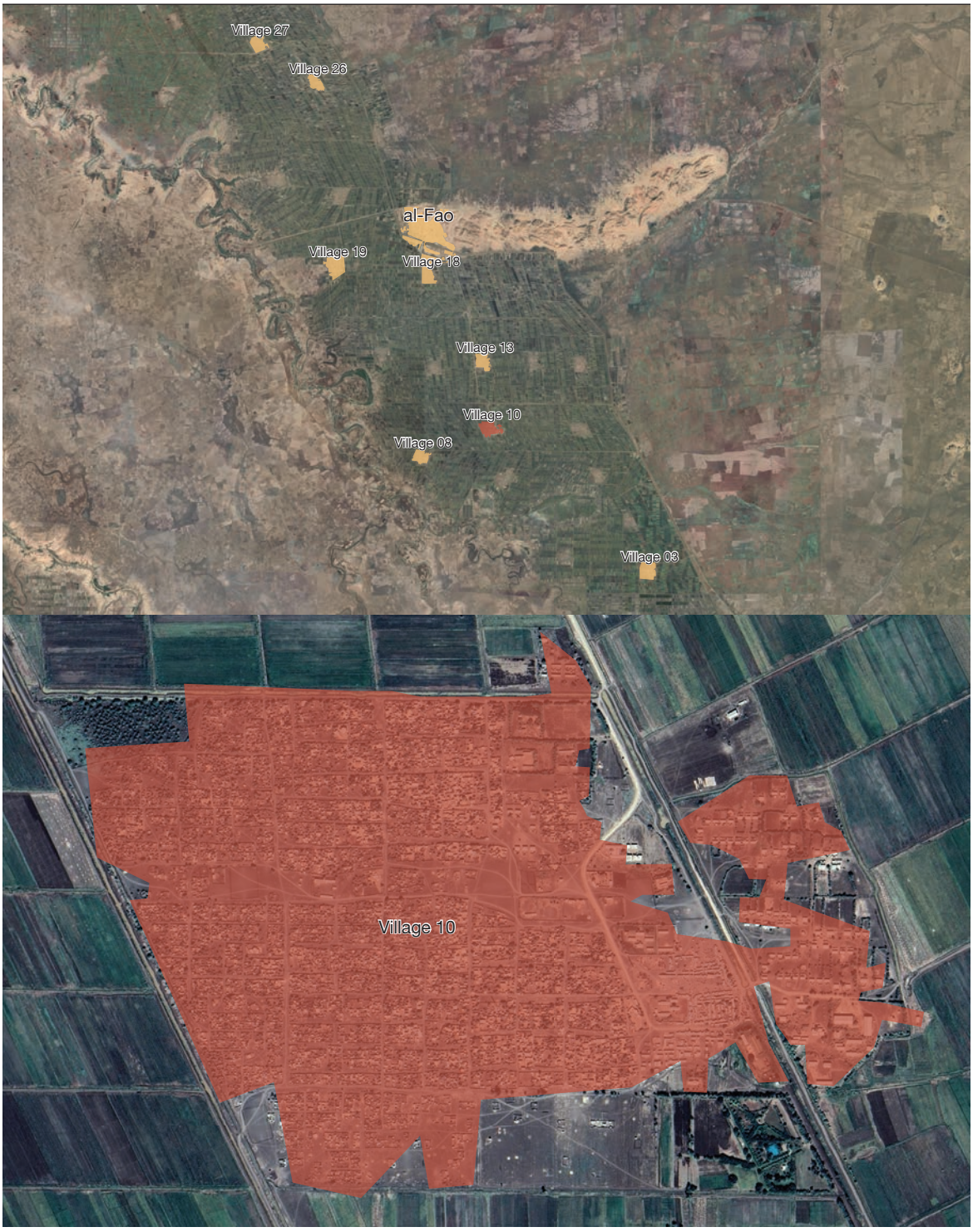
Planned grouped settlements

The example of the Rahad irrigation scheme in Sudan illustrates an urbanisation process through planned grouped settlements (Images 3.5 and 3.6). Within the irrigated perimeter, the villages (*qura*) are located in non-irrigated quadrants. The official place name is a number. The agricultural lands of the scheme are free from construction. Urbanisation is accompanied by an increase in cultivated areas. Constructions are tightly grouped producing very dense, spontaneous agglomerations. The road network inside agglomerations is not orthogonal, which contrasts with the geometry of the agricultural parcels (Image 3.6). Although, agricultural development is planned at the regional level of the scheme, land access at the level of each agglomeration is controlled by local customary bodies.

The built environment of agglomerations and villages inside the uncultivated quadrants does not emerge at the same speed in all villages. Temporarily vacant lots are used seasonally to store cotton. Of the approximately 40 villages within the Rahad irrigation scheme, eight exceeded 10 000 inhabitants in 2015, with populations ranging from 3 000 to 8 000 in the others. It is likely that in the mid-term, all will exceed 10 000 inhabitants. Although the agglomerations in the scheme are officially rural, they have major public services (schools and health) and infrastructure, the extension of the built environment is well planned, and each agglomeration is connected to the others by straight roads. Over time these agglomerations will grow into true "agro-cities".

Images 3.5 and 3.6

Grouped settlements in the south of the al-Rahad scheme, Sudan (general and detailed view)



Note: The extent of each agglomeration is superimposed in yellow on the image.

Sources: *Google Earth* (accessed December 2018), y=13.92, x=34.22, Alt 3 150m; OECD/SWAC 2018, Africapolis (database); Geopolis 2018

Table 3.7

Evolution of the number of agglomerations with more than 10 000 inhabitants in four Sahelian countries

Country	1960	1970	1980	1990	2000	2010	2015
Chad	4	9	14	25	37	77	92
Mauritania	0	4	7	15	12	20	22
Mali	5	14	18	24	41	79	93
Niger	4	6	10	24	37	48	67

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

Traditional spontaneous grouped settlements

In the arid regions of the Sahel such as around Dan Kori (Niger), settlements are tightly grouped (Images 3.7 and 3.8). In this type of settlement, there are no dwellings outside of villages, and no linearisation of construction along access roads. Land, without access to water, has value only because its agro-pastoral use is extensive and collective. The only residential strategy possible is to live closer to the centre of the town.

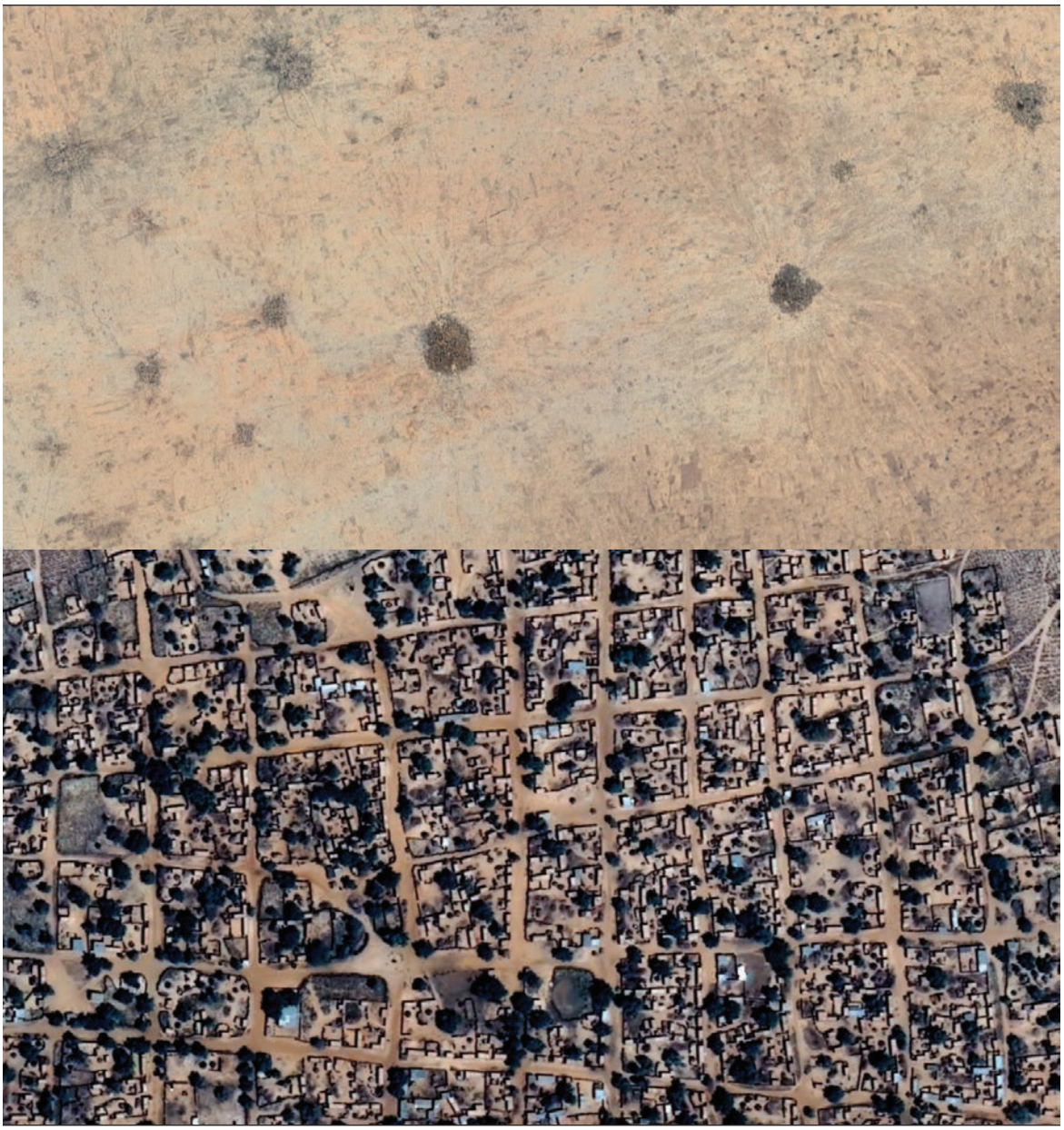
Separated by agricultural land or cattle rangelands, agglomerations are unlikely to merge with one another unless regional population density increases spectacularly, or centres are initially very close to one another. Population growth prompts a proliferation of small towns, with larger villages growing to reach a critical threshold leading to "urban" reclassification. Grouped settlements lead to an only moderate increase in the average size of the agglomerations of the entire urban system, as the latter is constantly fed by new small towns at the bottom of the urban hierarchy. Sahelian countries, dominated by this form of settlement, have thus seen the number of agglomerations increase at an exponential rate (Table 3.7). Different types of settlements may coexist in the same country. The frequency of grouped settlements within a country explains the large number of small agglomerations as seen, for example, in northern Nigeria, Burkina Faso and Sudan.

Dense developments on the outskirts of large agglomerations

The extension of existing agglomerations, driven by the natural population growth of cities, does not necessarily involve the inclusion of inhabited rural areas. They can follow the logic of dense grouped settlements. Images 3.9 and 3.10 show the planned district south of Bloemfontein (South Africa). The population density is roughly equivalent to the existing agglomeration and the housing development of previously free land takes place within a very short time.

Images 3.7 and 3.8

Traditional grouped settlement in Dan Kori, Niger (general and detailed view)



Note: The dark spots in the first image correspond to villages in the middle of the steppe.

Source: *Google Earth* (accessed May 2017), y = 13.91, x = 7.97, Alt. 17,020 m (Image 3.7) and 485 metres (Image 3.8).

Images 3.9 and 3.10

Planned urban sprawl to the south of Bloemfontein, South Africa

Note: The emergence of a planned neighbourhood south of Bloemfontein in South Africa between 2000 and 2018. The two images show the same area, at the same scale in 2000 (Image 3.9) and then in 2018 (Image 3.10). In 2018, the new neighbourhood is home to small rectangular houses, known colloquially as matchboxes, and agricultural lands have totally disappeared.

Source: *Google Earth*, y = -29,215, x = 26,235, Alt. 1600 metres

Linear settlement

A linear settlement is structured by a linear attractor. The attractor is ideally a line without width. It is characteristic of forest regions in Africa, but also in Russia, in historic areas of German-speaking Europe, and in Canada. A linear settlement begins when a road is cleared in a forest area followed by constructions appearing along it. Linear settlements are also widespread in irrigated regions, along canals and water-courses. They appear along the ridgelines of hilly and medium-sized mountainous regions (ex. Burundi, DRC, Rwanda and Uganda), in the valleys of high mountain regions and on the edges of deserts in hyper-arid zones.

Image 3.11

Resort towns to the West of Alexandria, Egypt

Note: The Egyptian coastline is completely appropriated and private beach ownership is allowed. Even in the absence of construction, access to the coast is only possible through public beaches which are rare. To the west of Alexandria, holiday villages and hotels are owned by wealthy people. The urbanisation of the coastline unfolds continuously over 100 kilometres. On the inland side of the coastal road, precarious and unorganised settlements house the families of hotel and service staff and other employees.

Source: *Google Earth* (accessed March 2016), y = 30.81 x = 29.13 Alt. 3 440 metres

The coast: A "genuine" linear attractor

A "genuine" linear attractor can be visualised as a line— for example, the Rwandan "hills" or a beach. In a seaside resort, there is a premium placed on being closer to the waterfront (Image 3.11). The shape of the agglomeration can become thicker further from the coastline, but (land) value decreases when moving away from the coast. In such agglomerations, the emergence of a centre is secondary and it does not necessarily alter land value patterns. On the contrary, some residents will prefer a location far from the centre, enjoying more calm and privacy.

Linearisation in clusters: The combination of linear and point attractors

The linear attractor can also manifest itself through a discontinuity of slopes, termed "piedmont" in geography. This process brings about the fusion of different urban or rural agglomerations, each of which retains its political identity. The example of Sawula in Ethiopia illustrates this case, which is also widespread in Africa (Map 3.8).

The city of Sawula (Ethiopia) has officially 43 000 inhabitants, but the agglomeration, which includes 13 villages between 730 and 10 000 inhabitants, has 83 000 inhabitants. The ensemble forms an alignment of boroughs with a built environment spread continuously over 19 kilometres, located at an altitude of 1 400 metres along a piedmont that is parallel to a 2 700-metre-high ridge. The piedmont is favourable to both agriculture, thanks to the flow of water coming from the mountain range, and to trade, due to the ease of communication along the lower slopes.

The adjoining administrative perimeters of the villages enhance the interface position of

the centre between the ridges and the base of the valley. The villages favour the local diversity of agricultural and pastoral production based on the natural climatic variation of cropping seasons, promoting a certain autarky of the local economy. The centre of each village is located at the exact inflection point of the slopes. Around this centre, each village agglomeration has grown to join that of the neighbouring village. The probability of coalescence between villages is maximised by the communal orientation perpendicular to the piedmont. This minimises the distance from village centre to village centre, which varies between 1 to 2 kilometres.

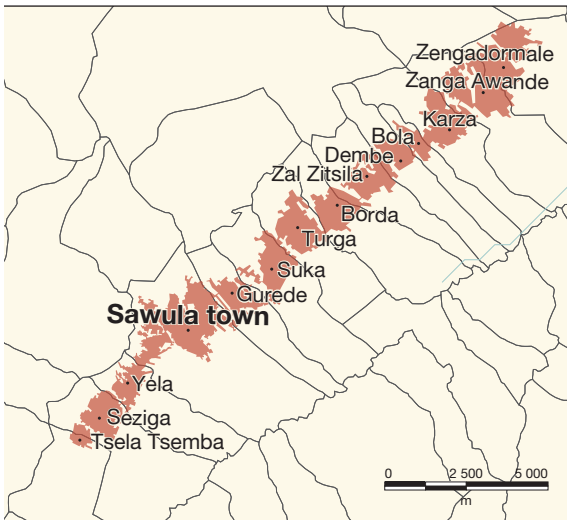
In this example, modelling urbanisation processes must be conceptualised at two scales. On a regional scale, the "piedmont" attractor is linear, highlighted by the alignment of each village centre. At the local level, however, there are point attractors, the centres of the settlements, which create clustered settlements. The interaction between these two scales produces a clustered urban form translating into the equal importance of the centres and links that connect them. In this process, urban growth happens in situ by subtracting villages from the "rural" category. The driving force of this process is the addition of village populations to the population of an official city, but without rural exodus.

Dispersed settlement

Dispersed settlements are characterised by the scattered distribution of households across isolated farms belonging to one family, or one extended family. This results in the emergence of spectacularly large agglomerations, albeit of relatively low density and a spatial structure with many undeveloped areas. This type of settlement is present in various regions of the world, from the ancient Celtic regions of Europe (northern Portugal, Galicia, Brittany and Ireland) to Kerala in India. In Africa, it exists from western Kenya to Ituri in the DRC, Bamileke country in Cameroon, and parts of Ethiopia. Dispersed settlements are structured around a surface attractor, which works in contrast to the point and linear attractors. The attractor is negative as each household seeks to maximise the distance from its neighbours. The objective is essentially to maximise the amount of space around the home. With population growth confined within a limited territory, new constructions emerge in increasingly smaller plots until the density reaches a critical point and the distance separating constructions falls below 200 metres, so that the whole territory is transformed into one agglomeration. This type of settlement can lead to one of the more chaotic forms of urbanisation due to a combination of available space, which is finite, coupled with constant population growth.

Map 3.8

The agglomeration of Sawula, Ethiopia: Linear attractor and in situ urbanisation



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

Image 3.12

Dense dispersed settlement near Nkwerre, Onitsha agglomeration, Nigeria,

Note: The landscape is a patchwork of construction interspersed with palm plantations, factories and various buildings. The unplanned road network consists of rural roads.

Source: *Google Earth*, (accessed March 2016), y = 5.75, x = 7.06, Alt. 1,700 metres

Absolute dispersion: "Countries without villages"

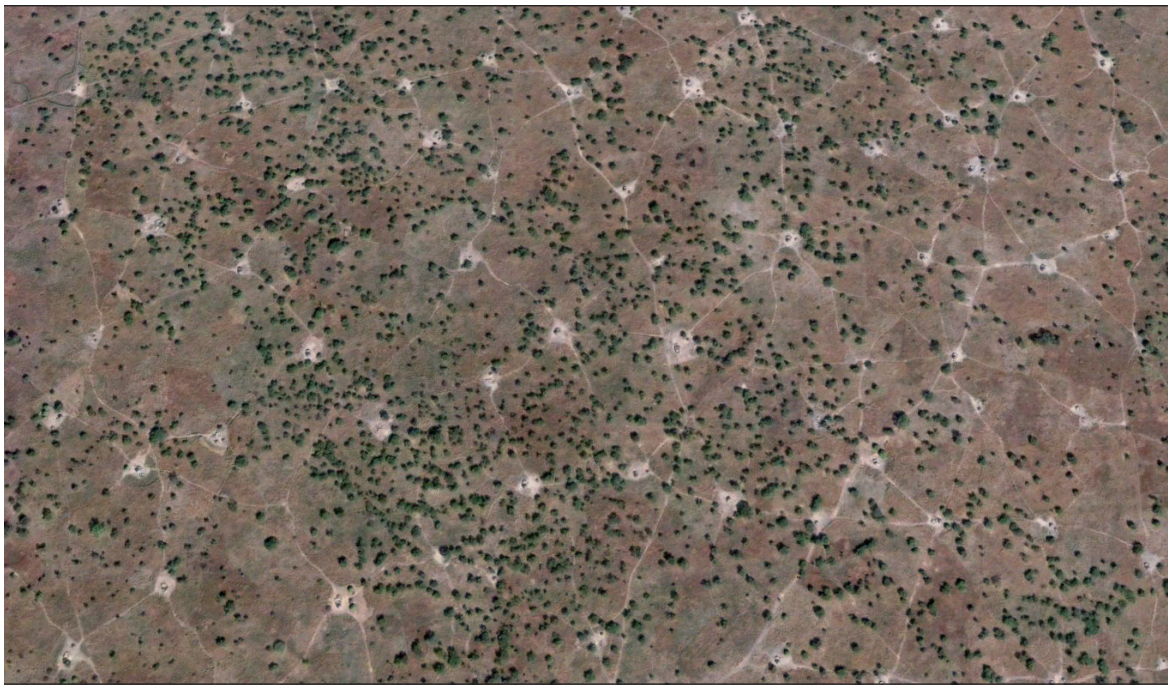
Southeastern Nigeria is one of the most spectacular examples of dispersed settlements (Image 3.12). This densely populated region was already described as a "country without a village" in 1962 (Larochte, 1962). Since then, the density has multiplied by a factor of four.

The population of urban agglomerations in southeastern Nigeria is systematically underestimated. According to the Africapolis definition, the agglomeration of Onitsha had a population of 8.5 million inhabitants in 2015, compared to only 1.1 million according to the World Urbanization Prospects (WUP). Similarly, Uyo has 2.3 million inhabitants according to Africapolis, but 1.1 million according to the WUP; Aba is estimated at 1.7 million people versus 0.94 million and Enugu 900 000 is estimated at inhabitants, compared to 680 000 (Table 4.2).

This type of agglomeration process that emerges from dispersed settlements makes it impossible to predict increases in the level of urbanisation via classic urban growth scenarios. However, morphological modelling, based on estimating density threshold values, can allow to simulate how this process transforms a territory from rural to urban.

Image 3.13

Detail of the interior of the Aduel agglomeration in South Sudan



Source: *Google Earth* (image from December 2003, accessed December 2003), x = 6.528, y = 29.841, Alt. 1 600 metres

Exogenously-limited dispersed settlements in refuge areas

The agglomeration of Aduel (South Sudan) with a population of 34 000 inhabitants stretched over 57 square kilometres in 2015, ranking it among the least dense agglomerations of the continent (Image 3.13). It is located on a slightly elevated plateau, in the middle of a swampy depression. This grouping of populations is a response to the insecurity that reigns in the country, which has been prey to civil war for several decades. The area has become a refuge for agro-pastoral populations who traditionally prefer dispersed settlements. Circumstance more than choice has led to this form of grouped settlement. However, the new inhabitants retain a habit of maximising the distance between them. Habitations are made of vegetable huts with tiny footprints. With the large size of households (more than 8 people), the population density is much higher than the number of buildings alone would indicate. The average distance between housings is 140 metres. Although, satisfying the Afriapolis agglomeration criteria, these cases clearly represent the limit of the concept of "urban" agglomeration: lack of permanent/solid construction and streets, large distances between constructions, an almost exclusively agro-pastoral local economy, a severe lack of infrastructure, etc. Nevertheless, on a regional and national scale, Aduel appears to be an actual agglomeration, in contrast with the deserted regions that surround it and is an example of a local adaptation strategy to political constraints at the national level.

Image 3.14

Endogenously-regulated dispersion in the west of Bloemfontein (South Africa)

Note: West of Bloemfontein City (South Africa). The neighbourhood is occupied by urban populations and was planned to host wealthy land owners.

Source: *Google Earth* (image from December 2003, accessed December 2016) y = -29.072, x = 26.120, Alt. 1 600 metres

Endogenously regulated dispersed settlements

Unlike in the previous case, some population groups voluntarily choose to adopt a scattered form of settlement. This type of urban evolution is said to be "endogenously-regulated". The objective is to maximise the distance to neighbours by occupying the largest possible property, but without going too far from the centre of an agglomeration. As a result, the dimensions of the properties are not excessive and are self-limited in the planning process (Image 3.14).

Box 3.3
The three settlement models in Rwandan legal definitions

Most political systems rely on traditional administrative divisions. Because of their close link with agriculture, they take into account the natural configurations of the environment, its resources and its constraints. They are based on an interaction between humans, history and nature. Thus, the notion of attractor allows us to model the urbanisation of Rwanda's linear rural settlements. The definitions adopted by the Rwandan administration capture the different types of settlement (RPHC4, 2012):

- umudugu: an old traditional settlement, that is to say, one located in the hills; dispersed habitat. Very rare in Rwanda but exists in the most rugged regions and in the east of the country;
- planned urban area:this is the settlement form underlying the political definition of urban of localities in Rwanda;
- akajari: spontaneous habitat or squatter settlement. The Rwandan State distinguishes this category, which does not conform to the well-organized traditional form of umudugu.

The three types of settlements are formed by attractors: linear ("umudugu"); dispersed settlement and the grouped settlement ("planned urban plan"), while the fourth is allogeneic and therefore without precise form.

Combinations of spatial attractors

The preceding examples demonstrate the decisive importance of the "spatial" factor for quantifying and anticipating urban growth. Each attractor optimises a function: control/appropriation of an area (point), movement (line), production (surface). These three functions are essential to the functioning of any society. However, their relative importance is more or less balanced depending on local context. Thus, in a region where movement is difficult, access to a road may be a dominant strategy, in a region where arable land is scarce, the appropriation of arable land is the key priority. These priorities can evolve over time, implying that they can also be reversed. The chronological order in which the different basic attractors have organised settlements, is therefore, as important as the scale to which they respond. There are an infinite number of possible combinations, of which only a few examples are presented here (Table 3.8). The interactions between the different levels of intervention that disrupt or accentuate trends in local population dynamics are key elements of modelling urbanisation dynamics. It is therefore essential to decipher each level in order to understand and to model urban logics.

Linearisation of a dispersed settlement

A dispersed settlement is generally dominated by a surface attractor. In areas of dispersed settlement, the superimposition of new roads within a maze of poor rural roads, introduces new settlement rationale that can produce new local dynamics. In the case of Kisii (Kenya), the construction of a new road is recent and has not yet had an impact on the settlement (Image 3.15).[2]

Star-shaped grouped settlement

Grouped settlements (around a point attractor) on land dominated by small-scale farming, illustrates land use competition between urbanisation and agriculture. In the case of Shashemene (Ethiopia), the spontaneous sprawl of the agglomeration takes the form of a star whose branches develop along the access roads (Map 3.9). The built-up area expands into the countryside and includes existing villages in a continuous fabric of construction. The spread of the agglomeration of Shashemene combines two conditions: the expansion of the original grouped centre in concentric circles and the linearisation along the access routes to the centre. The original compact shape thus tends to turn into a star. Shashemene was originally grouped and entirely contained within the administrative perimeter.

Image 3.15

Superimposition of a road axis in a sparsely populated area: the “C20” in the Kisii conurbation (Kenya)

Note: This image shows part of the Kisii agglomeration, one of the largest and least dense in Africa. The layout of the new main hard surfaced road was superimposed on pre-existing rural roads. The new road introduced a revolution in regional mobility. It is a valuable linear attractor for a large number of activities such as trade, food catering and other services (tires, mechanics, etc.). It risks introducing new dynamics in local settlement strategies. Unlike in the case of Rwanda’s “hills” or Egypt’s irrigation schemes, the linear attractor is introduced late into a fundamentally dispersed settlement.

Source: *Google Earth* (accessed June 2017), y = -0.57, x = 34.47. Alt. 1 230 metres

Image 3.16

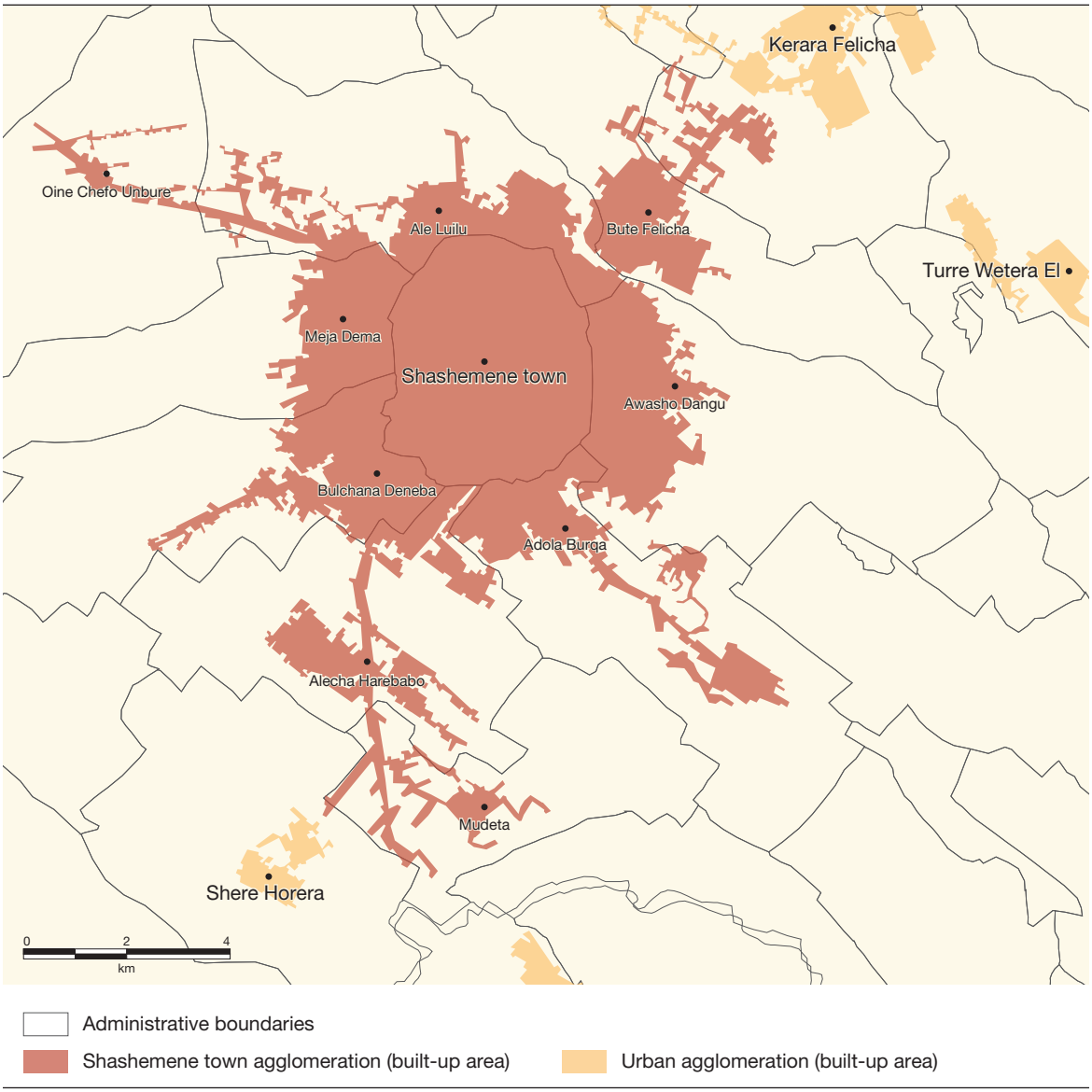
Combination of linear and grouped settlement in Balasfura, Egypt

Note: In this example, urbanisation emerges directly from a construction ban imposed on agricultural land in 1966. At that time, only 5% of the country’s land area was arable thanks to irrigation. Construction is thus (pushed) onto the dikes of the canals and the embankments of the roadsides.

Source: *Google Earth* (accessed September 2017), x = 26.529, y = 31.765, Alt. 6 140 metres

Map 3.9

An example of an urban "star" settlement: Shashemene (Ethiopia)



Note: In 2015, the city's official population was estimated at 148 000. However, the urban agglomeration extends beyond the administrative area of the city into ten adjacent rural communes, nine of which are considered agglomerated to Shashemene according to the Africapolis/Geopolis definition. The population of the entire agglomeration is estimated at 222 000 inhabitants.

Sources: OECD/SWAC 2018; Geopolis 2018 - Map: François Moriconi-Ébrard

Linearisation optimises access to the centre. This model of classical spatial growth, considered the archetype of urban sprawl, is relatively easy to predict and model.

Marginal linearisation: Urbanisation by default

This mixed settlement form frequently occurs whenever land is protected from construction for the public interest. These include national parks and natural areas set aside for conservation (Chapter 4), or agricultural lands, as in the case of Egypt (Image 3.16). Population growth combined with the scarcity of building land leads to extreme densification of constructions in a combination of grouped and linear forms. The construction ban is not "natural" but political. It gives rise to rather rectangular or square shapes,

due for example to the geometry of irrigated plots. This is another example of multiscale interaction: a political ban is instituted nationally to preserve land, while adaptation to this ban is a local response.

This example highlights two important points: first, the role of spatial scale in modelling and second, the irreversibility of urbanisation. This process is relatively easy to model, but only in theory because some effects are not predictable. For instance, in Egypt, the national law of 1966 banning construction on agricultural land is only loosely respected at the local level, for reasons of corruption and political patronage. These disturbances might be predictable at a micro level, but they become random and therefore unpredictable at any other scale. Contrary to the examples from other regions, where urbanisation is accompanied by a greening of the environment, here vegetation cover is destroyed.

Most settlement structures do not result from the influence of a single attractor, but from a combination of basic forms. It is this superposition of spatial attractors on a same territory that leads to the current logics of occupation.

Table 3.8 summarises in schematic and simplified form some basic structures and combinations, which coincide with the concrete examples presented previously.

What models of development for agglomerations?

Proposing observation tools adapted to spatial scales

To understand African urban dynamics and existing developments such as informal settlements or sustainable management, it is necessary to draw up an inventory of spaces and to have observation tools adapted to several spatial scales. The observations made based on the Africapolis database make it possible to propose modelling frameworks for urbanisation in Africa. These frameworks were developed using a methodology based on the deconstruction of urban phenomena in order to understand the sequencing and articulations between those logics, especially those of the natural environment and the organisation of society.

Taking into account the natural environment - orography, soil quality, rainfall, temperatures — is particularly important in societies dependent on agriculture and pastoralism. Technologies make it possible to overcome a number of environmental constraints — building dams, drainage, improvement and levelling of soils, pumping in deep layers, desalinisation of water. However, they have a high financial, social and environmental cost. As far as the organisation of societies is concerned, several logics are at work, and each one corresponds to a scale of action, which refers to actors of different spatial scope. This range extends from international institutions to local communities — neighbourhood, village — through various intermediate political levels — state, region, municipality — for the public sector, and from the multinational firm to the local entrepreneur concerning the private sector. A single scale rarely allows to model all dynamics observed, but it is common that one (of them) dominates.

The inclusion of different layers of interaction and activity, described by Africapolis through spatial dynamics, also includes various scales of political action, economic production, trade and financial flows. The analysis of the levers of urban phenomena and the modelling opportunities offered by spatial attractors are tools to be developed for the benefit of local and national entities, policy makers and partners.

Table 3.8

Combination of spatial attractors and settlement distribution

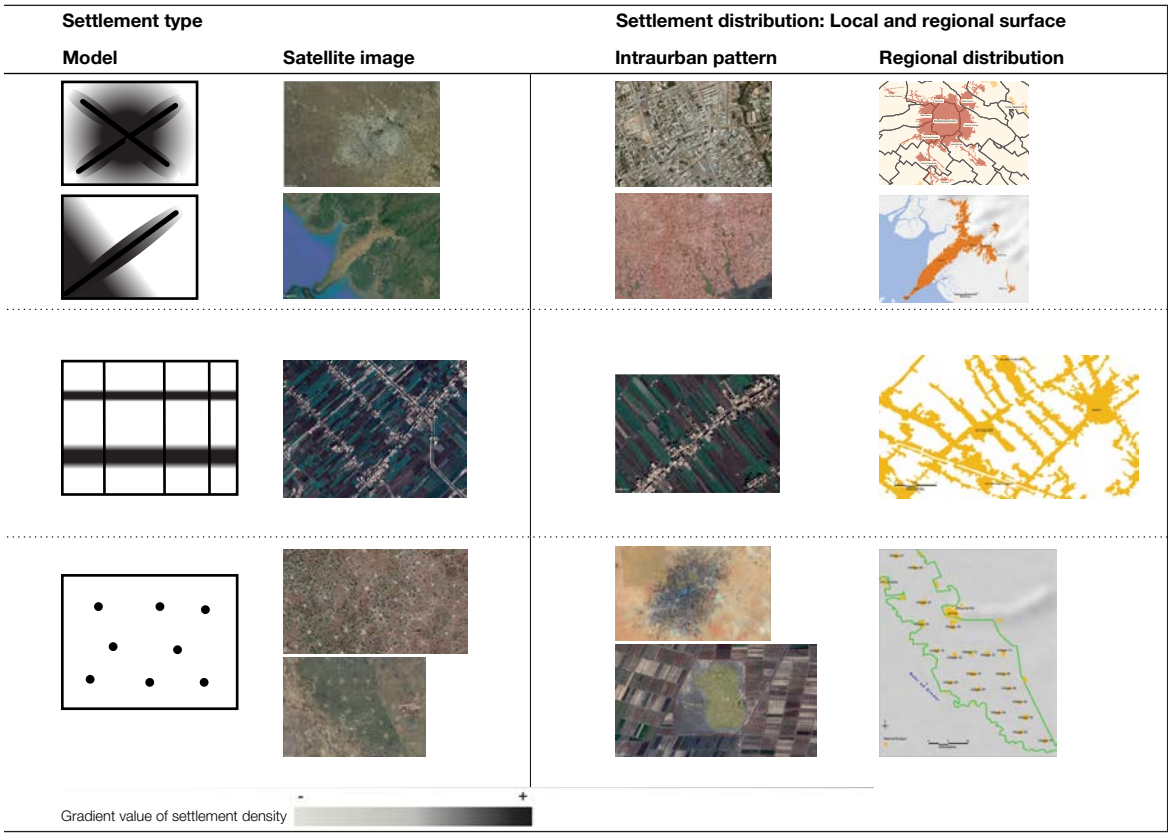
Attractor	Geographic situation	Examples
Point ●	Central (no spatial constraint)	Shashemene (Ethiopia): Star-shaped settlement
Line ／	Marginal (with spatial constraint)	Conakry (Guinea): Grouped settlement situated at an angle. Linear towards the interior
Line ／ Surface ▭	Rectangular or linear settlement structured around or against an area that is already appropriated/used for other purpose	Al-Bilîna (Egypt): Linear settlement pushed against edges of an agricultural plot
Surface ▭ Point ●	Settlement constraints: maximising distance from nearest neighborhood	Aduel (South Sudan) South of Al-Rahâd (Sudan)

Source: Geopolis 2018; Chatel 2012; *Google Earth*

Notes

1 The term “scheme” refers to agricultural development projects undertaken across large areas.

2 The Homa Bay-Rongo Road route was asphalted in 2015 as part of the upgrading of Homa Bay Airport and is therefore considered as a major national route.



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Chapter 4

Africa's new urban dynamics

This chapter explores the characteristics of large agglomerations and the variety of recent forms of urbanisation on the African continent. The hierarchy of national urban systems are characterised by the large size of metropoles relative to intermediary cities, and high primacy indices relative to the rest of the world.
New forms of urbanisation are appearing: the development of small and medium agglomerations forming large metropolitan regions, conurbations and mega-agglomerations. These agglomerations spread spontaneously in areas that are officially considered rural, though already densely populated, and notably in the interior of the continent. The evolution of metropoles into metropolitan regions has resulted in a redistribution of densities and the emergence of new intermediary urban centres with a new balance between inland and coastal urbanisation. The densification of territories weakens certain policies that protect natural areas (ex. national parks) as burgeoning peripheral urbanisation is seldom integrated into regional planning strategies. Driven by strong demographic growth, the densification of territories raises larger questions on urbanisation and its relation to the environment.

LARGER AGGLOMERATIONS AND NEW FORMS OF URBANISATION

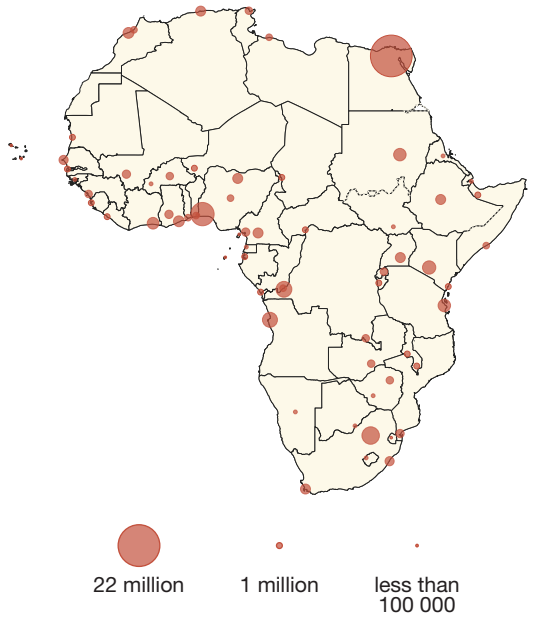
The large agglomerations that have emerged spontaneously in Africa are often not politically, and therefore statistically, recognised. Their urban processes and conditions are unique as they emerge in traditionally rural areas, where densities are now reaching a critical mass favouring widespread urbanisation. Africa's large agglomerations vary significantly in terms of their emergence, function and spatial imprint, and a better understanding of these factors is essential for anticipating economic, developmental and societal transformations. The spatial dimension is illustrated both at national and regional levels, both by discontinuities within national systems and by the emergence of metropolitan areas across borders. New urban forms, such as the emerging mega-agglomerations are distinct from more traditional patterns of urbanisation and creating an urban geography specific to Africa, its challenges and needs.

The dominance of national metropoles

Most African countries' urban networks are dominated by at least one metropole. In Angola, the population of the capital Luanda (7 million) equals the combined population of the next 27 largest agglomerations. In Sudan, Khartoum has as many inhabitants, 5.3 million, as the country's 248 smallest agglomerations combined (out of a total of 301 agglomerations). These metropoles, in some countries two (e.g. Burkina Faso, Congo, Ghana), or three agglomerations (South Africa), dominate national urban hierarchies. Their exceptional size reflects their dominant position as economic and political centres and their role as interface between the national and global levels. The disparity is therefore quantitative and qualitative.

Most of today's national metropoles have existed for long periods and many also served as colonial capitals. Yet, their demographic ascent really accelerated post-independence. The "metropolisation" process of a politically delimitated territory centred around a "mother-city" and coupled with strong demographic growth, translates into spectacular growth. Today, the size of the biggest cities may appear excessive, not in absolute size, but rather in terms of their relative size in relation to the entire urban

Map 4.1
National metropoles, 2015



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

system (macrocephaly), to the second largest city (primacy), or to a political territory (metropole). For instance, in countries with small total populations like Cabo Verde, Equatorial Guinea, Namibia and Sao Tome and Principe, national metropoles have fewer than one million inhabitants, yet their dominance on the national urban hierarchy is as pronounced.

Africapolis identifies 67 national metropoles, accounting for one-third of the total urban population (183 million) (Map 4.1). They account for an average of 51% of their countries' total national urban populations. In 10 countries, this share exceeds 66% of the total urban population, and more than 80% in Cabo Verde, Djibouti, Eswatini and Sao Tome and Principe. The metropolitan concentration tends to be higher in countries with small areas and population sizes and low levels of urbanisation. A notable exception is South Sudan with the lowest share of metropolitan population in Africa (11%). South Sudan gained independence only in 2008 and the political system remains fragile, providing little time for Juba to establish a dominant position within the urban system.

In countries with large urban populations and more developed urban networks, the relative weight of metropoles tends to be smaller and to decrease. This is the case for instance in Algeria, Egypt, Morocco and Nigeria. Also, countries with large urban populations can have more than one metropole. In South Africa, besides the huge industrial and mining conurbation of Johannesburg, the port cities of Durban and Cape Town are also important metropoles. In Nigeria, the two metropoles besides the former capital Lagos are Abuja and Kano. These metropoles correspond to three major historical settlement areas —Yoruba, Igbo and Haussa —and play a dominant role in the country's political structure. Two aspects characterise these metropolisation processes in Africa:

- Their systematic nature: only in a few countries the metropolitan primacy is low, for instance South Sudan;
- The magnitude of the imbalance between national metropolitan agglomerations and the most populous intermediary agglomerations: some of which are of key importance in their country, such as Bouaké (Côte d'Ivoire), Touba (Senegal), Lubumbashi (Democratic Republic of the Congo, DRC), Kitwe (Zambia), Lubango (Angola), etc. In monocephalic countries, the highest primacy is recorded in Liberia, where Monrovia is 21 time larger than Buchanan. Nine other national urban systems have a primacy of over ten. In bicephalous countries, the record is reached in the DRC, with Pointe-Noire, the country's second largest city, 9 times larger than Dolisie the third largest agglomeration. In tricephalic countries there is no exception.

Polycephalic urban systems

The importance of historical, political and geographic factors on the structure and hierarchy of national urban systems is evident in countries with polycephalic urban primacy. The existence of more than one urban agglomeration distinguished by their scale and significance can be attributed to characteristics of a political nature. In Cameroon and Congo, the second largest agglomerations are port cities (Douala and Point-Noire), while the national capitals are located in the interior of the country. In Zimbabwe,

Bulawayo is an important mining city; in Cabo Verde and Equatorial Guinea the particular geography—islands and mainland—supports the emergence of more than one primate city (Chapter 2).

However, over the long-term, the urban primacy of the largest cities seems to be increasing, tending towards a monocephalic structure, underlining the importance of policy and location of political power. In Burkina Faso, Bobo Dioulasso, situated at the end of a railway line connecting the landlocked territory to a port, used to be slightly larger than Ouagadougou. After independence the hierarchy changed and the primacy of Ouagadougou, the national capital, over Bobo-Dioulasso grew gradually and was 3.4 in 2015. Similar patterns are observed in Equatorial Guinea, with Bata overtaking Malabo; in Zimbabwe, Harare increases its lead over Bulawayo; in Cabo Verde, Praia over Mindelo. In some cases political decisions reduce potential competition with the largest agglomeration. In Côte d'Ivoire for instance, since the 1960s, Bouaké is by far the country's second largest city, yet when the political capital was moved to the interior of the country to increase its proximity to the total territory, it is Yamoussoukro and not Bouaké. Since then the primacy of Abidjan continues to grow. Touba, the second-largest agglomeration in Senegal, does not have an official status as urban.

Indicators and limits

The growth of an urban system is generally accompanied by a relative decrease in the weight of the metropolitan population. This decrease is not, however, reflected in the evolution of metropolitan primacy, since the primacy index connects the populations of two agglomerations (for example, the first and second cities), or two "parts" of the urban system, and not the whole system, the metropole and the total "urban population". Metropolitan primacy continues to increase in most African countries. In Côte d'Ivoire, while the share of the population of Abidjan within the total urban population decreased from 57% to 41% between 1960 and 2015, the primacy index rose from 4 to 9. This growing gap is explained by the less dynamic population growth of the country's second agglomeration, Bouaké, as compared to Abidjan.

The size of African metropoles is in many cases so disproportionate that it questions the significance of national urbanisation indicators. What does the level of urbanisation capture in a country where more than 50% of the urban population live in one agglomeration? In the Central African Republic for instance, besides the capital Bangui with almost 1 million inhabitants, there are only 30 other agglomerations with an average size of 30 000 inhabitants in a country the size of France. In more than 30 countries one single agglomeration makes up more than 1/3 of the total urban population and in 5 countries more than 2/3. Indicators such as the average size of agglomerations, average density and level of urbanisation are in many cases strongly biased by the national metropole.

Strong metropolitan primacy is in many cases the spatial equivalent of social inequality of power, wealth and status (J.R. Short, 2009). Demographic concentration translates into an even higher concentration in terms of economic, political and social power. In the least urbanised and least populated countries, the concentration of key services, infrastructure and political institutions can reach 100%. This dominance is particularly pronounced in monocephalic countries. The GDP per capita in Kinshasa is 50% above the national average (UNDP, 2017); Monrovia with 30% of the national population accounts for 80% of Liberia's GDP (Backiny-Yetna et al., 2012), in Mali, Bamako has GDP per capita of USD 1 550 compared to USD 490 nationally and the agglomeration accounts for 40% of the GDP with 12% of the population (World Bank, 2015). In Senegal, Dakar concentrates 60% of GDP and 83% of all formal enterprises[1]. In addition, countries with more balanced urban systems can show strong economic concentrations. In South Africa, Gauteng Province (including Johannesburg) shows a GDP per capita 50% above the national average and contributes 33% to the national GDP[2]. In Nigeria, Lagos has a GDP per capita 80% above the national average and 50% above the average for southern Nigeria (including Onitsha)[3].

Metropoles and intermediary agglomerations

In 2015, the agglomerations between 300 000 and 1 million inhabitants accounted for only 13% of the population of Africa, compared with 17% for metropolitan agglomerations. The dominance of national metropoles combined with the proliferation of small towns is explaining the relative weakness of intermediary cities. The stability of the growth of metropolises contrasts with the more irregular evolution of the population of intermediary agglomerations. Over the long term, and even for as short a period as the post-independence period, the trajectory of population growth in metropolitan agglomerations has been characterised by its persistence and relative regularity. However, the combined population of intermediary agglomerations is growing faster than that of metropoles. This is due to the fact that their number grows faster: four-fifths of the agglomerations identified in 2015 were villages or did not exist in 1960.

One of the consequences of these developments is that the main discontinuity of contemporary African settlement is not between "urban" and "rural", but between metropolises and intermediary urban agglomerations. The vast majority of urbanisation studies focus on large cities, whose population figures are the most—if not the only—accessible figures. Agglomerations with 500 000 inhabitants are thus considered as "small cities", whereas they are in the top 2% of agglomerations in the Africapolis database. A clear distinction between "metropolitan" and "intermediary" agglomerations and their documentation is crucial for urban strategies and policies and for the implementation of appropriate land use planning.

A new scale of African urbanisation: Metropolitan regions

When urbanisation is concentrated in certain regions, new settlement patterns emerge, such as metropolitan areas. These metropolitan areas form within concentrated regions and are composed of large agglomerations, as well as small and medium-sized agglomerations. The impression dominating metropolitan regions is that of urban sprawl. However, at a more local scale (for example, municipalities, districts or border areas), the regionalisation of urban dynamics reveals new forms of urban concentration that may have lower densities but show strong economic and social integration. These transformations and new urban forms highlight the rapid development of areas undergoing metropolisation and a decoupling from the rest of the territory.

The dynamics of metropolitan areas

As with "urban agglomerations", there is no standardised statistical definition of "metropolitan" regions or areas at the international level. In Africa, this notion officially appears only in South Africa with the metropolitan municipalities (MM), which are primarily political entities. Metropolitanised areas or 'regions'[4] are areas that extend beyond the boundaries of parent agglomerations, encompassing densely populated countryside, villages and intermediary agglomerations with a high degree of economic and social integration. The territory concerned is defined by the intensity of flows polarised around the centre of a large metropole or agglomeration. This functional integration can be measured from the flow data, especially travel to work commuting statistics. They are also supplemented by characteristics of attractiveness of the centre—number of jobs, shops, services and infrastructure. Due to the lack of data in Africa, the extent of a metropolitan area is approximated by density maps and population growth dynamics. Metropolitan regions are not only spaces dominated by a large urban centres, but areas where new small settlements are emerging such as dormitory towns (around capitals such as Lomé for example) and commercial and industrial hubs grafted to flows between the metropolitan agglomeration and the national hinterland (like Diamniadio situated 30 kilometres from Dakar). Their emergence is linked to the presence of large nearby agglomerations or an intermediate position between two major centres.

The emergence of metropolitan areas introduces two major changes in urbanisation:

- A process of flattening densities in metropolitan areas. In particular in areas midway from the centre of the metropolitan area

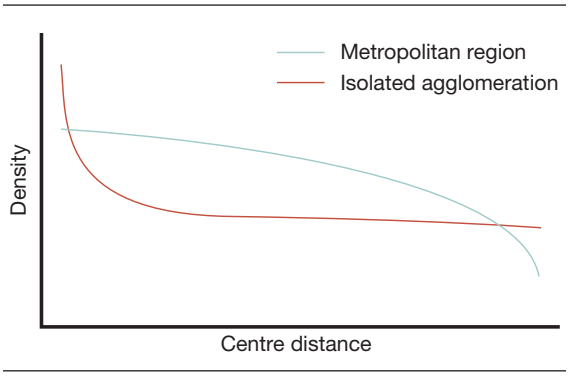
and between different urban nodes (Figure 4.1). This process illustrates the blurring of the boundary between "urban" and "rural" (Chapter 3) on a regional scale between the metropolitan area and the rest of the territory.

- New intermediary urban "centres" emerge within the region. From a certain scale onwards, agglomerations cease to function around a single centre. New, more accessible nodes appear on the peripheries, and even on the fringes of agglomerations ("edge" cities).

The transition from an agglomeration to a metropolitan region results in a redistribution of densities at the regional scale. The inclusion of peri-urban areas increases the population of a metropolis, but it also leads to a multiplying of its (surface) area. Extreme densities are lower and density gradients are shallower. However, the peripheries are relatively dense. Thus, in 2015 the population of the Ouagadougou agglomeration was estimated at 2.3 million inhabitants, covering an area of 400 square kilometres. Ouagadougou is situated in the Centre region, which roughly corresponds to the metropolitan region of Ouagadougou, which is both the smallest and the most populated region of Burkina Faso, covering 2 800 square kilometres and 2.5 million inhabitants. The peri-urban periphery thus adds about 200 000 inhabitants, including 3 agglomerations of more than 30 000 inhabitants, but crucially adds an additional 2 400 square kilometres, which has the effect of dividing the density by 6 compared to the agglomeration proper. The peri-urban area thus represent 8% of the population but 86% of the area of the "region" whose average density falls to 900 inhabitants per square kilometre.

A density of around 1 000 inhabitants per square kilometre represents the lower limit of many statistical or political definitions of "metropolitan region" in the world. It is comparable to Ile-de-France, the Comunidad de Madrid (Spain), Durban Metropolis (South Africa), the Metropolitan Region of Montreal (Canada), or Monterrey Metropolitana (Mexico). Densities fall abruptly outside of these metropolitan regions. Lower density automatically translates into a wider spatial spread with an influence on mobility and connectivity issues, such as transport and infrastructure, which need to be addressed by urban planning policies.

Figure 4.1
Density distribution: agglomeration vs. metropolitan area



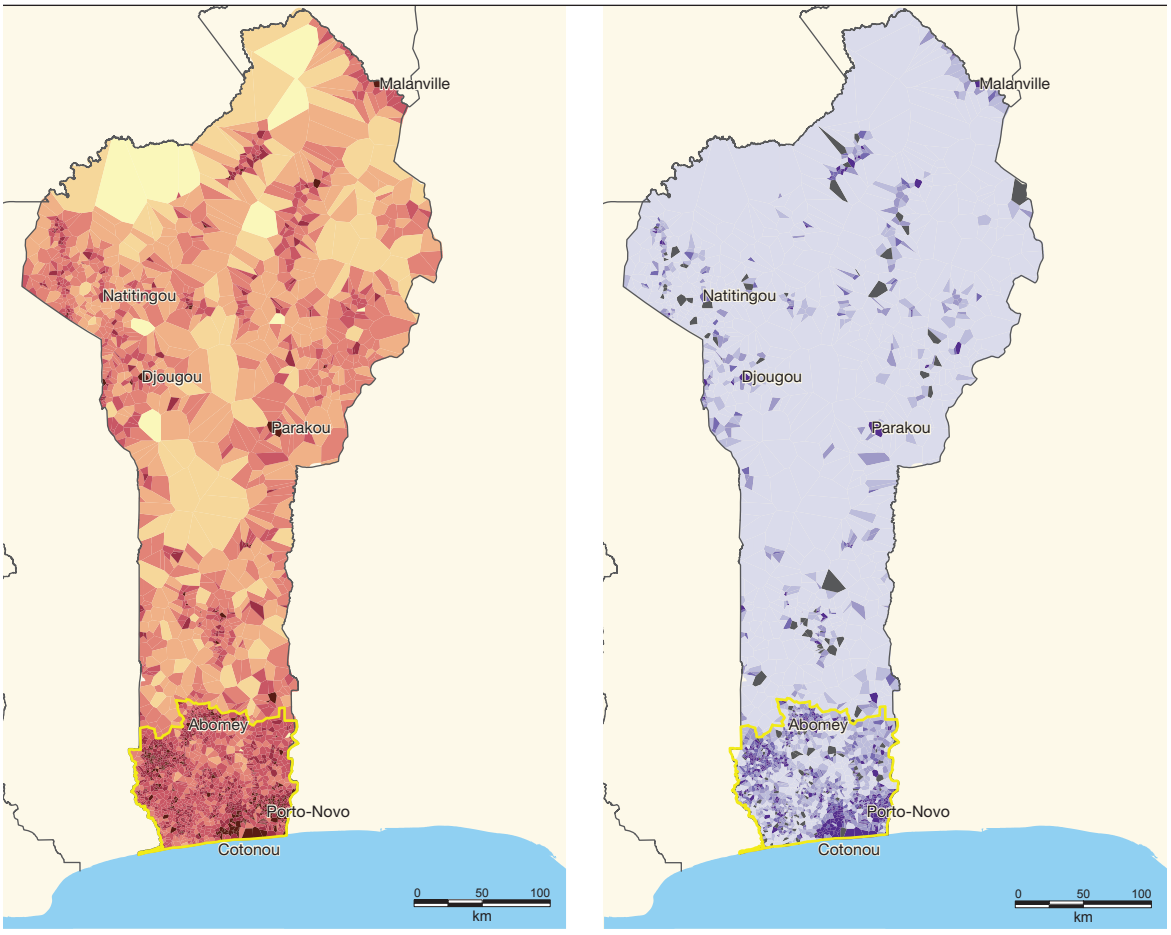
Territorial imbalances

The metropolitan area represents a new spatial scale of urbanisation. The development of regions that are linked by mobility and trade contrasts with even larger territories that are disconnected. This new trend raises the issue of spatial inequality in terms distribution of wealth across entire countries. In Benin, the primacy of Cotonou, the economic capital, over Porto-Novo, the political capital, is weak. However, these two agglomerations are located only separated by a few hundred metres of non-urbanised land (25 kilometres centre to centre). A true metropolitan area is developing between these two coastal poles and Abomey, the former capital, located less than 100 kilometres in the interior (Map 4.2). The whole region covers only 10% of the national territory but makes up 50% of the country's population. It accounts for most of the population growth and half of the country's intermediary agglomerations are located there. Two-thirds of the population already live in an agglomeration of more than 10 000 inhabitants, more than double the level of urbanisation of the rest of the country. The average distance between agglomerations is seven kilometres (Map 4.2).

Similar patterns are observed in Senegal, where the agglomerations of Dakar, Mbour, Touba and Kaolack account for most of the urban growth. The nine departments concerned

Map 4.2

Concentration of density and population growth in Benin, 2015



Population density inhab./km²
[Number of cells]

- > 1 000 [370]
- 316 - 1 000 [743]
- 100 - 316 [931]
- 31.6 - 100 [690]
- 10 - 31.6 [323]
- 3.16 - 10 [78]
- less than 316 [12]

Population growth 2000-15 inhab./km²
[Number of cells]

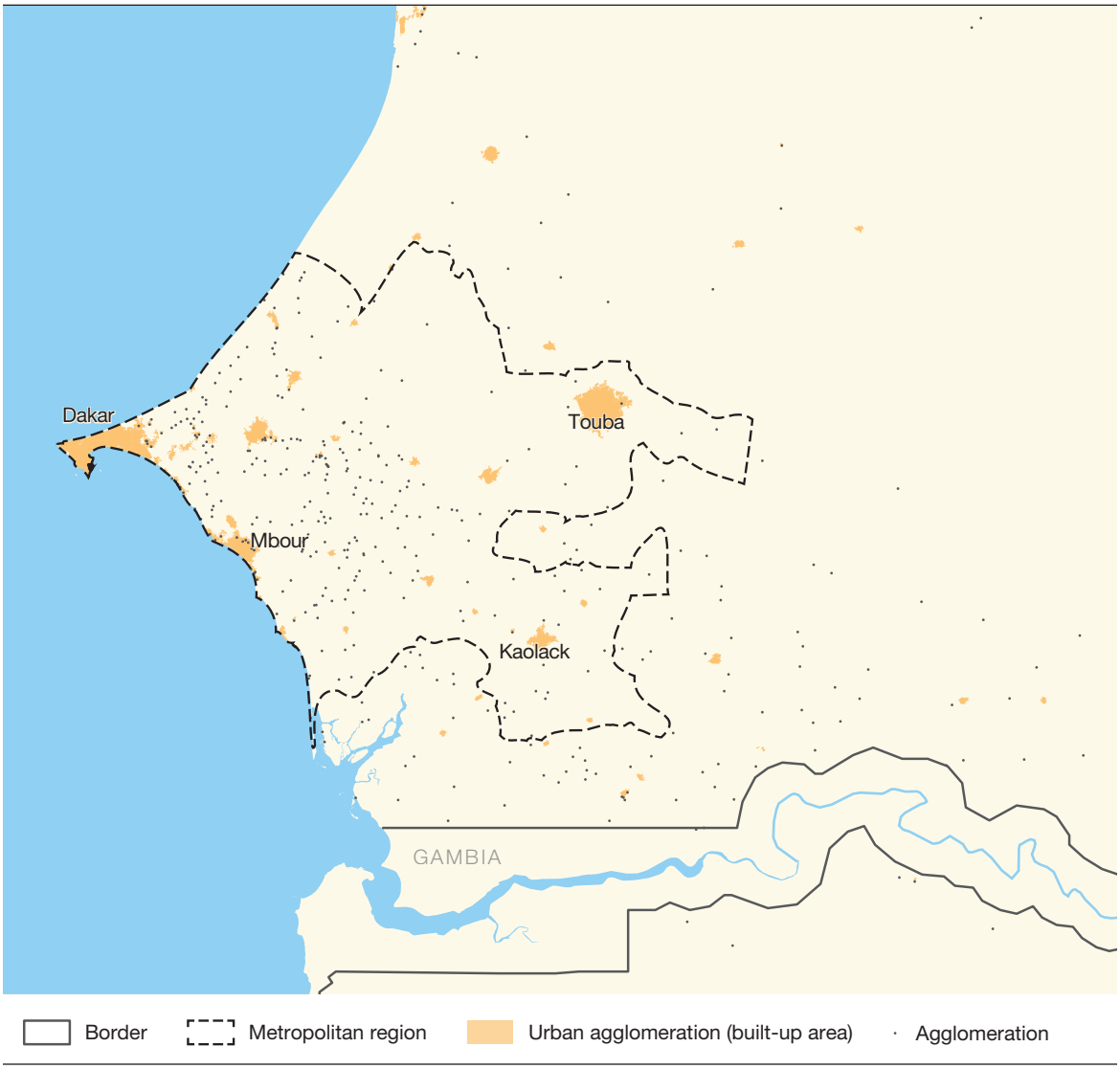
- 120 - 31 560 [493]
- 60-120 [381]
- 30-60 [466]
- 15-30 [489]
- 0-15 [1 175]
- Negative growth [144]

Source: Geopolis 2018 - Map: François Moriconi-Ebrard

(Bambey, Diourbel, M'Backé, M'Bour, Thiès, Fatick, Tivaouane, Guinguinéo and Kaolack) cover 17 000 square kilometres and brought together 7 million inhabitants in 2015, or 55% of the population on 9% of the territory (Map 4.3). In 1960, the proportion was reversed, with the rest of the country accounting for 55% of the population. In 2015, one-third of Senegal's urban agglomerations were located there, including the five most populated agglomerations in the country. The level of urbanisation is 73%, compared with 22% in the rest of the country (Map 4.3).

The concentration of urbanisation is even more striking in Gambia, where Banjul the capital with 33 000 inhabitants, is an isolated centre on a peninsula linked to the mainland by an 8 kilometres-long road (Map 4.4). Due to lack of space, urban growth took place at the other

Map 4.3
Extended metropolitan region of Senegal

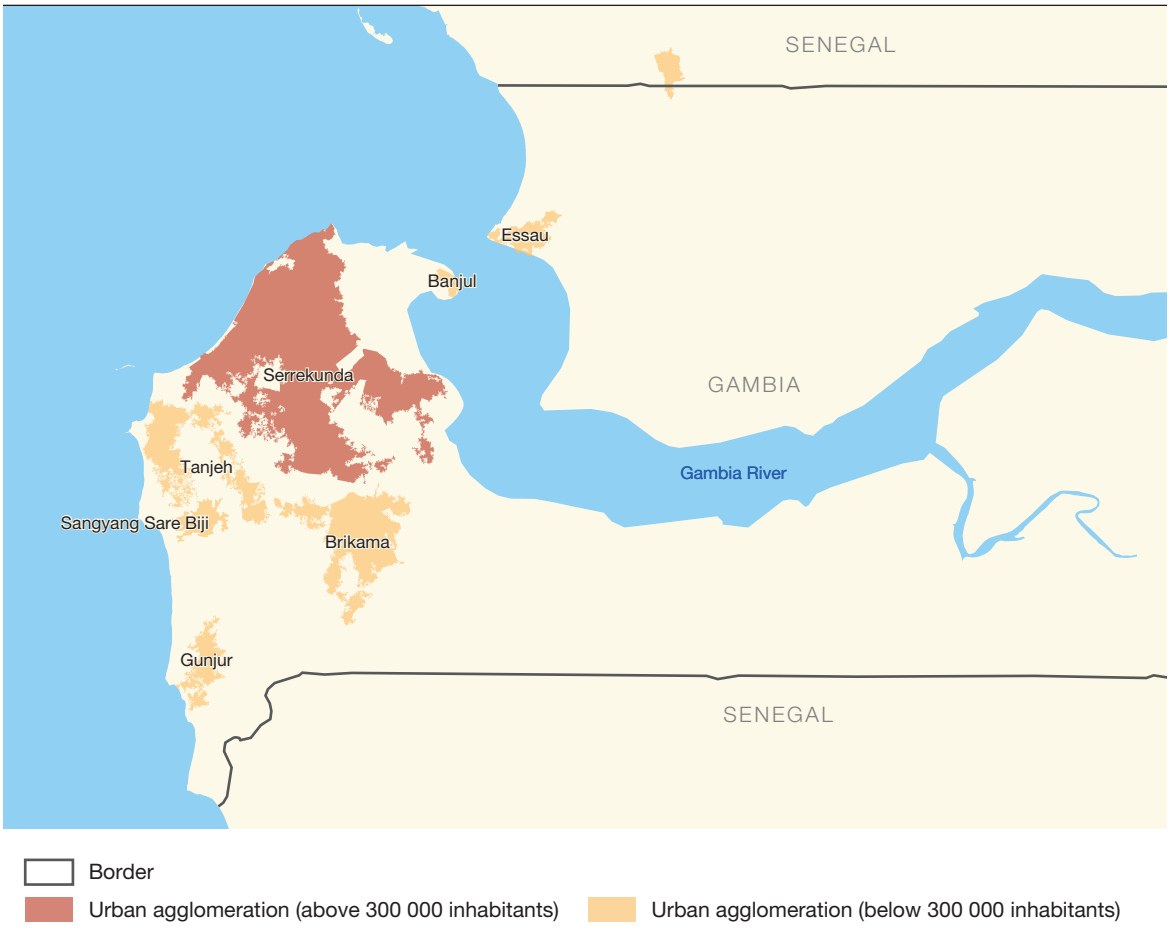


Sources: OECD/SWAC 2018, Africapolis (database); Geopolis 2018 - Map: François Moriconi-Ebrard

end of the road, starting from the agglomeration of Serrekunda, which dominates the urban hierarchy with 800 000 inhabitants in 2015. Today, Serrekunda is part of a true metropolitan area, made up by the country's four most populated urban agglomerations which are separated from each other by only a few hundred metres of undeveloped land. Including the agglomeration of Essau, located opposite Banjul on the north bank of the estuary, this region has increased from 14% to 53% of the national population between 1960 and 2015. The population is 95% urban. In contrast, the remainder of the country has only 3 agglomerations with more than 10 000 inhabitants and the level of urbanisation barely exceeds 10%.

In Ghana, 80% of agglomerations and one-third of the national population are part of the Accra-Kumasi-Takoradi triangle in the south of the country. The north of the country remains poorly developed and barely urbanised, where only small isolated urban centres have emerged. Tamale, its main regional centre, hardly exceeded 300 000 inhabitants in 2015.

Map 4.4
"Metropolisation" in Gambia, 2015



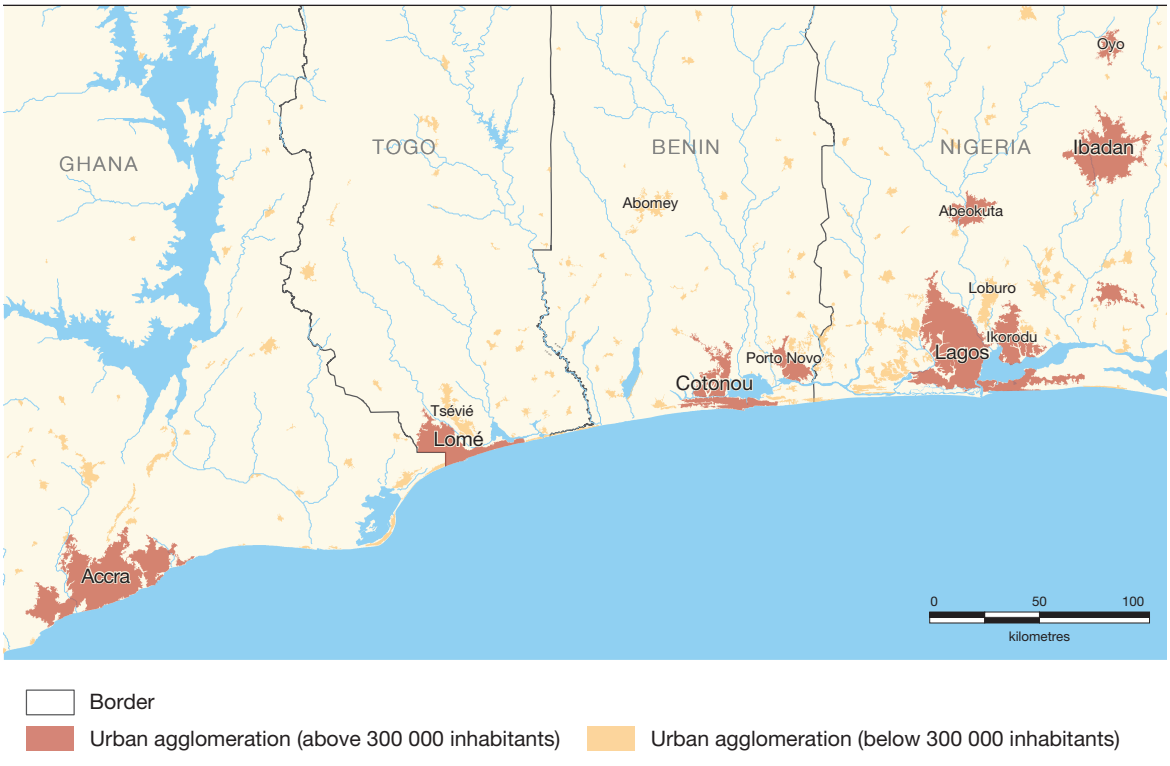
Sources: OECD/SWAC 2018, Africapolis (database); Geopolis 2018 - Map: François Moriconi-Ebrard

These examples highlight different national realities. They show the gap between the metropolitan and intermediary agglomerations of a country. The small agglomerations of large metropolitan areas complement the main urban centres by decongesting and connecting. Although individually they might still be small towns, they increase the relative weight of metropolitan areas and increase territorial inequalities at the level of whole countries.

This trend, however, cannot be generalised to all African countries. Some national metropoles do not induce the formation of metropolitan areas. For example, the peripheries of, Kinshasa, Bangui, Kinshasa, Lusaka, N'Djamena, Niamey and Nouakchott are surrounded by areas of very low density. Even if the influence of the metropolitan agglomeration on its periphery is never totally nil, a satellite agglomeration or development corridor has yet to appear.

Hence, the increase in the number of urban agglomerations in a country does not imply that urbanisation is spreading homogeneously at the national level. On the contrary, it can be highly concentrated in certain regions of a country. A spatial approach with indicators disaggregated to the relevant scales, is needed to better understand these processes.

Map 4.5
The Greater Ibadan-Lagos-Accra Urban Corridor



Sources: OECD/SWAC 2018, Africapolis (database); Geopolis 2018 - Map: François Moriconi-Ebrard

Transnational and international metropolitan regions

The development of metropolitan regions illustrates a change in the scale of trade. Africa's metropolises are increasingly connected to the global economy. Financial, commercial and human flows link to major cities in Europe, North America and Asia. In addition, veritable transnational metropolitan areas are emerging. Thus, the metropolitan areas of southern Ghana, Benin, Togo and Nigeria juxtapose, and form what UN-HABITAT calls "The Greater Ibadan-Lagos-Accra Urban Corridor" (UN Habitat, 2008) (Map 4.5).

The formation of metropolitan regions can also be seen in the highlands of the Great Lakes region, between Rwanda and eastern DRC (Kivu), and between Uganda and western Kenya. Some pairs of cross-border cities such as Kinshasa-Brazzaville, N'Djamena-Kousséri, Bangui-Zongo or Bujumbura-Uvira may also be considered transnational metropolitan areas. The agglomerations of Nairobi and Johannesburg are extended and surrounded by other agglomerations forming larger metropolitan areas. These transnational metropolitan regions contribute to regional integration by promoting the flow of people and goods between countries and by insisting on improving the fluidity of circulation and better enforcement of related treaties.

The emergence of mega-agglomerations

As early as 1991, the morphological approach proposed by e-Geopolis highlighted the existence of mega-agglomerations that were not yet recognised by any official body. This included the conurbation between Brussels, Antwerp and Ghent, establishing a junction with Lille in France (INSEE, 1991), confirmed since by STATBEL[5], the national statistical office of Belgium. In 2001, e-Geopolis also showed that several official "urbanised areas" of the United States were merging together, notably the New

York and Philadelphia agglomerations as well as Washington and Baltimore. In 2018, these units were formalised by the United States Census Bureau (USCB) with the "combined metropolitan area" concept. In sub-Saharan Africa, 15 agglomerations with more than 600 000 inhabitants fit this definition (Table 4.1).

By identifying these agglomerations, the Africapolis database informs policies on current transformations and their impacts. To facilitate identification, a name is proposed by the authors for each mega-agglomeration, often that of a smaller agglomeration, at the top of the administrative hierarchy. Within these vast morphological units, sometimes only a few small urban centres are officially identified.

These 15 urban agglomerations in sub-Saharan Africa represent 8% of the urban population and 35.7 million inhabitants, hence the importance of taking into account the morphological criterion. In Africa, the evolution of population settlement is so rapid that everything indicates that the process of emergence of this type of agglomeration will intensify. Mega-agglomerations share certain common characteristics which make it possible to project and anticipate their development. Moreover, on a more theoretical level, these new morphological objects for both researchers and actors can be framed with different known models of urban geography and spatial economics such as *conurbations* and *desakota*.

Factors affecting the spontaneous emergence of mega-agglomerations

Large, spontaneous agglomerations are found in four regions of sub-Saharan Africa; (1) the highlands around the Great lakes, in Burundi, western Kenya, Rwanda, southern Uganda, north-western Tanzania and the far northeast from the DRC (new province of Ituri); (2) the Ethiopian highlands; (3) the Cameroonian highlands; (4) south-eastern Nigeria. The situation in Egypt is different as two large metropolitan urban centres—Cairo and Alexandria—have long been concentrated in contrast to the scattered settlements of the Nile valley. Although, each spontaneous mega-agglomerations has specific trajectories, several common features can be identified:

A very high rural density

The average density of mega-agglomerations is 1 300 inhabitants per square kilometre, with a high of 3 500 inhabitants per square kilometre in Gisenyi (Rwanda) and a low of 500 inhabitants per square kilometre in Bomet (Kenya). Too dense to be considered rural, these spontaneous agglomerations remain below the thresholds for urban agglomerations. This high density in rural areas is the result of excellent agricultural conditions and the environment, especially the climate (rainfall or irrigation as in Egypt). This is why the major settlement clusters are found in Africa's highlands and, above the Niger delta in the Gulf of Guinea. They are also the regions where sedentary agriculture is ancient, and where the population has accumulated for centuries, even millennia. This particular origin of agglomerations has two consequences:

- *A linear or dispersed settlement pattern*
  High agricultural yields allow for a fragmentation of land holdings as agricultural output compensates for small farm size. In the tropics, two or more crop rotations are possible on the same plot, provided the soil quality is carefully maintained. Dispersed settlements maximise proximity of different crops and traditionally dominate in all areas of very high density. Egypt is an exception, since the mode of production linked to irrigation favours linear and clustered settlements, as in the Great Asian plains.
- *A tendency to the retention and demarcation of the territory*
  Confronted with the lack of space reserved for agriculture, populations must expand their territory, or emigrate. This implies either the development of land with less favourable agronomic or climatic qualities, or the risk of neighbourhood tensions for land. Whatever the strategy adopted, it tends to increase the population density limit. The confinement of settlements within a territory may also result from strict territorial boundaries. The boundary may correspond to a natural discontinuity, such as theedges of the Ethiopian highlands (Map 4.7) or the desert in the Nile valley where land is available but barren. In some cases the discontinuities are

Box 4.1

Metropolitan regions in southern Africa: Political tools

Some metropolitan areas originate from specific spatial planning policies. In southern African countries, urbanisation inherits both ruralist ideology and a policy of racial segregation that prevailed until the early 1990s. The "Garden City" with its a sparse agglomeration and small size dominated. When human concentration becomes too great, urban planning fragments urbanised areas into distinct agglomerations separated by wide undeveloped corridors. The non-continuity of agglomerations supports both racial and socio-economic segregation. Since the abandonment of segregationist regimes, certain corridors have been populated and developed with the construction of shopping centres, sports and leisure areas, reconnecting some agglomerations. Many urban agglomerations' built-up areas have a uniquely fragmented layout (Map 4.7). Africapolis distinguishes several agglomerations within the same municipality, based on the continuity of the built environment. The map shows that each agglomeration is itself a small conurbation organised in different blocks.

Since 1996, the government of South Africa has undertaken a vast programme of territorial reform. The Bantustans[6] have been removed, the map of administrative divisions remade, and town plans redesigned.

The Johannesburg-Pretoria agglomeration (8.3 million inhabitants) extends to the north through Soshanguve, which itself exceeds one million inhabitants. Duduza, Evaton, Vanderbijlpark, Vereeniging, Saulsville, Etwatwa, Madibeng "A" and "B" are between 100 000 and 785 000 inhabitants. A true metropolitan region has formed, comprising more than 13 million inhabitants in 2015 in a nebula of agglomerations. Similar patterns are also observed in Botswana, Kenya, Malawi, Namibia, Zambia and Zimbabwe.

Table 4.1

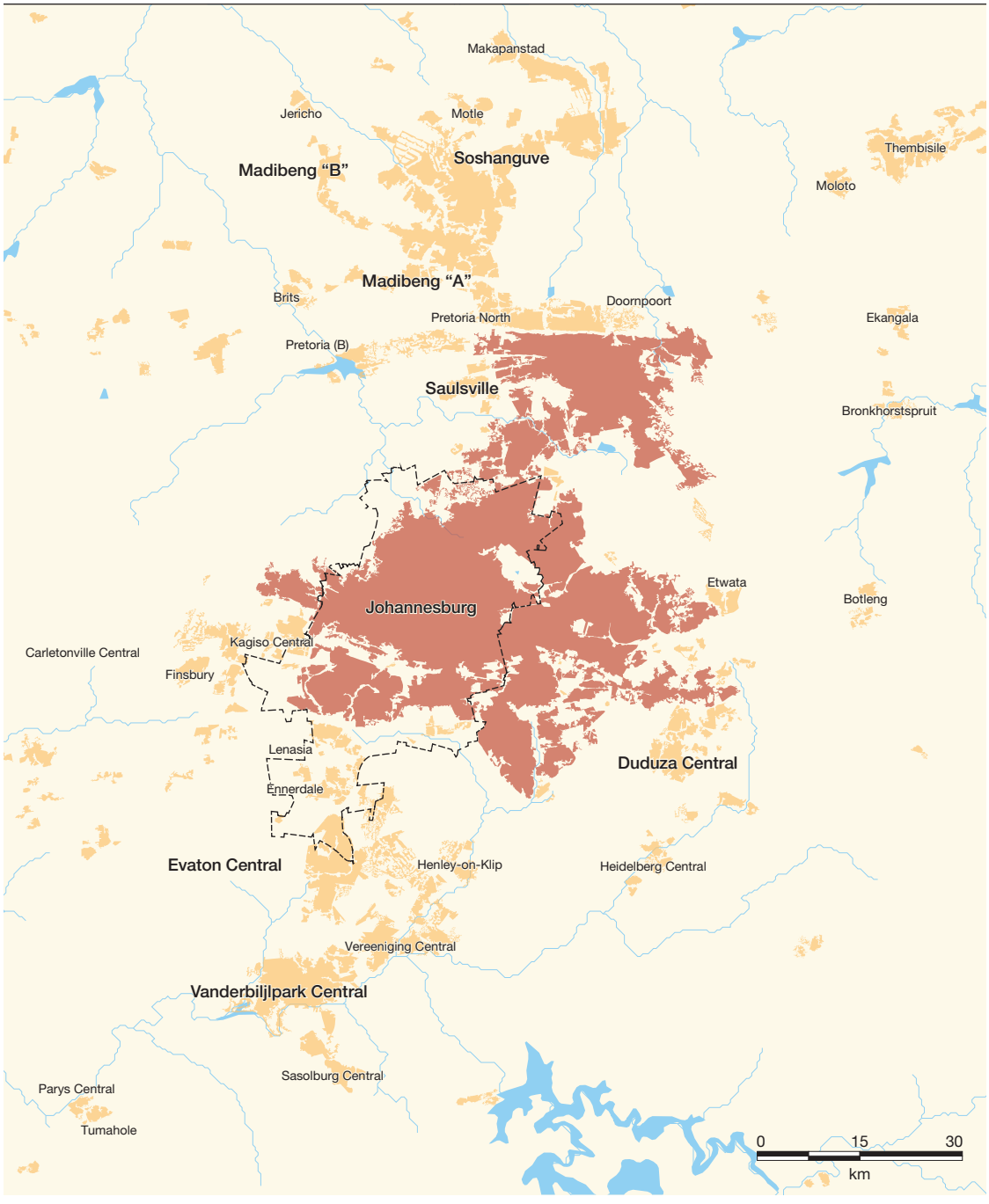
Spontaneous mega-agglomerations of more than 600 000 inhabitants in sub-Saharan Africa, 2015

Agglomeration (2015)	Country	Agglomerated urban population	Population of administrative centre	Built-up area (km²)	Number of LU*	Population density (inhab/km²)
Onitsha	Nigeria	8 530 514	176 200	2867	46	2 976
Aba	Nigeria	1 687 158	136 000	754	14	2 237
Nsukka	Nigeria	1 430 312	390 525	699	9	2 047
Bafoussam	Cameroon	1 146 320	248 377	1 318	43	607
Sodo Town	Ethiopia	2 261 958	145 100	1930	318	1 172
Hawassa City	Ethiopia	2 182 604	300 100	1302	236	1 677
Kisumu aggl.	Kenya	5 040 159	N/A	5863	655	860
Kisii aggl.	Kenya	3 407 476	N/A	5001	466	681
Uyo	Nigeria	2 271 025	414 600	997	22	2 277
Mbale	Uganda	2 228 643	98 746	1060	125	2 109
Embu aggl.	Kenya	2 046 897	N/A	1555	361	1 317
Gisenyi/Kisoro	Rwanda/Uganda/RDC	1 255 024	21 348	355	48	3 534
Maua aggl.	Kenya	848 272	N/A	943	137	899
Bomet aggl.	Kenya	753 093	N/A	1504	179	501
Busia	Uganda	612 696	57 354	366	43	1 675

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

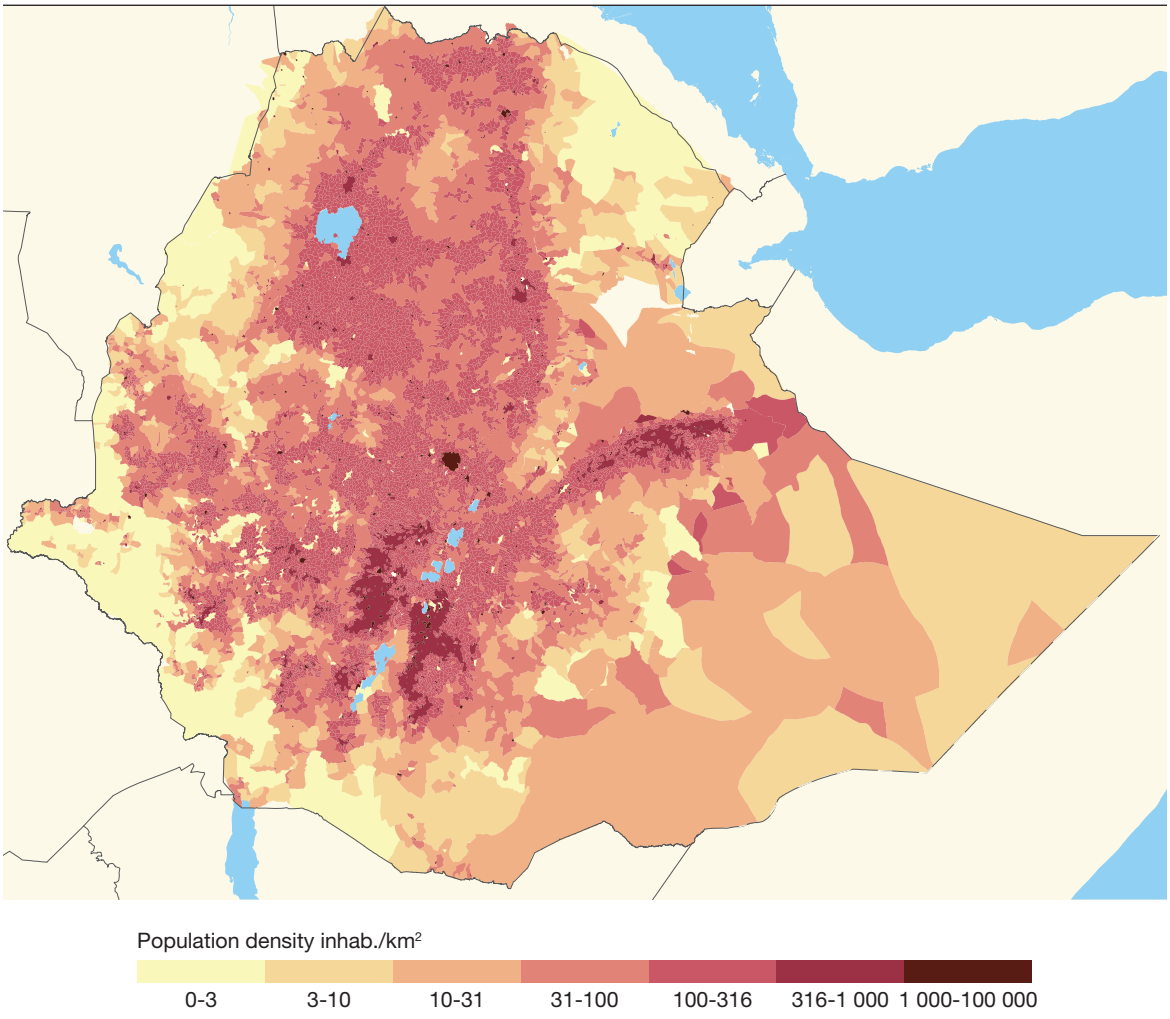
Map 4.6

The nebulous agglomerations around Johannesburg



Sources: OECD/SWAC 2018, Africapolis (database); Geopolis 2018 - Map: François Moriconi-Ebrard

Map 4.7
Population density in Ethiopia in 2015



Source: Geopolis 2018 - Map: François Moriconi-Ebrard

administrative, as for instance in Lomé, Togo or Mbale along the Uganda-Kenya border where urban expansion is blocked by an international border. In other cases again, physical and administrative boundaries overlap (Map 4.7). This cantonment of populations, due to administrative or physical constraints, can lead to strong urban concentrations as highlighted by protected areas and natural reserves. Thus, Kisii (Kenya) emerged as a continuously built-up area around 2010. In 2015, it had 3.4 million inhabitants stretched over 5 000 square kilometres, making it one of the world's least dense large agglomerations, similar to Atlanta in the United States. However, unlike the latter, densification continues within the bounded space at the rate of 2.5 to 3% per year. At this rate, it will have 5 million inhabitants before 2030.

Low emigration

At the national level, the demographic pressure that drives the process of spontaneous emergence of agglomerations is stronger when emigration and rural-urban migration are weak. Since the mid-1970s, state and development partner strategies have focused on limiting rural exodus. Many organisations stress the adverse effects of this policy which has not taken into account

Image 4.1

An administrative boundary: South of the Kisii agglomeration (Kenya)

Note: The image shows a detail at the southern limit of the spontaneous agglomeration of Kisii. This boundary is a long almost straight line of 50 kilometres. It is superimposed on an agricultural landscape that follows contour lines to minimise erosion in this particularly rainy equatorial region. This spatial discontinuity also corresponds to the administrative boundary between two provinces, Nyanza and Rift Valley. Although provinces were abolished by the 2013 territorial reform, their visible boundary on the map remains at the same location of the new county boundaries, separating the counties of Kisii and Narok.

Source: *Google Earth* (accessed July 2017), y = -0.919, x = 34.900, Alt. 4 700 metres

the consequences of rapid population growth. Constant in terms of rate, this linear growth becomes exponential once it is related to a bounded area.

For a rural region with 5 inhabitants per hectare (500 inhabitants per square kilometre) in 1975, similar to the average of the 15 spontaneous mega-agglomerations in (Table 4.1), the density will have reached 13 inhabitants per hectare in 2015 at a constant natural growth rate of 2.5% per year. By 2050, with the same growth and in the absence of migratory movements, the density will increase to 32 (3 200 inhabitants per square kilometre). The question is therefore not whether this rural region will become urban, but when it will become urban. Similarly, several areas in Africa, where population settlement is still dispersed and densities are still below the critical threshold of agglomerations, should expect to become urbanised.

With a density of 3 000 inhabitants per square kilometre, the conurbation/mega-agglomeration of Onistha (Nigeria) is no longer identifiable as rural. The natural population growth rate predicts a tripling of the population in 35 years. At the current rate, in 2050, the agglomeration will house more than 25 million inhabitants in its perimeter and its density will reach 9 000 inhabitants per square kilometre. In addition, under current trends in sprawl, it will lead to the formation of a single agglomeration that extends throughout the Port-Harcourt-Uyo-Nsukka triangle forming a mega-agglomeration of 50 million people by 2050, surpassing Lagos as the country's largest agglomeration. In many cases these agglomerations are not recognised by national or international political institutions, even though they are positioned among the most populated of the country. The territory of south-eastern Nigeria's conurbations is managed as a set of rural units without taking into account the

increase in density and the gradual transformation of the economy and societies. The projected trends make the "political recognition" of cities and agglomerations all the more important (Table 4.2).

Mega-agglomerations and similarities with other urban forms

Characteristics of conurbations

Popularised at the beginning of the 20th century, the word "conurbation" refers to agglomerations built during the industrial revolution. It is a form of urbanisation of the North American "Rust Belt", English "Black Counties" and Northern Europe. They are characterised by the weakness of service industries and a more polycentric form, with several centres distributed throughout the agglomeration, and higher spatial dispersion which leads to lower density. Their lack of economic, political and social structure means that their functional and statistical units are often difficult to determine. In Africa, the only real industrial conurbation is that of the Witwatersrand, where a number of cities have developed in conjunction with industrialisation: Johannesburg, Germiston, Brakpan, Krugersdorp, Roodepoort, Bokspburg.

From a structural and functional point of view, three generic forms of conurbations are present in Africa:

- Type 1 characterises conurbations without a real centre: these did not develop from a large city, but simultaneously from all centres of the basin. The most representative example is the Ruhr in Germany. The Ethiopian agglomerations of Sodo and Hawassa, in which no significant centrality emerges, are of this type.
- Type 2 distinguishes conurbations that associate a nebula of small peripheral industrial or service cities to a larger centre. Each small town retains a strong local identity, but their regional, national or even international political influence is reduced. The development of the city-centre also stimulates growth of cities and villages of the region. The archetypes are Manchester and Birmingham in the United Kingdom or Naples and Milan in Italy. In Africa, Aba (Nigeria) belongs to this category.
- Type 3 characterises conurbations that combine two "centres" of comparable size and strong local identity, such as the twin cities Leeds-Bradford (United Kingdom), Minneapolis-St. Paul (Minnesota), Dallas-Fort Worth (Texas), Miami-Fort Lauderdale (Florida). Conurbations or mega-agglomerations such as Onitsha and Uyo are also this type.

In Europe and North America, "city" centres concentrate the symbolic seats of spiritual, political, financial and cultural power. In the absence of true centrality and political function, conurbations of industrial origin tend to suffer from a deficit of urbanity in the sense of the Anglo-Saxon sociologist Louis Wirth. In the African context, where agglomerations are not born of an industrial impulse but of a densification of the rural world, this deficit of urbanity is amplified.

Africa's spontaneous mega-agglomerations share common characteristics, but also differences with conurbations. A commonality for instance is the absence of a real centre, indicating that the urbanisation process did not follow a centrifugal diffusion from the centre to the periphery. As for the differences: historically, conurbations, often of an industrial nature, have densified due to the inflow of people from outside the agglomeration, from other regions or countries (most conurbations of Europe or North America). In Africa, the densification of mega-agglomerations results primarily from an increase of the local population. Mega-agglomerations in Africa are rather emigration areas, whose diaspora networks have contributed to their development, as in eastern Nigeria.

Mega-agglomerations and "desakotas"

"Desakota" originates from the Bahasat language of Indonesia, in which *desa* means village and *kota*, city (McGee, 1991). The English and French translations remain imperfect because urban village or *village urbain* does not transcribe exactly the idea of *desakota*.

At the micro-local level, South Asian *desakotas* combine farms, houses or concessions adjacent to cultivated plots, industrial

Table 4.2

Nigeria: An underestimated southeastern urban population

Regions and agglomerations	Area km² 2015	Africapolis population 2015	WUP population 2015	Difference
South East				
Onitsha	2 867	8 531 000	1 109 000	
Nnewi			770 000	
Owerri			716 000	
Uyo	997	2 271 000	1 114 000	
Port Harcourt	368	1 845 000	2 343 000	
Aba	754	1 687 000	944 000	
Nsukka	699	1 430 000	n.d.	
Enugu	178	905 000	681 000	
Umuahia	96	393 000	580 000	
Total		17 062 000	8 257 000	- 52%
Other regions				
Lagos	1 093	11 811 000	13 123 000	
Kano	282	3 889 000	3 587 000	
Ibadan	608	3 088 000	3 160 000	
Abuja	489	1 999 000	2 440 000	
Benin City	438	1 570 000	1 496 000	
Kaduna	271	1 447 000	1 048 000	
Maiduguri	139	1 012 000	728 000	
Ilorin	220	891 000	857 000	
Jos	184	870 000	810 000	
Sokoto	87	840 000	552 000	
Zaria	88	796 000	703 000	
Osogbo	182	764 000	650 000	
Abeokuta	179	748 000	495 000	
Ikorodu	273	732 000	706 000	
Gombe	72	601 000	417 000	
Warri	141	586 000	663 000	
Akure	158	533 000	556 000	
Bauchi	96.08	528 000	496 000	
Calabar	80.64	517 000	467 000	
Total		33 222 000	32 954 000	-1 %

Notes: According to the World Urbanization Prospects (WUP): Enugu, Port Harcourt, and Calabar are identified as cities. Aba and Uyo are listed, but their populations are half of Africapolis figures. Onitsha is divided into three "agglomerations" (Onitsha, Nnewi and Owerri) losing 5.9 million inhabitants and declining in the national urban hierarchy. The Nsukka, 1.4 million inhabitants according to Africapolis, is not mentioned in the WUP. In contrast, the population of the capital Abuja is overestimated, with the WUP estimates referring to entire federal capital territory which covers 7 800 km². Similarly, the population of Port-Harcourt, home to several headquarters of gas and oil companies, is 27% higher than Africapolis. Thus, the recognition or lack thereof of the estimated size of agglomerations may take on a political dimension.

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

enterprises, shops, and schools. At the regional level, their development is based on large cities, such as Jakarta in Indonesia, Hanoi and Ho Chi Minh City in Vietnam. In this context, this concept only describes the periphery of these large cities. In Africa, the development of spontaneous mega-agglomerations differs in the sense that it does not rely on large cities, comparable to those in South Asia.

However, Africa's mega-agglomerations benefit from highly productive agricultural activities within the agglomeration like the *desakotas*, notably in terms of promoting agri-food processing activities. For instance, agglomerations of the Kenyan Highlands are home to the production of off-season vegetables that supply major distribution companies of Western frozen products, as well as battery farming and

Box 4.2

Southeast Nigeria: From a mega-agglomeration to a megalopolis of 50 million inhabitants in 2050

The urban development of southeastern Nigeria with the existence of several conurbations close to each other unites all the features of spontaneous mega-agglomerations. The combination of natural and administrative barriers limit the region: the mangroves of the delta in the south, and the floodable areas of the Niger valley in the west covered with palm kernel forests (Oil River). To the east, the region abuts a rugged massif covered with dense (and protected) forest towards the Nigeria – Cameroon border, constituting a geopolitical division analogous to Kruger or Virunga Parks (Map 4.8)

The Onitsha agglomeration morphologically unites several historic urban centres buried in an immense area of dense dispersed settlement. Located at the extreme north-west of the agglomeration, the centre was described during the 1950-60s as "the most active market of all West Africa" (Laroche, 1962, op.cit.). The original centre is identifiable on a map by a very dense urban habitat. An anomic maze of roads lined with various constructions extends to Awka, the capital of Anambra State to the east, and to Nnewi to the south. Several smaller centres like Ihiala, Nkwerre and Orlu are also absorbed by the conurbation. East of the delta, the agglomeration of Uyo spreads on alluvial terraces about 60 metres above the level of the Cross River flood plain. Uyo's 2.3 million inhabitants mainly speak Ibibio.

Between these two agglomerations, Aba, located in the south of Abia State is 95% Igbo. The agglomeration has 1.7 million inhabitants and has a dense centre. Industrial zones and workshops are spreading producing cosmetics, textiles, plastics, cement, pharmaceuticals, palm oil, etc.. The Ariaria International Market of Aba, nicknamed the "China of Africa" handles millions of transactions internationally in shoemaking and clothing. With 7 000 shops, it is the largest market in West Africa besides Onitsha. North of this area, Nsukka (1.4 million inhabitants) extends on a plateau at an altitude of more than 450 metres. It is considered one of the main centres of Igbo culture and houses the first Nigerian university. The agglomeration has some small intermediary centres: Enugu-Ezike, Obolo, Ibegwa.

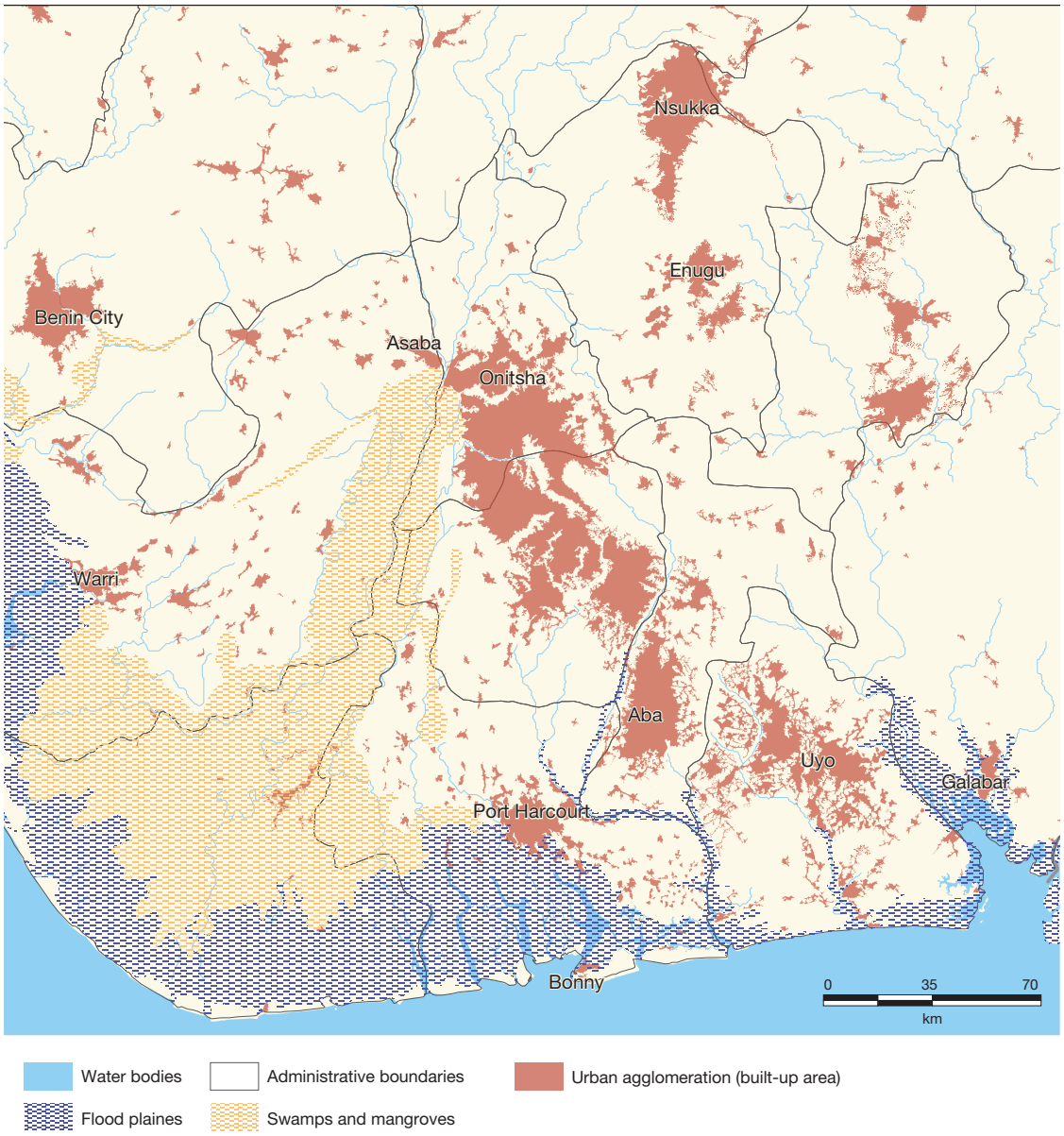
The central core of Onitsha is divided into two Local Government Areas (LGAs), Onitsha South and Onitsha North. Both had only 340 000 inhabitants in 2015. They do not correspond to the old municipality, which already had 165 000 inhabitants in 1962 and 657 500. Within the conurbation, Nnewi has around 200 000 inhabitants within a dense core. Akwa has about 300 000 inhabitants, Orlu, 150 000, and Nkwerre, 100 000. At the extreme south of the conurbation, Owerri spreads out over three LGAs (Municipal, North and West) and has a dense urban core of about 550 000 inhabitants. These figures are very roughly estimated at this stage on the basis of the presence of compact habitat nuclei, structured by a regular urban-type road network.

above-ground farming. The production practices are well adapted to availability of a large local workforce and relative small farms size. These local economies centred around agri-food industries are specific to spontaneous mega-agglomerations, and link them to the continental and global economy.

The singularity of the conditions and factors leading to the emergence of spontaneous mega-agglomerations make them difficult to classify in the vocabulary of development and geographical sciences. They are only partially similar to that of conurbations or *desakotas*. "Mega" refers to their large areas and "spontaneous" to the fact that their emergence is not part

Map 4.8

The political and natural confinement of urban areas in the southeast of Nigeria



Sources: OECD/SWAC 2018, Africapolis (database); Geopolis 2018 - Map: François Moriconi-Ebrard

of any urban development plan. Another shared characteristic of spontaneous mega-agglomerations is their location within the interior of the continent and not along the coasts. The features, conditions, and specific forms of these spontaneous mega-agglomerations make them new urban territories. The morphological, economic and territorial heterogeneity of these new urban forms must be analysed and projected in order to be able to anticipate and accompany ongoing transformations and their spatial impacts beyond the national scale.

Table 4.3
Share of coastal urban population in Africa by agglomeration size

Agglomeration size	Coastal urban population (in millions)	Number of coastal agglomerations	Share of coastal agglomerations in total	Share of coastal urban population in total
> 1 million inhabitants	86.3	28	38 %	38 %
> 500 000 inhabitants	98.3	47	34 %	36 %
> 100 000 inhabitants	115	113	16 %	29 %
Total(> 10 000 inhabitants)	121	424	6 %	21 %

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

COASTAL URBANISATION AND INTERIOR URBANISATION

Most major colonial cities were port cities. These port cities are the foundation of many of today's most populated African agglomerations. And yet, this view of an urban coastal Africa should be qualified. The colonial period also saw the emergence of cities within the interior of the continent: Bamako, Bangui, Brazzaville, Bujumbura, Bulawayo, Cairo, Harare, Johannesburg, Kampala, Kinshasa, Lubumbashi, Lusaka, Nairobi, N'Djamena, Niamey, were founded inland. Other ancient big cities like Addis Ababa, Ibadan, Kano, Khartoum, or Sokoto are also in the interior of the continent.

In addition, many coastal cities have only limited contact with the seafront. Nouakchott's urban area barely touches the coast. The centre of Lagos is located on a lagoon and not at the edge of the ocean, just like Abidjan, Boma, Cotonou, Porto-Novo, Saint-Louis, or Tunis. Douala and Port-Harcourt developed in an estuary. At the local level, many buildings and sites along the coastline are more inward looking than seaward.

Finally, the strong urban growth in the interior of the continent is salient, including not only small agglomerations and political capitals, but also new spontaneous mega-agglomerations. These two urban faces - coastal and interior - and their dynamics highlight some of the political issues of urbanisation and the new social and economic dynamics at work.

Africa's low urban coastalisation

The perception that African urban networks are coastal is biased for two reasons. The first is the subjective perception of many of Africa's elite who reside in coastal metropoles, as well as of foreigners who enter the continent through international airports of major coastal cities. Second, the most commonly used and known maps focus primarily on the most populated and officially-recognised agglomerations which are coastal. The spontaneous mega-agglomerations identified by Africapolis are located in the interior of the continent, many of which do not appear on maps. In addition, about 80% of smaller agglomerations are not included in "urban" categories and are mostly located in the interior.

The larger the size of the agglomerations sampled, the higher the relative weight of coastal agglomerations. At a threshold of 1 million inhabitants and above, coastal agglomerations represent 38% of all the agglomerations and 38% of the total urban population (Map 4.9). At a threshold of 100 000 inhabitants, their share in the total urban population drops to 29%. And, covering the entire urban network (threshold of 10 000 inhabitants), coastal agglomerations represent 6% of the total number of agglomerations and 21% of Africa's urban population. Africa comprises 17 landlocked countries which represent 29% of the continent's population.

The development of Africa's coastline is discontinuous and heterogeneous. Southern Africa has the most urban coastal region, with 100 agglomerations comprising 29% of the urban population, including Luanda, Cape Town, Durban, Maputo and Dar-es-Salaam (Table 4.4). It also has the most developed seaboard, with 8 500 kilometres of coastline. The two truly "coastal" areas in sub-Saharan Africa are around Durban, with many seaside resorts, and

Table 4.4

Coastal urbanisation of Africa's main regions

Régions*	Number of coastal agglomerations	Share of coastal agglomerations in total	Coastal urban population (in millions)	Share of coastal urban population in total	Coastline (km)
Central	15	2 %	4 700 000	8%	1 998
East	36	2 %	11 600 000	10 %	8 386
North	178	10 %	40 000 000	28 %	8 201
Southern	100	10 %	24 100 000	29 %	8 440
West	96	4 %	40 700 000	25 %	6 065
Total	424	6 %	121 100 000	21 %	33 090

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

*North Africa: Algeria, Egypt, Libya, Morocco, Tunisia

Central Africa: Burundi, Cameroon, Central African Republic, Congo, DRC, Equatorial Guinea, Gabon, Sao Tome and Principe

East Africa: Djibouti, Eritrea, Ethiopia, Kenya, Rwanda, Somalia, South Sudan, Sudan, Tanzania, Uganda

Southern Africa: Angola, Botswana, Eswatini, Lesotho, Malawi, Mozambique, Namibia, South Africa, Zambia, Zimbabwe

West Africa: Benin, Burkina Faso, Cabo Verde, Chad, Côte d'Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leone, Togo

the Dar-es-Salaam-Bagamoyo-Zanzibar triangle, which foreshadows the emergence of a Tanzanian metropolitan region.

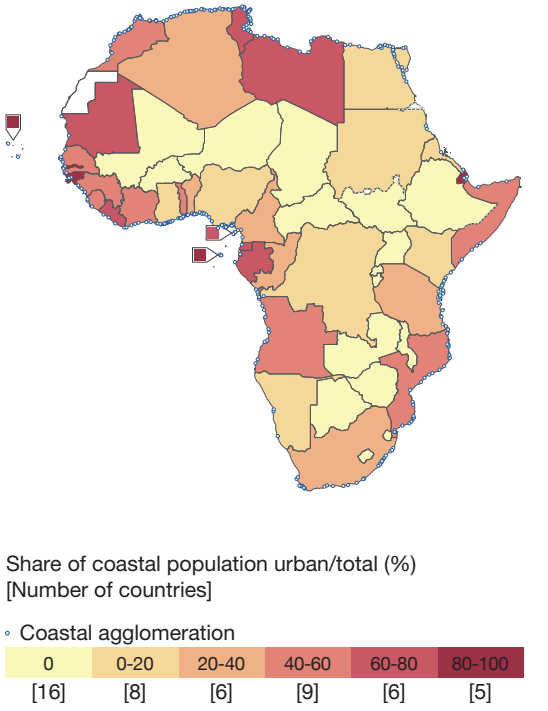
West Africa's urban expansion only concerns limited portions of the coastline: from Dakar to Mbour, the coast of Togo, some sectors of the Ghanaian coast. Along the Greater Ibadan-Lagos-Accra urban corridor (GILA) the urban built-up areas only occasionally follow the coastline, contrary to North America, Europe or South Asia. The major routes of the corridor avoid the coastal rims of the lagoon regions and bypass the Volta River delta.

One of the most striking examples of Africa's low urban coastalisation is that of Nigeria, the country with the largest urban network in Africa and 853 kilometres of coastline. The number of urban contact points with the ocean increased slightly in the 20th century, but mostly at the edge of lagoons and within the immense Niger delta. Even by extending the idea of "coastal" to these agglomerations, the urban/ocean interfaces remain very limited, concerning mainly Lagos, Warri, Port-Harcourt and Calabar. By extracting estuarine estates and lagoons, only ten of the country's 1 236 agglomerations are located on the coast in the strict sense.

Although cities have developed on the coast of East Africa since antiquity, it is the least coastally settled region. In Sudan, Port Sudan, only one of two major ports in the country, with a population of 423 000 is 12 times smaller than

Map 4.9

Share of urban population living in coastal agglomerations 2015



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

Khartoum, the country's largest agglomeration. Significantly, Hargeisa, the "capital" of the self-proclaimed state of Somaliland, a city of more than 700 000 inhabitants, is prospering far

from the coast, at an altitude of 1 300 metres. In Kenya, the Mombasa region is the only stretch of coastline where an urban network runs parallel to the coast, but the agglomeration itself was only the fifth-largest in the country in 2015, far smaller than the spontaneous mega-agglomerations that have emerged in the highlands of the interior.

In Central Africa, the coast of the DRC (40 kilometres) has only two agglomerations, with a combined population of slightly more than 300 000 inhabitants, or 1% of the urban population of the country. In Angola, four major cities with more than 500 000 inhabitants are located on the coast (Luanda, Cabinda, Benguela and Lobito), while other major agglomerations, including Lubango (616 000 inhabitants) and Huambo (600 000), and Malanje (470 000), are all at an altitude of more than 1 100 metres. The urban development of the interior continues.

The weak coastalisation of urbanisation is a common feature of African societies, and also present in Central America. In mainly agrarian and pastoral societies, coastal areas are less attractive because of the poor agrarian quality of soils. Sea fishing is poorly developed. In addition, movement of goods and travel is done by land, and at a good distance from a coastline with many bays that are difficult to cross. For the moment, urbanisation has only led to little development of the coasts. With the exception of northern and southern Africa, the coastalisation of African populations is recent but should not be neglected. It operates in two ways: The first is domestic and still marginal: the recent appropriation of the seafront by construction near major urban centres (Lagos, Abidjan, Durban, Mombasa). It is of interest to a limited segment of the population, mainly the emerging middle classes. These socio-economic groups are more numerous in the richest countries, especially in South Africa. However, they also emerge in a few stations along the South Atlantic between Kribi (Cameroon) and Namibe (Angola), on the Indian Ocean in South Africa and Mombasa (Kenya), and along the Mediterranean coasts that attract domestic and foreign tourists (Egypt, Tunisia). The second is the promotion of new housing developments. This new attraction for the coastline signals a significant societal change.

Emergence of an inner urban Africa

At the continental level, the presence of large cities on the African coast is a legacy of the colonial period. The original foundation sites tended to be insular. Dakar originated on the island of Gorée, Conakry on that of Tombo, Mozambique was founded in the island of the same name at a good distance from the coast. Similarly, Banjul, Monrovia, Freetown and Cape Town are hardly accessible from the mainland. When these initial sites proved too small, urbanisation spread across to the mainland. It then proceeded perpendicular to the coast, and not parallel, as illustrated by Guinea Bissau. The territory was first administered from outside the continent as a dependency of the Cabo Verde islands. Becoming an autonomous colony (1879), its capital was located in Bolama, on an island in the archipelago of Bijagos, still outside the continent. It was not until 1941 that the capital was transferred to the mainland in Bissau.

Along the coasts, the natural sites most conducive to the installation of deep water harbours, that are well sheltered are accessible, are relatively rare. These were coveted by major powers for the development of export economies. This scarcity has resulted in a few cities, but with strong urban concentrations. The value of these coastal positions is, however, derived from the riches of the interior. Thus, networks tended to turn their backs on the ocean, developing perpendicularly to the coastline. This spatial logic persisted after independence, and the same agglomerations became the bridgeheads of increasingly globalised trade. Today, trade with the outside world is increasingly focused on emerging economies like China, Thailand, Brazil or the Persian Gulf countries.

The main historical settlement areas of sub-Saharan Africa are in the interior of the continent, mainly in the highlands long dominated by dense rural settlement. The major migratory and trade corridors are located far from the coastlines, connecting these large settlement clusters. Indicators show that Africa's greatest potential for urban growth lies in these inner territories, and this has political implications.

The dynamics of big cities in countries whose capitals have been located in the interior since

before independence, illustrates the fundamental role of political functions. Thus, in Cameroon, Yaoundé has supplanted the port of Douala in terms of population. In the Congo, Brazzaville has passed Pointe-Noire. Namibia has only two agglomerations on the coast, with its capital flourishing far inland on the plateaux. Finally, the capitals of the 17 landlocked countries display urban growth that is just as rapid as that of countries with a coastline.

This change in the dynamics between interior and coastal cities, with an increasingly rapid increase in the former, can also be measured by introducing a third spatial variable, altitude. In addition to the longitude and latitude variables, this dimension is rarely used in spatial analysis. It is introduced in Africapolis by the average altitude of each agglomeration relative to sea level (Box 4.3). Africa is the highest of all the continents in terms of average altitude. In the intertropical zone, altitude has a considerable impact on the climate, and thus on the conditions of agriculture and urban development. Altitude profoundly affects temperatures and precipitation patterns. High altitude areas get more rain and less evaporation. They provide favourable conditions for types of agriculture less practicable in low, drier and forested areas.

Altitude influences the development conditions of cities: population health, epidemiology, energy consumption, supply, natural risks, accessibility. In the intertropical zone, it tempers extreme heat and therefore the proliferation of certain diseases and parasites that have long decimated livestock and humans. The flipside of high altitude locations is a relative isolation, compared to civilisations that were constantly expanding and interconnected by sea. Of all the areas of Africa, the highlands have long remained the most rural: with the continuous increase of their population.

However, despite the reversal of trade routes, driven by colonisation and then globalisation, to the benefit of coastlines, the highlands continue to concentrate the major centres of settlement in sub-Saharan Africa with the highest potential for urban growth.

Political equilibriums are influenced by urban development, especially in inland territories. Some of the intermediary agglomerations of the interior, such as Kumasi in Ghana, Kano in Nigeria, Touba in Senegal and Bouaké in Côte d'Ivoire, are the second largest agglomerations competing with national metropoles. They are home to hotbeds of political dissent. To a lesser extent, in Togo, Kara, "city of the President" and Abomey, seat of the Kingdom of the same name, represent important domestic political centres.

In Somalia the vigorous growth of Hargeisa highlights tensions between the interior Africa, focused on intracontinental circuits and coastal Africa, developed during the colonial period, such as Mogadishu. In Cameroon, the Bamileke of Bafoussam, an "informal" agglomeration of more than one million inhabitants, are traditionally differentiated by their "high" and the "low" altitude position.

This bipolarity of African urbanisation, increasing with the continued urbanisation of the interior, is affecting political stakes and potentially aggravating tensions. These issues may not be only economic and financial, but also signal the beginning of a shift in political power relations to the benefit of inland agglomerations and populations long subjected to colonial and more recently national coastal interests.

Box 4.3

Altitude, coastal and inland Africa

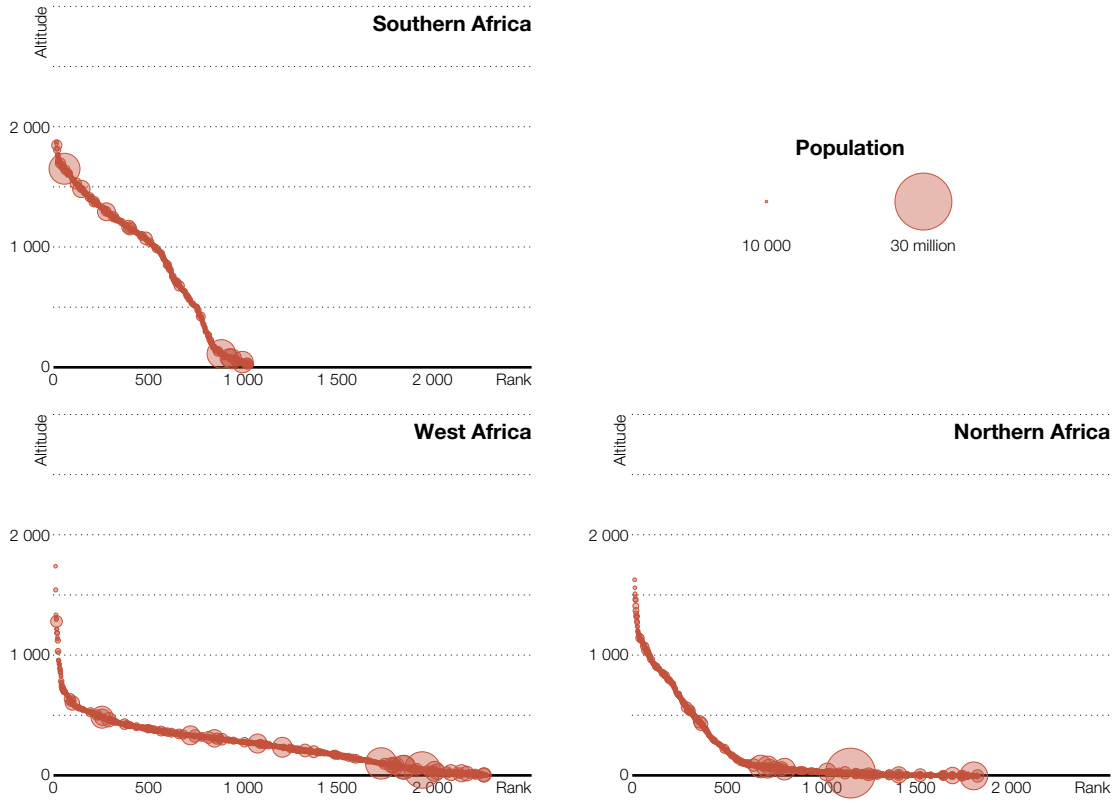
The contrast between coastal Africa and the interior of Africa is reflected in Figure 4.2. Agglomerations in each region are ranked in descending order of altitude. Each is represented by an area proportional to its population in 2015. The altitude of African agglomerations ranges between -43 metres in the Fayoum basin in Egypt and up to 3 372 metres in Ethiopia. However, all the graphs highlight two altitude attractors: low altitude coastal plains and high altitude, highland settlement clusters.

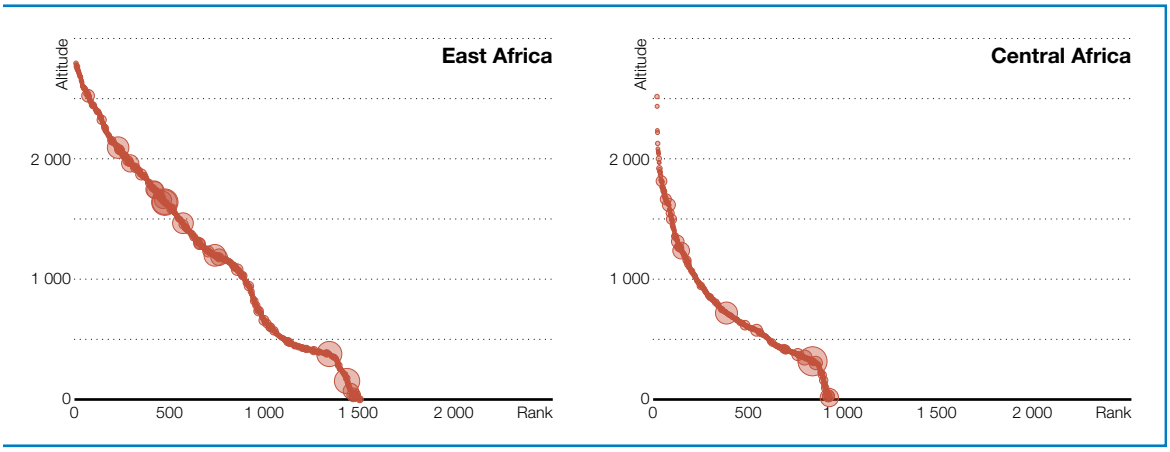
The "low" attractor corresponds to old colonial cities. Today these cities continue to benefit from the globalised economy. The "high" attractor corresponds to highland regions that are rapidly urbanising.

The most remarkable contribution of this statistical representation is that, on all the graphs, a break is visible between the two groups, indicating a relative deficit of agglomerations at intermediate altitudes. This gap is particularly marked in Central Africa, East Africa and Southern Africa. It is more attenuated in Nigeria and especially in the rest of West Africa, because the reliefs are less pronounced. It also appears in North Africa, where it corresponds to a political reality: the populations of the Great Rift Valley, the Moroccan Atlas Mountains and of Kabylie are historically rebellious regions whose centres of power are situated in the large "low-lying" agglomerations. It should also be noted that as Mediterranean rim does not belong to the inter-tropical zone, the mountain climate of North Africa is much more rigorous than in the rest of Africa. From this point of view, the highlands of North Africa belong less to the African climate than to the Mediterranean.

Figure 4.2

Population of agglomerations relative to altitude





THE ENVIRONMENT AND THE URBAN

In recent decades, the protection of natural environments has developed as well as new correlated town planning policies. The first Garden City-style projects were created at the beginning of the 20th century and influenced colonial urbanism particularly in South Africa, Rhodesia (Zimbabwe, Zambia, Malawi) and Kenya. In the 21st century, the idea of conserving urban nature is part of numerous urban planning projects in developed countries of the north.

The challenge for public policies is to integrate and co-ordinate different scales of urbanisation effectively, from the neighbourhood to that of the entire agglomeration. This integration makes it possible to empower citizens, reduce excessive mobility that is expensive in terms of energy consumption, shorten supply chains, and promote new sustainable and efficient practices. While in the most technologically advanced countries the city abandons parts of its urbanity, in African countries, the densest rural areas cede part of their rurality. In both cases, this development leads to a reconsideration of the urban/rural divide. The African city of tomorrow fits into this new framework.

The balance between humans and nature

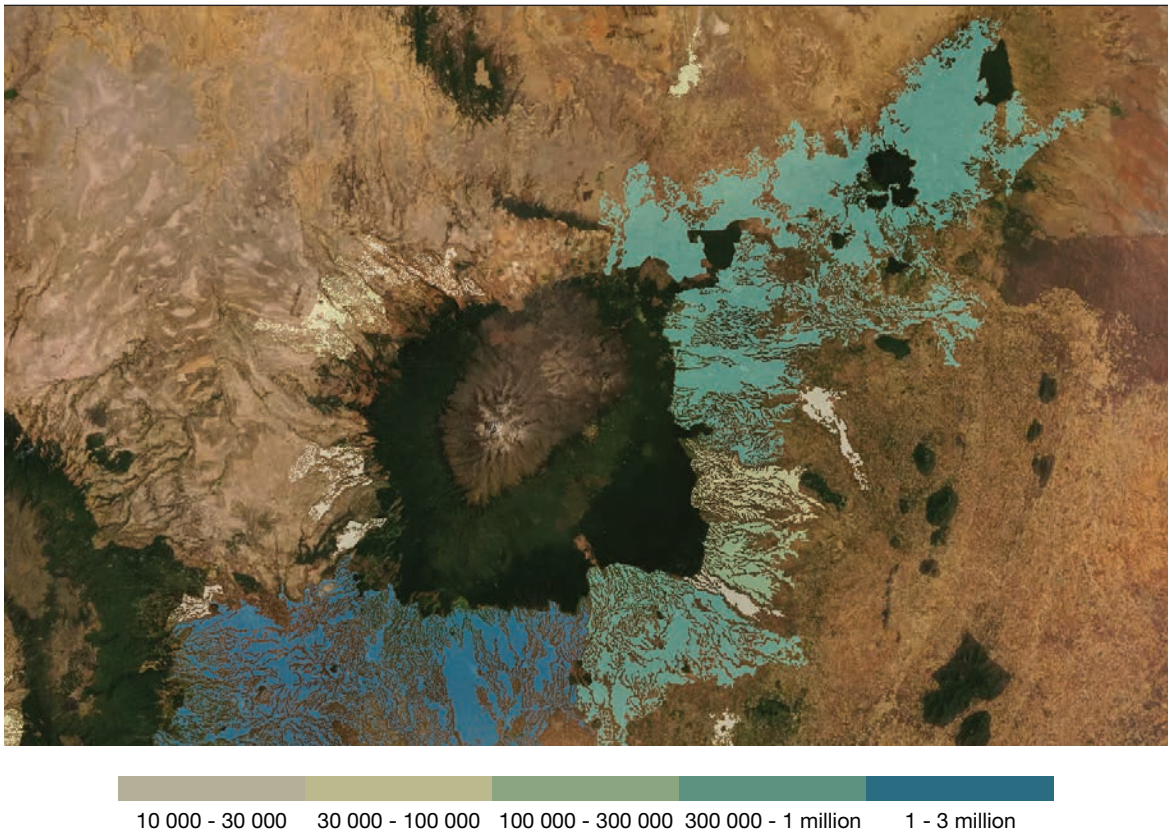
In rural territories, the introduction of ecological thinking has followed two approaches. One approach excludes all human settlement and human activity from natural areas — apart from regulated and controlled tourist activity. This approach appears in industrialised countries as early as the 1930s with the establishment of reserves and natural parks, especially in northern Europe. In the United States, the Yellowstone National Park was established in 1872. With nearly 9 000 square kilometres, it is as large as Gambia.

The second approach maintains that human presence is part of Nature, provided that its activities are respectful of environmental balances. However, environmental equilibriums are challenged when population density reaches critical values. In Africa, these two approaches existed long before European colonisation. For millennia, men and wildlife cohabited without destroying each other. There are also cultures where human settlement in certain areas is prohibited, such as the sacred forest of Mbuti pygmies.

Borrowing from the French legal tradition, some former colonies consider national and regional parks more like conservatories of rural environments than as a forbidden sanctuaries. In the former British colonies, vast reserves have instead been created where the resident population is zero. These territories have a special administrative status, equivalent to the municipality, the canton or even the department. These various protection strategies evolved as regimes changed. Today they converge. The first approach attempts to integrate more participatory management with the participation of local populations. The second approach introduces

Image 4.2

The urban footprint of agglomerations at the base of Mount Kenya



Note: The attraction exerted by the edges of the reserve is reinforced by the agronomic quality of the volcanic soils and the climatic conditions favourable to agriculture (coffee, tea, food crops). The northern slopes are drier and less desireable. The "zebra skin" pattern of the agglomerated areas indicates a strong deference of settlement patterns to the natural constraints of the volcanic slopes, cut by deep valleys. Finally, the contrast is very clear between the edge of the reserve located upstream, where agglomerations stops abruptly along the borders of the park, and downstream, where filaments of unequal length dissolve into the rural confines at the bottom of the slopes. This illustrates that the immediate proximity of the reserve is the most popular position.

Sources: *Google Earth* (accessed December 2018); OECD/SWAC 2018, Africapolis (database); Geopolis 2018 - Map: François Moriconi-Ebrard

zonings ranging from absolute protection to areas where the presence of certain forms of agriculture is tolerated.

In the current context, however, land withdrawn from human occupation contributes to an over-densification of the peripheries of the protected territories. These growing and uncontrolled forms of urbanisation are a challenge for local elected officials and politicians.

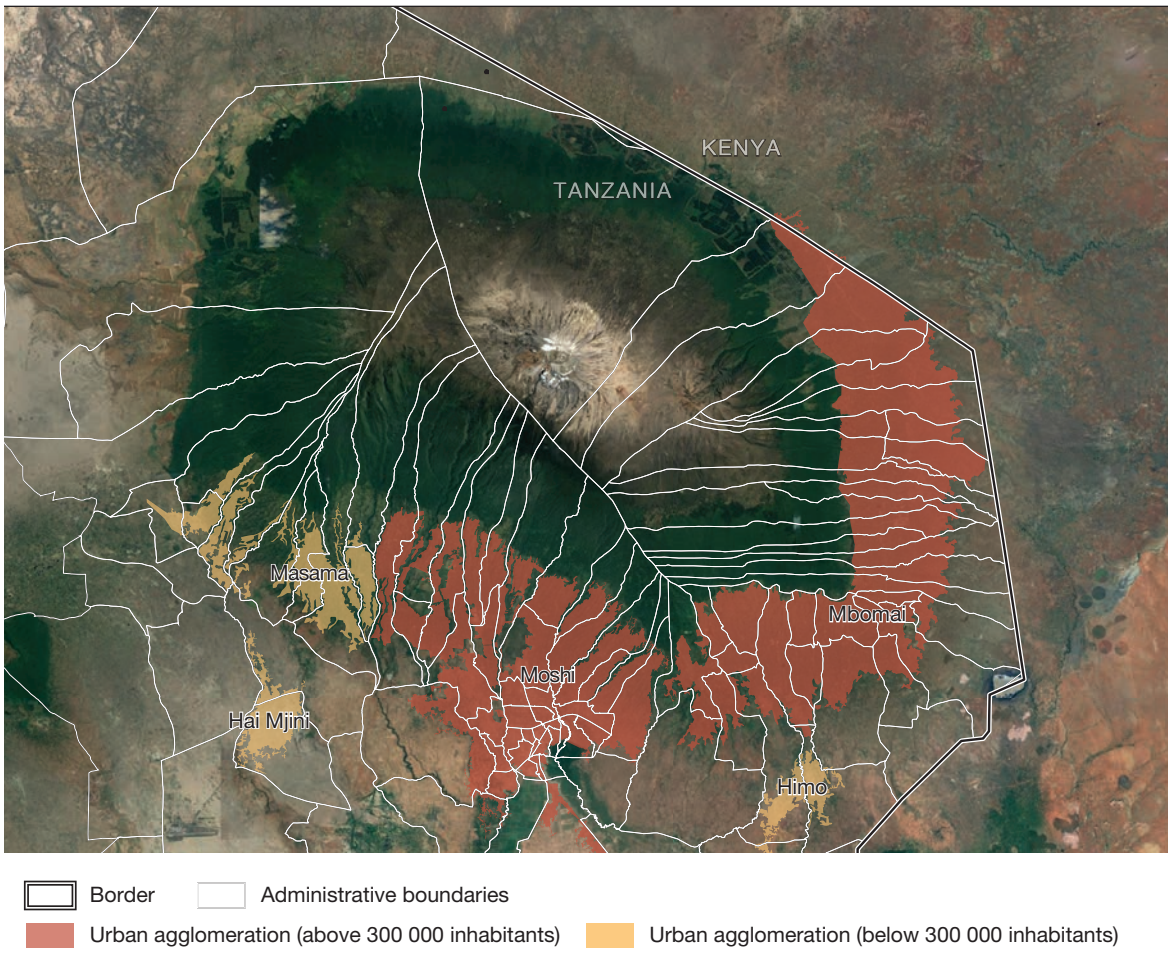
Urbanisation and protected areas

The case of protected territories illustrates agglomeration processes that are generated by a spatial prohibition on settlement. By excluding any construction and activity on a block of land, habitable and cultivable land is mechanically "subtracted" at the regional level. Mapping the built-up areas of agglomerations shows the emergence of agglomerations that line the borders of protected territories as in Malawi, Kenya, Uganda, South Africa, the DRC (Kivu), Tanzania, and even Botswana (Images 4.2 and 4.3). These agglomeration-building processes are more similar to the hyper-urban forms of large metropoles rather than rural forms.

Visitors of national parks are mainly international, while the local population are sensitised by international communication campaigns. The flow of visitors generates activities — transport and hotel services and artisanal or industrial production. Agricultural activity is in many cases export-oriented — tea, coffee, bananas, frozen

Image 4.3

The Kilimanjaro massif surrounded by urbanisation



Note: At the bottom of the snow covered slopes of Kilimanjaro, the massif is surrounded by urban agglomerations with a combined population of one million inhabitants in 2015.The Kilimanjaro scenario is similar to that of Mount Kenya, with a strong dissymmetry between the south and east and north-west due to unequal rainfall conditions. In 2015, the agglomeration of Moshi had 480 000 inhabitants, half of whom live in the city. The agglomeration of Mbomai with 450 000 inhabitants, on the other hand, is totally spontaneous and not recognised as "urban" or even "semi-urban" by the Tanzanian statistical definition. Unlike Kenya, the protected massif is not established as a single administrative unit, but rather shared between neighbouring communities.

The asymmetry between upstream and downstream, visible in both examples displays the unequal intrinsic value of land, and therefore the hierarchy of appropriation faced with an attractor of a purely political nature: the legal boundaries of a park.

Sources: *Google Earth* (accessed December 2018); OECD/SWAC 2018, Africapolis (database); Geopolis 2018 - Map: François Moriconi-Ebrard

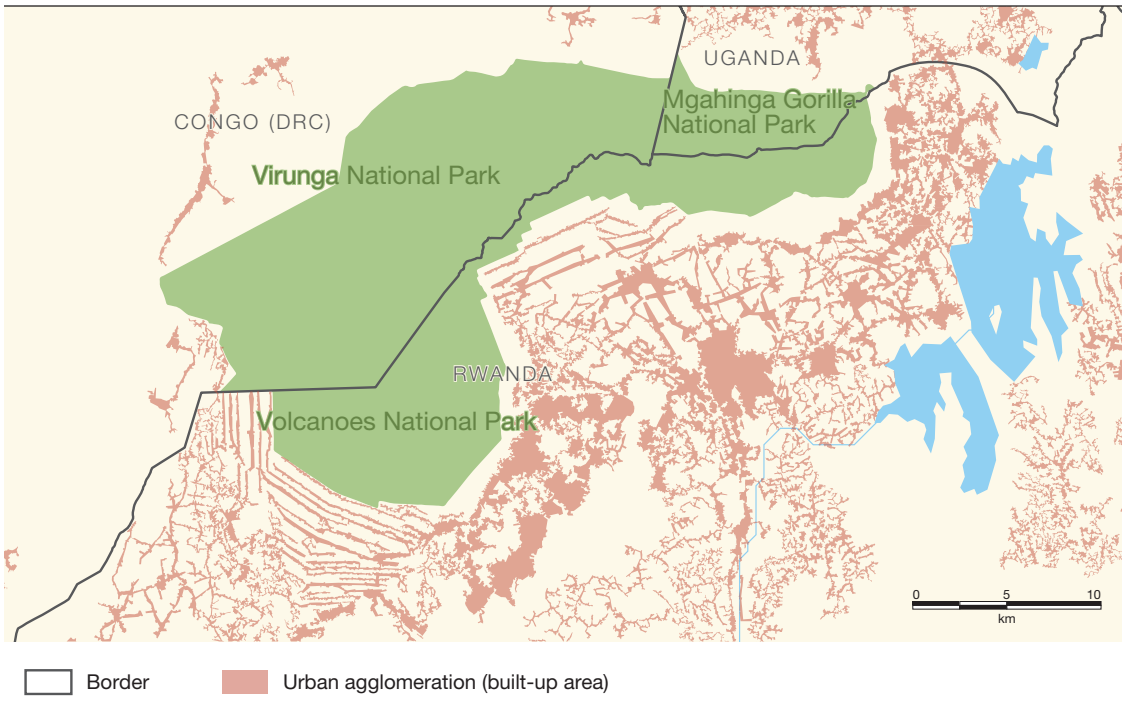
vegetables. The influx of money partly supports the social and economic costs of conserving, monitoring and protecting nature reserves.

However, in certain cases a strategy of exclusion simply displaces the problem and challenges of urban concentration. The social cost may become too large. Its effect is to polarise the human settlement along its edges, thus establishing the optimum conditions for a urbanisation to take place. This model is more or less true depending on local conditions. However, it is acts as a generator of agglomerations throughout Africa, like on the edges of Mount Kenya and the slopes of Kilimanjaro. The protection of natural areas should be accompanied more systematically by compensatory measures, such as relocation programmes. In their absence, two options are available to populations: migration to a city, or a spontaneous rural-to-rural movement, likely to create tensions if not properly anticipated and accompanied.

Box 4.4
Environment and geopolitics

Several national parks are shared between the territories of the DRC (Virunga Park), Rwanda and Uganda. The Virunga National Park is one of the last reserves of mountain gorillas on the planet (Map 4.10). In this region, human density is very high. The park was, in 2015, almost entirely encircled by agglomerations, otherwise not recognised as urban according to official statistics.

Map 4.10
Virunga National Park, border between DRC, Rwanda and Uganda



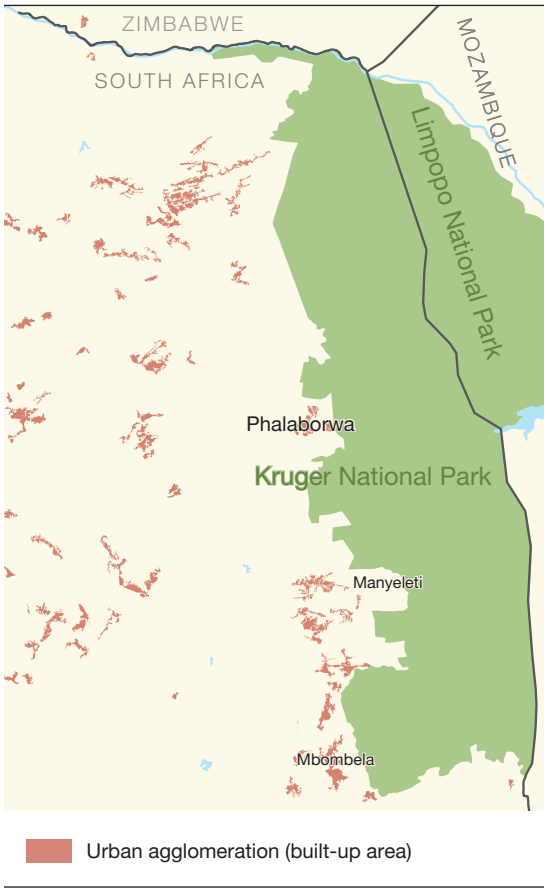
Sources: OECD/SWAC 2018, Africapolis (database); Geopolis 2018 - Map: François Moriconi-Ebrard

Prospects for sustainable development

As long as cities are spread out from one another across a low-density rural environment, they can be represented as simple points on a map. Until the 1990s, aspatial — demographic or economic — approaches provided satisfactory results. They relied on the natural dynamics and net-migratory flows of populations as well as on economic growth parameters, without integrating spatial factors. However, with rapid population growth, the situation has changed, and factors related to spatial distribution are now essential. As the continent's population has doubled, urbanisation is now taking place through rural densification and outside of the traditional administrative boundaries of cities. Urban areas are incorporating their peripheral areas and populations into increasingly larger urban agglomerations. The density of previously rural areas is reaching pivotal levels and urbanisation is spreading to an extent which policies have not sufficiently anticipated in terms of volume, form and type. These densely populated areas concentrate the continent's largest rural populations. For example, the Lower Nile

Map 4.11

Urbanisation and protected areas in southern Africa along the border with Mozambique



This protected region is located at the intersection of three national borders with strong geopolitical implications, establishing a *de facto* space between countries that have experienced episodes of war and tension. Similarly, Kruger National Park and its adjacent areas form an uninhabited block of more than 20 000 square kilometres (Map 4.11). The park establishes a buffer, where access and traffic inside the protected area are controlled, between the people of South Africa and Mozambique, a country devastated for years by civil war. By establishing no man's lands along the borders, the geography of the protected areas could be akin to the military strategy of the glacis.

The vacancy of a territory implies a densification of the human population in the peripheral areas. The immediate vicinity of the borders of the coveted areas can also suit the richest populations, national elites or international groups. Spatial prohibition enacted in the name of public concern can then trigger practices of land speculation.

Note: Protected areas are classified from I to VI according to their level of protection, which goes from the prohibition of access to different forms of legal occupations. Kruger Park is surrounded by territories of different categories, including hunting reserves and large properties for tourists. Spontaneous and very extensive agglomerations emerge further away, where the population lives on subsistence farming and remittances. Most of these agglomerations were born during the apartheid era. Today, as a result of emigration, they have very low or even negative population growth.

Sources: OECD/SWAC 2018, Africapolis (database); Geopolis 2018 - Map: François Moriconi-Ebrard

Valley, the Highlands of Africa, the Great Lakes, Ethiopia, and southeast Nigeria make up about one-third of the continent's population.

The border between urban and rural areas is becoming increasingly blurred: the development of agglomerations through the in situ densification of rural areas is creating urban forms characterised by relatively low densities. This new type of development questions the link between "urban" and "density" and thus the traditional morphological concept of agglomerations that is based solely upon the concentration of buildings, activities or populations within a restricted space. Once again, the integration of context and scale interactions early on in the definition of urban policies is crucial.

From an environmental perspective, the interactions between natural environments are illustrative of a global trend that seeks to address climate-related and other issues according to the specific forms of urbanisation that are already in place. Whilst the African countryside is urbanising, OECD countries are trying to reintroduce nature, micro-agriculture and proximity into their cities. Finding a balance and reconciling urban and sustainability concerns by building

on existing adaptation strategies is a major challenge for development policies in Africa. A territory can become urban while remaining moderately dense, adopting an urban development model that is more adapted to the diversity of African needs and which fulfils sustainable development and international climate change objectives. Local responses to the challenges and opportunities that arise do, in certain cases, exist and should be heard.

The last three decades of African urbanisation have seen the considerable spatial extension of agglomerations. Cities are, for the most part, horizontal, requiring daily commutes of more or less long distances, creating challenges in terms of congestion, transportation, "smart" development, pollution and social fragmentation. Rapid urbanisation, especially in developing countries, poses increasing challenges for the balance between populations and resources and between the available and efficient use of land. A city is a complex system that cannot be reduced to a single dimension, be it demographic, economic or social (Campaud, 1991). Several aspects must be considered simultaneously and coherently in spite of the rapidity of urban growth. Following COP 21 and the Paris Agreement, cities were recognised as important drivers of resilience to climate change. This momentum on the part of citizens, governments and international actors could help open the door to development opportunities, in particular, through climate finance.

Urban agglomerations are an essential factor of development, not only because of the boom in services and industrial sector employment but also through the development links with rural areas and with territories in general.

The need to observe and analyse urban growth in relation to surrounding environments in the medium to long-term is crucial. This is one of the many environmental challenges that all countries, with their urban diversities, must tackle.

Notes

1 Cited by Joan Clos, Habitat III, Quito, October 2016.

2 Gross domestic product: Annual estimates 2002–10, Regional estimates 2002–10, Third quarter 2011 (PDF) (Report). Statistics South Africa (29 November 2011. p. 31).

3 www.nigerianstat.gov.ng

4 This notion is officially used only in certain countries and under different terms: metropolitan areas in the United States, urban areas in France, metropolis region in Brazil, etc. In general, this concept refers to that of an extended metropolis.

5 https://statbel.fgov.be/fr/open-data/agglomerations-200m

6 The Bantustans were the regions created during the apartheid period in South Africa and south-west Africa, reserved for black populations that had varying degrees of autonomy.

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Annexe A

Processing satellite images

The objective of this procedure is to replace the manual digitisation of urban agglomerations carried out using *Google Earth* satellite images, which represent an incomparable source of very high-resolution images for the entire African continent.

The procedure for extracting/identifying urban areas/surfaces is sub-divided into two sequences: one which corresponds to dry zones (approximately <800 mm of precipitation per year) and the second to wetlands (approximately> 800 mm of precipitation per year) (Graph A.1).

The images are initially (typical image size is 4 800 x 3 500 pixels) converted to grey-tinted images ("2a" and "3a", Figure A.1) and they are automatically georeferenced from the centre co-ordinates of the image and the co-ordinates of the lower right-hand corner. The contrast between urban areas and their surroundings is enhanced using a method proposed by Mering et al. (2010), which is based on the use of morphological filters. The combination of the "White Top Hat" and "Black Top Hat" ("2b") filters makes it possible to extract the "salt and pepper" texture which results from "the overlapping of lightly-shaded buildings, of roads and of shadows cast by dark-hued buildings" (Baro et al., 2014). Subsequently, a closure by reconstruction is made to smooth the images ("2c"). Finally, the application of "high thresholding" makes it possible to isolate urban areas in a binary mask ("2d" and "3c"). In a second phase, the images undergo further processing to remove portions of certain structures (from roads, rivers or beaches) which might be misconstrued as urban and which would therefore skew the estimation of urban areas ("2e" and "3e "). Next, "holes" in the images are filled and the final product is cross-referenced against a vectoral database of points corresponding to the centroids of agglomerations of more than 10 000 inhabitants, so as to retain only the agglomerations targeted by Africapolis. The outlines of the agglomerations are shown in Images A.1 ("f") and A.2 ("f"). A final visual check is made to correct any classification errors.

The image processing sequence for wetlands follows the sequence outlined above with a few important additional steps. The accentuated spectral contrast between the urban area and its environment makes it possible, in wetlands, to use "high thresholding" on the grey-tinted image ("b", Image A.2). The overlapping of the two binary masks ("d", Image A.2) makes it possible to extract the urban areas by applying a selection based on both the texture and the spectral response of the surfaces (the grey levels). Some misclassified areas of Lagos Lake were eliminated using this process (yellow portions in "d", Image A.2). Finally, a specific algorithm is applied which gathers all of the pixels that belong to one agglomeration and that are located within 200 metres of one another. The application of this algorithm is particularly important in wetlands where populations are often widely dispersed ("f", Image A.2).

Figure A.1
Image processing sequences (simplified)

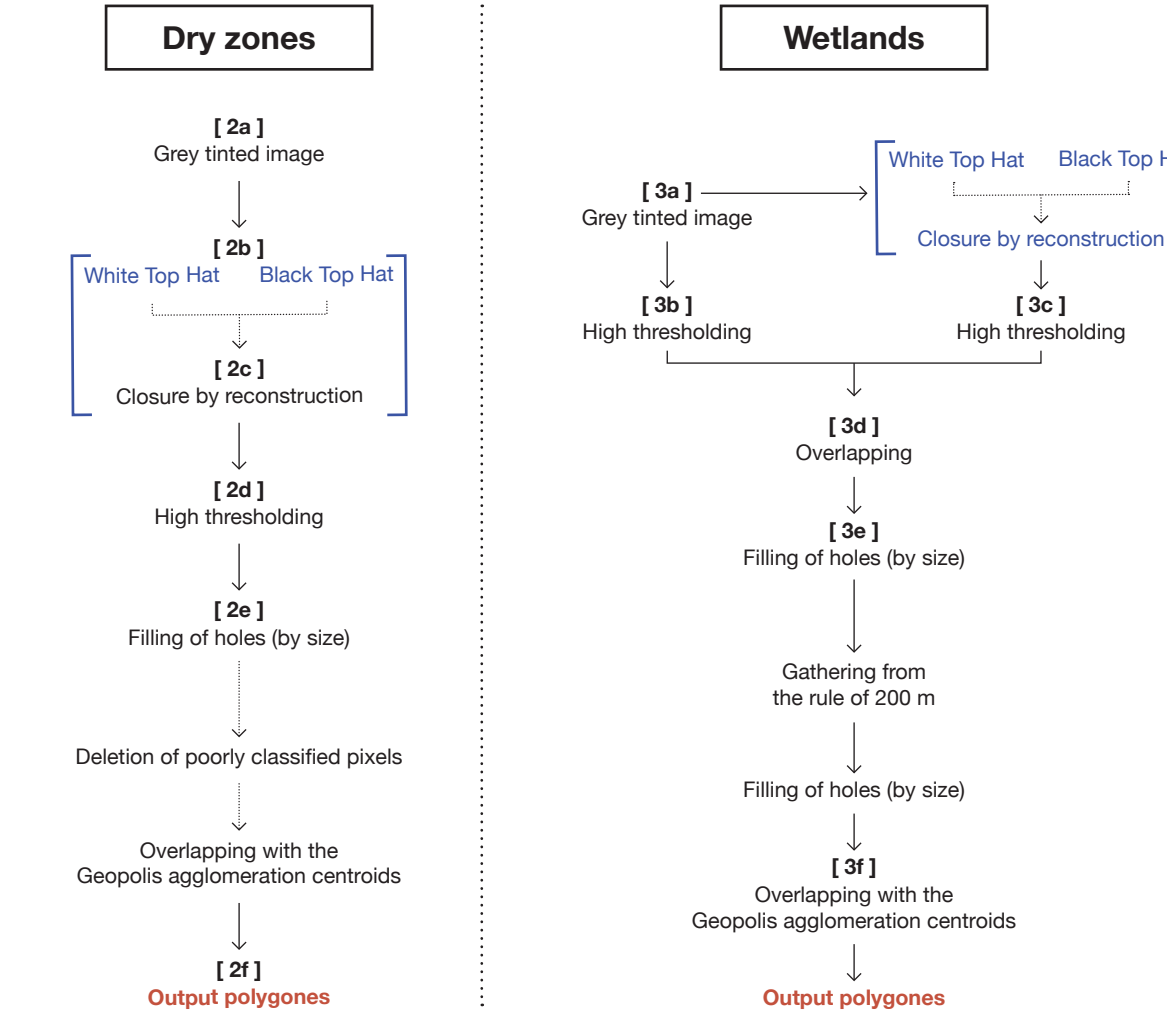
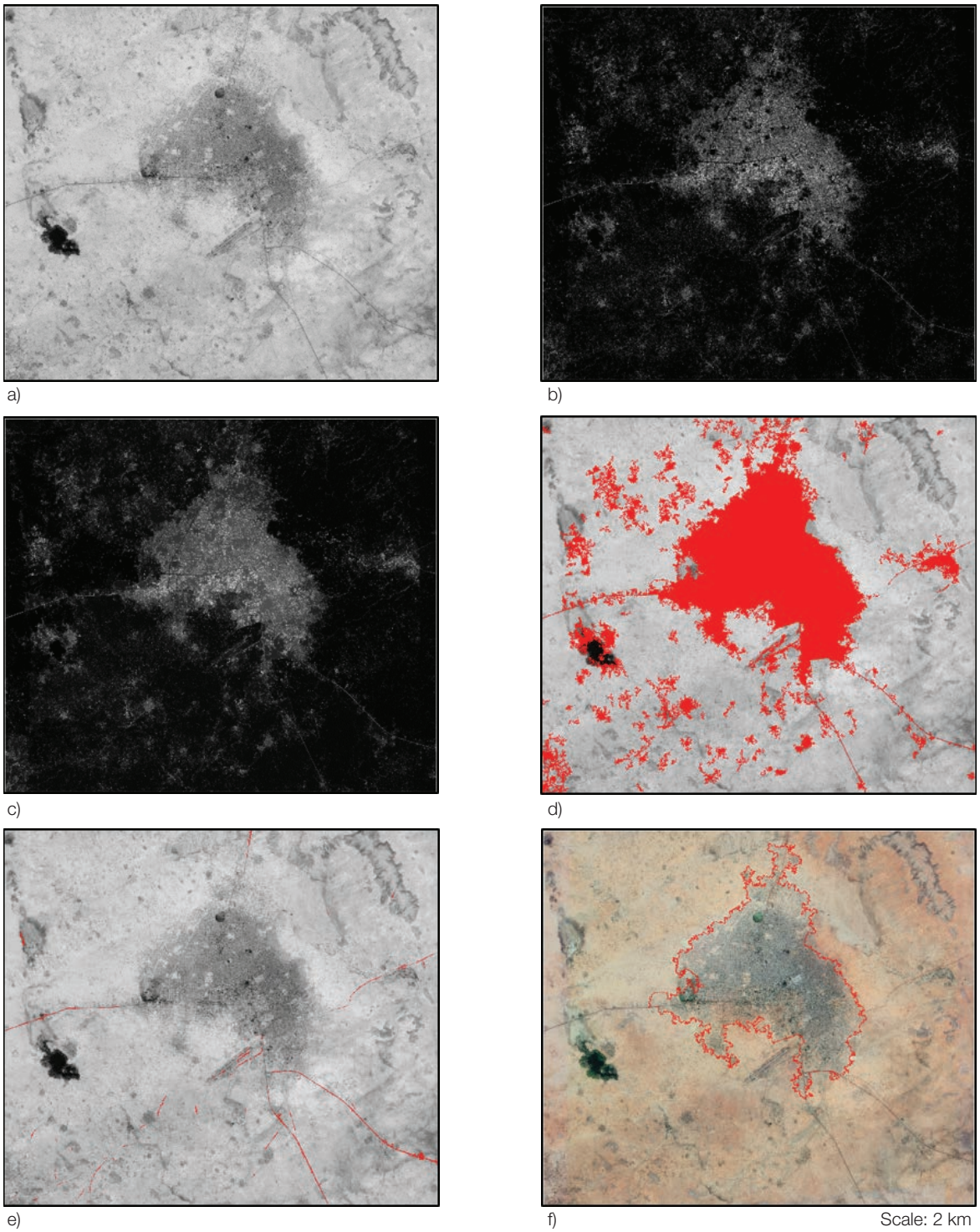


Image A.1

Image processing sequence (dry zone), Zinder (Niger)

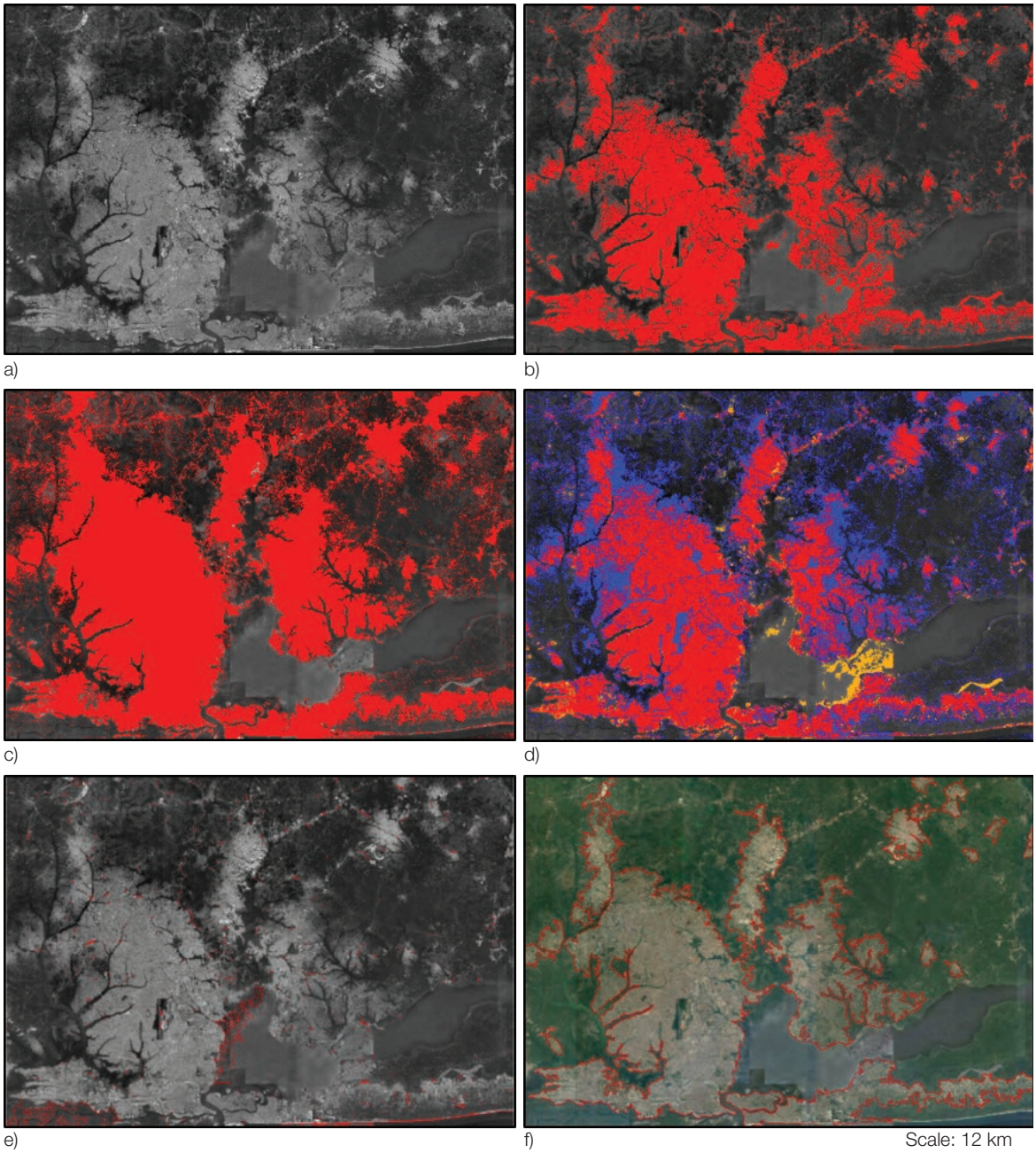


Notes: a) Original image in shades of grey; b) Application of morphological filters on the grey-tinted image. Sum of White Top Hat and Black Top Hat; c) Closure by reconstruction of image “b”; d) Binary image obtained through the "high thresholding" of image "c"; e) Deletion of pixels that could be misclassified; f) Final outline of the agglomeration after cross-referencing with the Geopolis database.

Source: *Google Earth* (accessed February 2018)

Image A.2

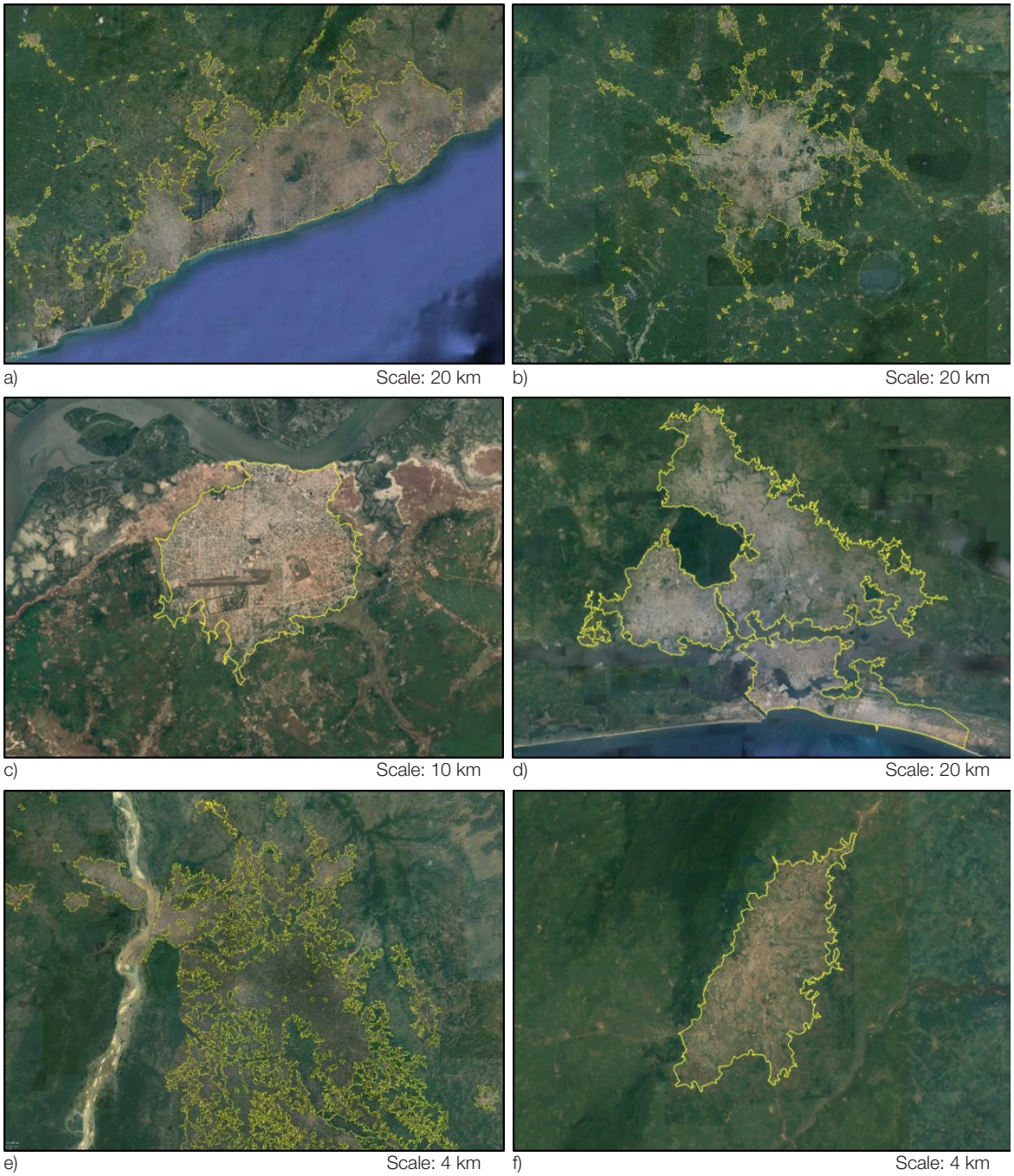
Image processing sequence (wetlands), Lagos (Nigeria)



Note: a) Original image in shades of grey; b) Binary mask obtained from the "high thresholding" of the grey-tinted image; c) Binary mask obtained from the "high thresholding" of the image to which morphological filters have been applied; d) Overlapping of “b” and “c”. The red corresponds to the parts that are perfectly overlapped, the yellow to portions only visible in image “b” and the blue to portions only visible in image “c”; e) Deletion of pixels that could be misclassified; f) Final outline of the agglomeration after cross-referencing with the Geopolis database.

Source: *Google Earth* (accessed February 2018)

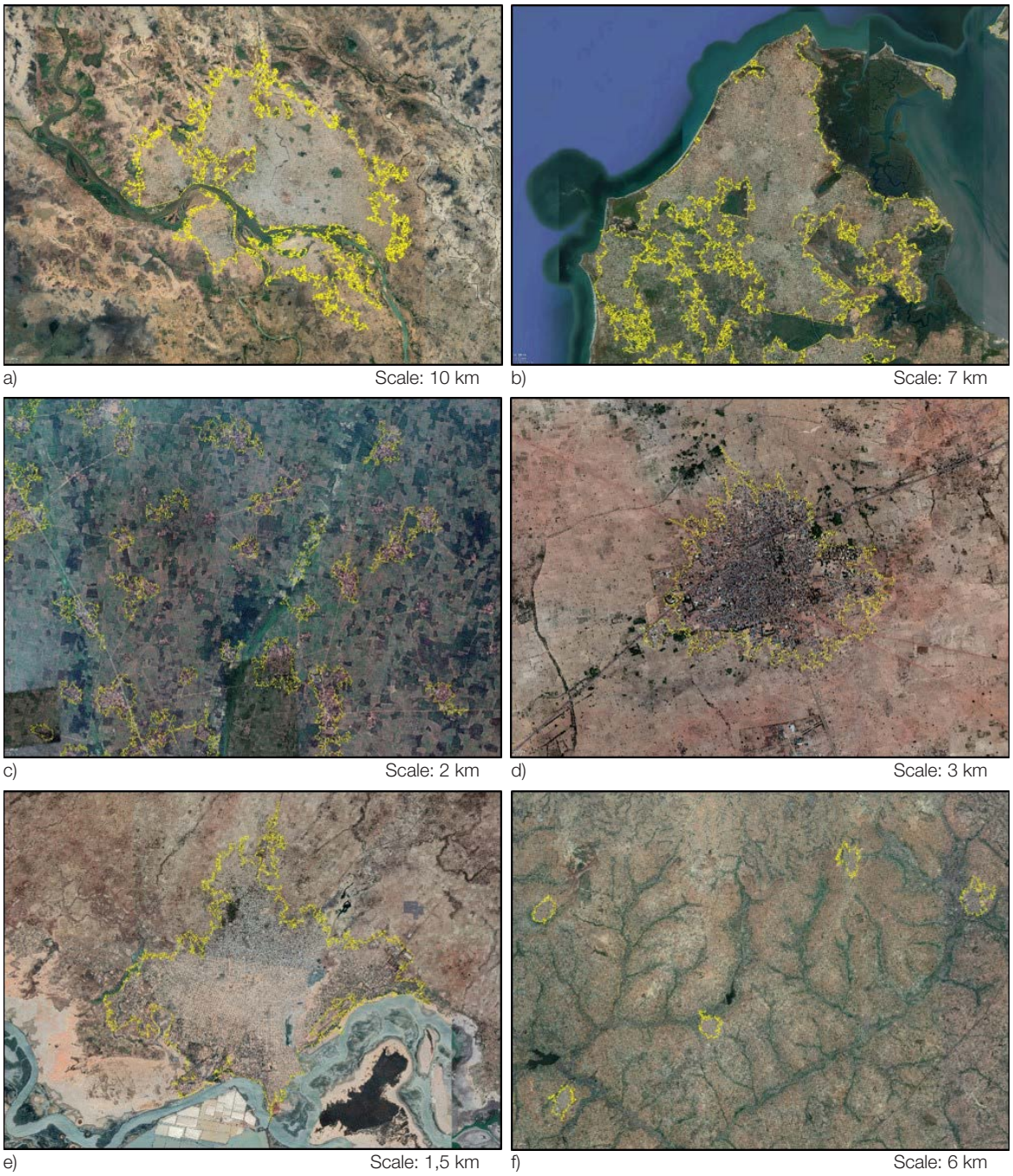
Image A.3
Wet zone agglomerations



Note: a) Accra (Ghana), b) Kumassi (Ghana), c) Abidjan (Côte d'Ivoire), d) Onitsha (Nigeria), e) Ziguinchor (Senegal), f) Kenema (Sierra Leone).
Source: *Google Earth* (accessed February 2018)

Image A.4

Dry zone agglomerations with exceptions



Note: a) N'Djamena (Chad), b) Banjul (Gambia), c) Tambawel (Nigeria), d) Kaolack (Senegal), e) cluster of small urban agglomerations (Togo), f) cluster of small urban agglomerations (Nigeria).

Source: *Google Earth* (accessed February 2018)

Annexe B

Urban population

(in millions)

Country	1950	1960	1970	1980	1990	2000	2010	2015
Algeria	1.5	3.1	4.6	6.9	10.9	16.2	22.4	26.3
Angola	0.2	0.4	0.8	1.5	2.6	4.2	10.3	15.9
Benin	0.1	0.2	0.4	0.8	1.3	2.1	3.6	5.3
Botswana	0	0	0.1	0.2	0.5	0.8	1.1	1.2
Burkina Faso	0.1	0.1	0.3	0.7	1.4	2.4	4.1	5.3
Burundi	0.0	0.0	0.1	0.2	0.3	0.5	1.7	2.1
Cabo Verde	0.0	0.0	0.1	0.1	0.1	0.2	0.2	0.3
Cameroon	0.3	0.5	1.1	2.2	4.1	5.9	10.3	12.8
Central African Republic	0.0	0.1	0.4	0.7	0.9	1.3	1.6	1.8
Chad	0.1	0.1	0.3	0.6	0.1	1.6	2.9	3.9
Congo	0.1	0.2	0.4	0.8	1.3	1.9	2.8	3.1
Côte d`Ivoire	0.1	0.4	1.2	2.8	4.7	7.0	9.8	11.5
Democratic Republic of the Congo	0.6	1.7	4.7	6.9	10.6	13.9	21.7	32.0
Djibouti	0.0	0.0	0.1	0.2	0.3	0.4	0.6	0.7
Egypt	8.5	12.2	17.2	24.6	36.0	47.0	68.5	84.4
Equatorial Guinea	0.0	0.1	0.1	0.1	0.1	0.4	0.5	0.8
Eritrea	0.1	0.2	0.3	0.4	0.5	0.7	0.9	1.2
Eswatini	0	0	0.0	0.1	0.1	0.3	0.3	0.3
Ethiopia	0.5	0.8	1.3	2.4	3.9	6.5	11.1	24.3
Gabon	0.0	0.0	0.1	0.2	0.5	0.9	1.2	1.5
Gambia	0.0	0.0	0.1	0.1	0.3	0.6	0.9	1.1
Ghana	0.4	1.1	2.1	2.9	4.3	7.1	11.9	14.2
Guinea	0.1	0.2	0.6	0.1	1.7	2.4	3.3	4.0
Guinea-Bissau	0.0	0.0	0.1	0.1	0.2	0.3	0.5	0.5
Kenya	0.3	0.5	0.1	2.1	3.6	10.6	19.1	28.6
Lesotho	0	0.0	0.1	0.1	0.2	0.3	0.5	0.5
Liberia	0.0	0.1	0.2	0.5	0.8	1.0	1.5	1.7
Libya	0.6	0.8	1.1	2.0	3.3	4.2	4.4	4.4
Malawi	0.0	0.1	0.2	0.5	0.9	1.4	3.8	4.8
Mali	0.2	0.2	0.4	0.1	1.5	2.5	4.6	5.7
Mauritania	0	0	0.1	0.3	0.7	0.8	1.3	1.7
Morocco	2.2	3.2	4.8	7.3	10.5	14.1	17.2	19.9
Mozambique	0.1	0.3	0.6	1.6	2.4	4.8	7.1	8.9
Namibia	0.0	0.0	0.1	0.2	0.3	0.5	0.8	0.9
Niger	0.0	0.1	0.2	0.5	1.1	1.7	2.5	3.3
Nigeria	3.6	8.4	12.4	20.2	32.7	48.6	76.9	99.0
Rwanda	0.0	0	0.1	0.2	0.4	2.0	5.3	6.3
Sao Tome and Principe	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2

(in millions)

Country	1950	1960	1970	1980	1990	2000	2010	2015
Senegal	0.4	0.6	1.1	2.0	3.1	4.0	5.9	7.2
Sierra Leone	0.1	0.2	0.3	0.6	0.9	1.3	1.9	2.6
Somalia	0.2	0.3	0.5	0.8	1.3	2.1	3.4	4.6
South Africa	4.1	5.7	7.8	10.8	14.4	24.6	33.7	38.2
South Sudan	0.0	0.0	0.2	0.3	0.5	0.8	2.4	3.4
Sudan	0.5	0.9	1.7	3.0	5.4	8.9	13.2	16.3
Tanzania	0.2	0.4	0.9	2.1	3.8	10.0	15.4	18.6
Togo	0.1	0.2	0.4	0.7	0.9	1.3	2.6	3.4
Tunisia	0.8	1.0	1.5	2.3	3.6	4.8	6.0	7.0
Uganda	0.0	0.2	0.5	0.7	1.9	3.4	5.7	14.0
Zambia	0.3	0.6	1.1	2.1	2.5	3.4	5.2	6.9
Zimbabwe	0.4	0.9	0.9	1.5	2.5	3.4	4.2	4.8
Africa	27.2	46.3	74.5	119.9	186.5	285.3	436.8	567.1
Central Africa	1.1	2.7	6.8	11.1	17.8	24.8	40.0	54.1
East Africa	1.9	3.3	6.5	12.2	21.6	45.4	77.1	117.9
North Africa	13.6	20.3	29.1	43.1	64.2	86.3	118.6	142.0
Southern Africa	5.2	7.9	11.7	18.5	26.3	43.7	66.8	82.4
West Africa	5.3	12.1	20.3	34.9	56.5	85.0	134.3	170.6

Annexe C

Urban population growth

(annual compound growth rate, in %)

Country	1950-60	1960-70	1970-80	1980-90	1990-2000	2000-10	2010-15
Algeria	7.3	4.0	4.2	4.7	4.0	3.3	3.2
Angola	5.7	7.3	7.1	5.3	4.9	9.4	9.1
Benin	11.2	4.9	8.5	4.8	4.8	5.3	8.1
Botswana	0.0	0.0	12.0	7.7	4.4	2.9	2.8
Burkina Faso	5.3	8.3	8.4	7.0	5.7	5.4	5.0
Burundi	10.0	6.9	6.5	4.7	5.1	13.8	4.0
Cabo Verde	12.1	4.8	4.5	3.4	4.6	3.1	2.8
Cameroon	4.6	8.7	7.0	6.1	3.9	5.6	4.4
Central African Republic	14.1	10.4	5.7	3.3	3.2	2.7	2.2
Chad	9.2	8.7	6.3	5.2	4.8	6.5	5.9
Congo	5.4	8.0	8.0	5.1	3.7	3.9	2.2
Côte d`Ivoire	13.9	12.1	8.4	5.5	4.1	3.4	3.3
Democratic Republic of the Congo	11.7	10.5	4.0	4.4	2.8	4.6	8.0
Djibouti	1.6	9.0	7.6	4.0	3.6	4.3	3.0
Egypt	3.7	3.5	3.7	3.9	2.7	3.8	4.3
Equatorial Guinea	1.7	1.0	1.3	2.3	15.2	3.4	7.5
Eritrea	2.5	6.2	1.9	2.6	4.2	2.3	4.7
Eswatini	0.0	0.0	5.4	5.1	9.2	1.4	0.9
Ethiopia	4.5	5.6	5.9	5.0	5.3	5.4	17.1
Gabon	16.0	8.3	8.6	8.1	5.4	3.7	3.9
Gambia	-0.2	9.7	8.3	7.7	6.7	4.6	4.7
Ghana	10.7	6.3	3.4	3.9	5.2	5.3	3.7
Guinea	9.8	9.7	5.5	5.5	4.0	3.1	4.0
Guinea-Bissau	0.8	9.1	0.9	5.0	4.6	3.6	2.2
Kenya	7.4	6.0	8.0	5.6	11.4	6.1	8.3
Lesotho	0.0	16.1	5.6	6.4	6.7	4.1	2.5
Liberia	11.0	12.5	8.8	4.6	3.1	3.5	3.2
Libya	2.9	3.3	5.6	5.2	2.7	0.4	0.0
Malawi	15.2	7.6	8.1	6.9	4.9	10.2	5.1
Mali	3.5	7.5	8.2	4.2	5.5	6.3	4.4
Mauritania	0.0	0.0	14.2	8.8	1.6	4.8	5.2
Morocco	3.7	4.2	4.2	3.7	3.0	2.0	2.9
Mozambique	6.8	8.4	10.6	4.0	7.1	4.0	4.7
Namibia	9.1	8.2	4.8	6.5	4.9	4.2	2.9
Niger	13.7	9.8	9.2	7.7	4.6	3.9	5.5
Nigeria	8.8	4.0	5.0	4.9	4.0	4.7	5.2
Rwanda	0.0	0.0	12.3	4.9	18.5	10.3	3.8
Sao Tome and Principe	1.1	10.5	4.6	3.3	2.0	5.0	3.9

(annual compound growth rate, in %)

Senegal	3.1	5.8	6.5	4.5	2.8	3.8	4.0
Country	**1950-60**	**1960-70**	**1970-80**	**1980-90**	**1990-00**	**2000-10**	**2010-15**
Sierra Leone	5.7	7.8	6.4	4.0	3.4	3.9	6.5
Somalia	5.7	5.7	6.0	4.6	4.7	5.2	5.8
South Africa	3.3	3.3	3.3	2.9	5.5	3.2	2.6
South Sudan	9.5	13.5	7.1	4.8	5.3	10.9	7.4
Sudan	5.0	6.9	5.8	6.1	5.0	4.1	4.3
Tanzania	8.0	7.7	9.1	6.1	10.1	4.4	3.8
Togo	11.9	9.3	5.3	2.7	3.8	7.5	5.5
Tunisia	2.7	3.6	4.8	4.4	3.0	2.2	3.1
Uganda	17.0	9.8	3.2	10.1	6.1	5.4	19.8
Zambia	7.1	6.3	6.2	1.9	3.4	4.3	5.6
Zimbabwe	8.0	0.0	5.5	5.5	2.9	2.1	2.8
Africa	5.5	4.9	4.9	4.5	4.3	4.4	5.4
Central Africa	9.2	9.8	5.0	4.8	3.3	4.9	6.2
East Africa	5.8	6.9	6.5	5.8	7.7	5.4	8.9
North Africa	4.1	3.7	4.0	4.1	3.0	3.2	3.7
Southern Africa	4.3	3.9	4.7	3.6	5.2	4.3	4.3
West Africa	8.5	5.3	5.6	5.0	4.2	4.7	4.9

Annexe D

Level of urbanisation

(in percentage)

Country	1950	1960	1970	1980	1990	2000	2010	2015
Algeria	17	30	34	39	44	53	62	66
Angola	5	8	14	21	26	30	50	63
Benin	5	10	14	24	28	33	40	49
Botswana	0	0	13	28	41	49	53	56
Burkina Faso	3	3	6	11	16	21	25	29
Burundi	1	2	3	4	6	7	20	21
Cabo Verde	7	16	19	26	31	39	47	50
Cameroon	9	11	19	27	35	39	52	55
Central African Republic	3	12	22	29	33	35	36	37
Chad	3	5	9	13	17	19	26	29
Congo	15	20	33	50	60	65	66	66
Côte d`Ivoire	4	12	23	34	41	46	48	49
Democratic Republic of the Congo	5	12	22	25	29	29	35	45
Djibouti	64	48	61	75	80	82	71	72
Egypt	41	47	53	61	69	74	86	93
Equatorial Guinea	25	24	25	25	26	43	47	62
Eritrea	12	12	18	16	15	26	23	24
Eswatini	0	0	9	11	13	26	28	28
Ethiopia	3	4	5	7	8	11	14	27
Gabon	3	10	20	30	55	65	73	81
Gambia	9	8	15	23	33	45	52	56
Ghana	8	17	25	26	30	39	49	52
Guinea	4	8	14	18	25	32	34	37
Guinea-Bissau	9	9	24	16	22	28	31	34
Kenya	5	7	9	13	16	36	49	65
Lesotho	0	2	5	6	10	17	25	26
Liberia	3	7	16	28	32	35	40	42
Libya	65	60	56	64	76	80	81	81
Malawi	1	3	5	7	10	14	27	30
Mali	4	5	9	15	18	23	30	32
Mauritania	0	0	7	21	36	33	41	42
Morocco	25	27	32	38	45	51	55	60
Mozambique	2	4	7	14	18	29	33	34
Namibia	5	9	14	17	23	29	37	40
Niger	1	3	5	9	14	16	16	17
Nigeria	11	21	25	31	38	42	48	53
Rwanda	1	0	2	4	5	26	59	56
Sao Tome and Principe	17	7	42	52	58	60	74	80
Senegal	21	24	28	35	42	42	47	51

(in percentage)

Country	1950	1960	1970	1980	1990	2000	2010	2015
Sierra Leone	5	7	14	20	24	28	32	37
Somalia	8	12	14	17	17	23	32	36
South Africa	33	36	42	45	40	56	66	70
South Sudan	1	2	6	7	8	12	25	27
Sudan	8	11	15	21	30	36	40	43
Tanzania	2	4	7	11	16	31	36	38
Togo	5	11	20	25	25	28	43	50
Tunisia	23	25	29	37	45	51	57	63
Uganda	1	3	5	6	11	15	18	39
Zambia	13	19	27	36	33	34	40	44
Zimbabwe	18	26	17	21	26	30	33	34
Africa	13	18	22	27	32	38	44	50
Central Africa	6	11	19	23	29	30	38	46
East Africa	4	6	8	11	14	23	30	39
North Africa	32	38	42	49	57	63	72	79
Southern Africa	17	21	24	28	29	39	48	52
West Africa	9	15	20	26	32	37	42	46

Annexe E

Metropolitan population

(share of urban population in %)

Country	1950	1960	1970	1980	1990	2000	2010	2015
Algeria	28	24	25	22	17	13	14	15
Angola	64	59	61	50	47	46	50	44
Benin	63	62	68	60	58	55	44	40
Botswana	0	0	18	21	26	26	28	30
Burkina Faso	88	79	74	64	60	56	57	56
Burundi	100	100	100	94	79	77	52	51
Cabo Verde	100	100	100	100	100	94	87	85
Cameroon	48	40	42	43	44	49	44	51
Central African Republic	100	60	53	51	49	50	51	52
Chad	42	48	47	49	47	44	33	31
Congo	100	93	89	84	81	81	79	78
Côte d`Ivoire	60	57	47	45	45	43	42	41
Democratic Republic of the Congo	45	37	33	37	41	39	33	29
Djibouti	100	100	100	100	100	100	82	81
Egypt	30	32	33	31	28	25	24	27
Equatorial Guinea	100	100	100	100	100	93	81	75
Eritrea	73	71	69	75	73	54	47	39
Eswatini	0	0	100	100	100	79	81	82
Ethiopia	72	70	59	54	46	37	27	15
Gabon	100	60	70	64	69	61	58	59
Gambia	0	0	44	59	69	69	71	70
Ghana	60	46	46	45	43	47	52	51
Guinea	41	55	63	61	54	51	53	54
Guinea-Bissau	100	100	100	89	87	91	82	78
Kenya	88	84	81	58	51	35	28	25
Lesotho	0	100	74	80	70	71	56	58
Liberia	100	100	71	61	69	73	67	69
Libya	27	35	39	37	36	38	44	44
Malawi	100	87	85	83	74	69	44	45
Mali	54	59	45	51	51	50	48	49
Mauritania	0	0	50	60	59	67	64	62
Morocco	39	40	40	37	33	29	29	30
Mozambique	69	70	75	44	44	31	27	29
Namibia	100	75	58	54	44	43	41	40
Niger	0	40	47	50	39	39	36	33
Nigeria	8	10	12	14	15	16	16	14
Rwanda	53	0	82	62	66	39	35	35
Sao Tome and Principe	0	0	63	73	76	77	68	84
Senegal	52	53	53	49	52	49	45	43

(share of urban population in %)

Country	1950	1960	1970	1980	1990	2000	2010	2015
Sierra Leone	81	71	60	58	58	57	56	56
Somalia	51	52	61	65	63	61	57	53
South Africa	47	52	50	48	43	36	40	39
South Sudan	100	38	25	23	22	20	13	11
Sudan	43	39	39	40	40	39	35	32
Tanzania	40	38	40	37	32	22	26	29
Togo	81	77	48	56	55	53	54	51
Tunisia	53	47	42	34	33	33	31	35
Uganda	75	66	65	65	46	43	42	27
Zambia	13	19	23	26	31	34	37	35
Zimbabwe	75	75	72	65	61	61	53	61
Africa	42	41	41	40	38	36	33	30
Central Africa	57	45	41	45	47	48	42	40
East Africa	62	59	56	52	47	40	34	27
North Africa	38	38	39	36	32	30	28	26
Southern Africa	61	61	58	52	49	43	41	41
West Africa	26	26	30	32	32	32	31	28

Annexe F

Number of agglomerations

Country	1950	1960	1970	1980	1990	2000	2010	2015
Algeria	34	72	105	147	238	385	460	475
Angola	5	7	11	18	26	40	75	96
Benin	4	7	9	20	27	42	80	122
Botswana	0	0	6	11	17	21	23	25
Burkina Faso	3	4	6	16	30	53	77	101
Burundi	1	1	1	2	4	6	26	33
Cabo Verde	1	2	2	2	2	3	4	4
Cameroon	12	19	32	48	70	76	137	147
Central African Republic	1	5	11	16	22	28	31	31
Chad	3	4	9	14	25	36	70	93
Congo	2	3	4	9	15	16	24	27
Côte d`Ivoire	3	9	29	54	76	119	180	220
Democratic Republic of the Congo	14	36	91	109	130	145	351	553
Djibouti	1	1	1	1	1	1	6	7
Egypt	210	284	385	595	894	1 194	1 293	1 061
Equatorial Guinea	2	2	2	2	2	3	8	13
Eritrea	4	5	6	6	7	17	19	26
Eswatini	0	0	2	2	2	5	5	5
Ethiopia	6	11	24	45	78	147	288	510
Gabon	1	2	2	5	7	12	13	14
Gambia	1	1	2	3	4	9	11	11
Ghana	10	35	50	63	86	138	181	209
Guinea	5	7	11	17	22	32	37	42
Guinea-Bissau	1	1	1	2	3	3	4	6
Kenya	4	6	11	26	48	145	235	126
Lesotho	0	1	2	2	4	6	10	10
Liberia	1	1	5	13	14	14	21	21
Libya	23	25	25	31	42	52	46	46
Malawi	1	3	4	6	13	19	65	77
Mali	5	5	14	18	24	42	79	94
Mauritania	0	0	4	7	15	12	20	23
Morocco	33	49	60	80	104	153	153	167
Mozambique	2	3	6	15	15	65	138	167
Namibia	1	2	4	7	12	16	18	17
Niger	2	4	6	10	24	37	48	68
Nigeria	99	210	310	478	583	784	1 013	1 236
Rwanda	2	0	2	6	8	52	40	41
Sao Tome and Principe	1	1	2	2	2	2	4	3
Senegal	8	9	13	27	36	45	59	74

Country	1950	1960	1970	1980	1990	2000	2010	2015
Sierra Leone	2	4	6	9	12	16	20	25
Somalia	4	11	13	16	22	28	42	49
South Africa	48	66	85	126	162	452	456	502
South Sudan	1	3	7	11	14	18	68	90
Sudan	13	21	35	50	77	142	221	301
Tanzania	7	13	19	43	77	233	264	249
Togo	2	4	15	17	19	25	45	53
Tunisia	17	24	31	50	68	73	82	89
Uganda	2	5	10	12	37	69	101	125
Zambia	8	9	14	23	25	41	58	80
Zimbabwe	8	13	14	18	26	30	50	53
Africa	618	1 010	1 519	2 310	3 271	5 102	6 759	7 617
Central Africa	34	69	145	193	252	288	594	821
East Africa	44	76	128	216	369	852	1284	1 524
North Africa	317	454	606	903	1 346	1 857	2 034	1 838
Southern Africa	73	104	148	228	302	695	898	1 032
West Africa	150	307	492	770	1 002	1 410	1 949	2 402

Annexe G

Average distance between agglomerations

(in km)

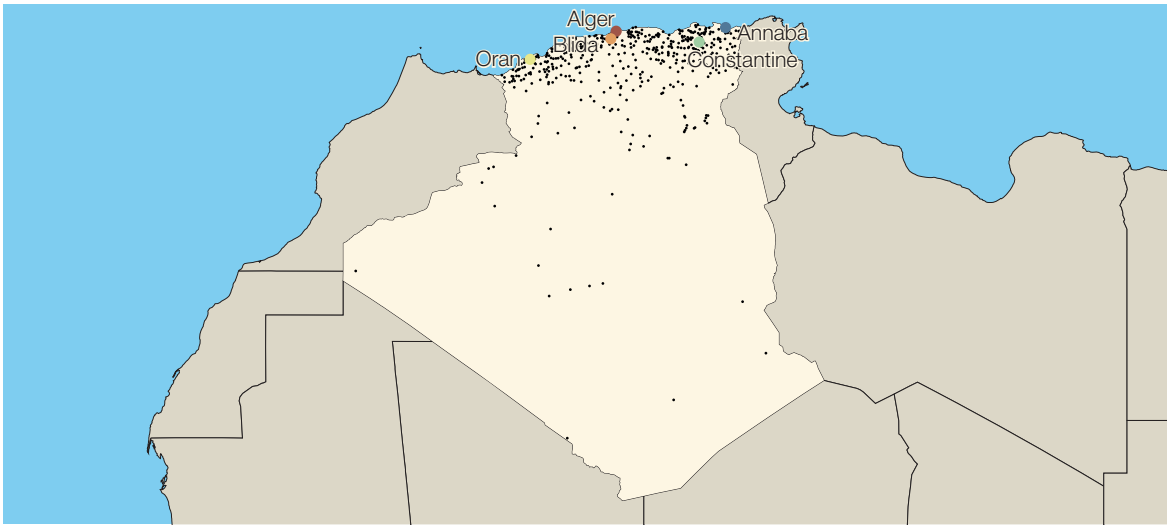
Country	1950	1960	1970	1980	1990	2000	2010	2015
Algeria	62	40	38	32	28	20	19	19
Angola	189	179	199	127	93	73	57	54
Benin	45	62	43	40	34	25	17	14
Botswana	0	0	79	92	59	53	59	55
Burkina Faso	141	143	135	58	52	38	34	28
Burundi	0	0	0	64	44	48	17	15
Cabo Verde	0	270	270	270	270	216	118	118
Cameroon	76	54	51	50	44	42	28	27
Central African Republic	0	228	105	90	79	81	82	82
Chad	312	380	160	95	82	81	46	46
Congo	376	168	116	100	86	83	67	65
Côte d'Ivoire	211	98	57	43	40	30	23	20
Democratic Republic of the Congo	211	146	81	72	67	66	34	29
Djibouti	0	0	0	0	0	0	35	31
Egypt	8	7	8	6	5	5	5	5
Equatorial Guinea	240	240	240	240	240	193	53	34
Eritrea	50	144	126	126	119	56	52	43
Eswatini	0	0	31	31	31	16	16	18
Ethiopia	174	123	72	56	47	37	24	19
Gabon	0	150	150	127	138	88	79	95
Gambia	0	0	11	14	38	28	11	11
Ghana	72	41	28	29	25	19	19	17
Guinea	113	97	85	72	68	53	50	45
Guinea-Bissau	0	0	0	110	69	69	50	40
Kenya	217	136	65	75	58	28	15	28
Lesotho	0	0	64	64	24	40	22	23
Liberia	0	0	33	68	59	56	32	35
Libya	47	45	66	82	57	56	62	63
Malawi	0	114	156	119	82	60	23	22
Mali	267	267	135	108	93	65	39	39
Mauritania	0	0	356	237	155	183	122	107
Morocco	51	42	43	45	37	28	29	29
Mozambique	719	804	257	134	122	55	26	29
Namibia	0	266	342	162	162	133	126	134
Niger	418	259	227	132	78	57	44	38
Nigeria	39	29	24	20	19	16	14	14

(in km)

Country	1950	1960	1970	1980	1990	2000	2010	2015
Rwanda	81	0	73	43	37	10	12	13
Sao Tome and Principe	0	0	7	7	7	7	10	12
Senegal	61	59	65	45	42	35	30	25
Sierra Leone	175	93	48	39	43	40	34	31
Somalia	249	77	107	118	104	86	70	65
South Africa	61	61	48	30	29	16	18	17
South Sudan	0	471	167	131	121	121	40	32
Sudan	211	115	73	61	49	34	29	25
Tanzania	217	150	145	80	56	23	22	24
Togo	41	107	42	35	35	29	21	18
Tunisia	44	35	31	25	22	22	21	20
Uganda	70	115	84	79	36	28	22	21
Zambia	95	84	109	93	99	74	70	56
Zimbabwe	125	85	83	62	59	59	39	34
Africa	58	48	43	35	29	23	21	20
Central Africa	163	140	83	73	67	66	38	34
East Africa	174	133	95	76	57	33	25	24
North Africa	23	20	23	19	16	13	13	14
Southern Africa	95	98	86	62	56	33	30	30
West Africa	69	52	43	35	33	27	22	21

Annexe H

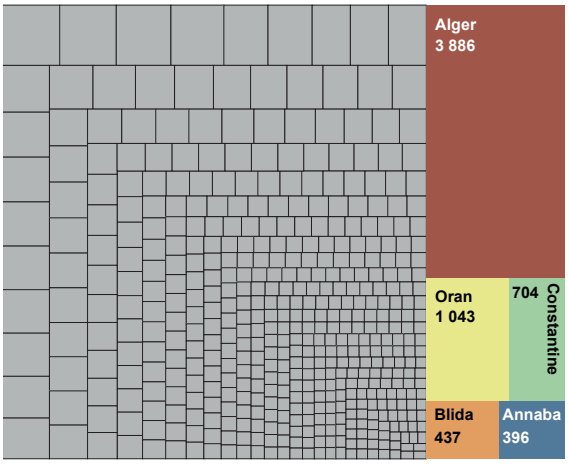
Statistical annex



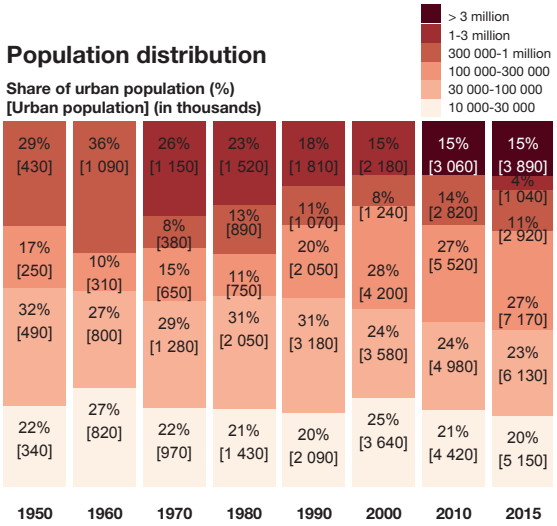
Algeria

Population	Total population **39 963 000**	Urban population **26 303 000**	Urbanisation level **66 %**
Agglomerations	Number of agglomerations **475**	Metropolitan population **15 %**	Average distance between agglomerations **19 km**
Density	Average urban density **3 744 hab./km²**	Urban land cover **7 025 km²**	Urban land cover/ total land cover **0.3 %**

Major agglomerations



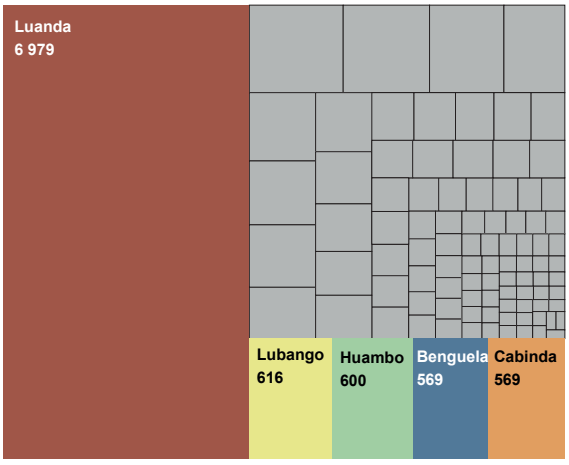
Population distribution



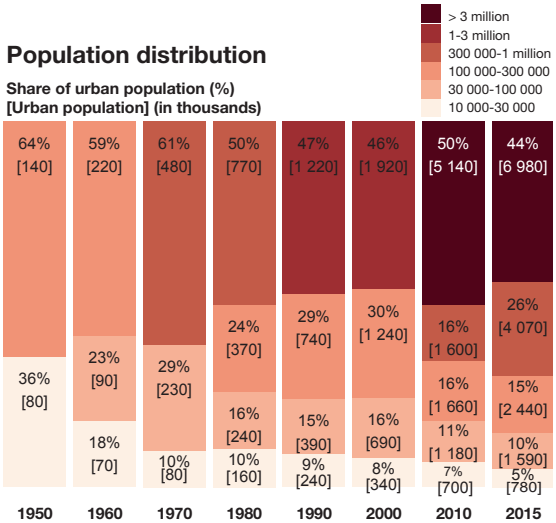
Angola

Population	Total population **24 993 000**	Urban population **15 863 000**	Urbanisation level **63 %**
Agglomerations	Number of agglomerations **96**	Metropolitan population **44 %**	Average distance between agglomerations **54 km**
Density	Average urban density **6 771 hab./km²**	Urban land cover **2 343 km²**	Urban land cover/ total land cover **0.2 %**

Major agglomerations



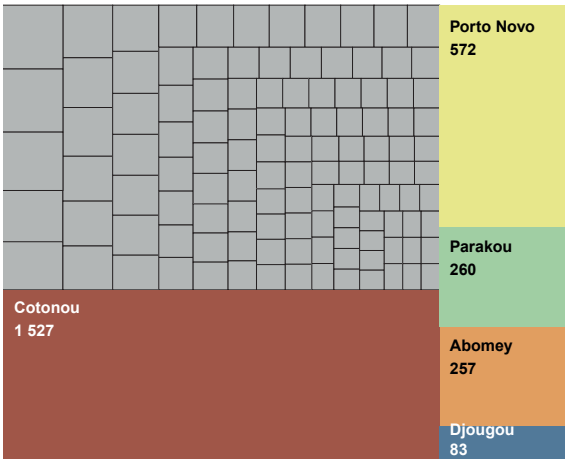
Population distribution



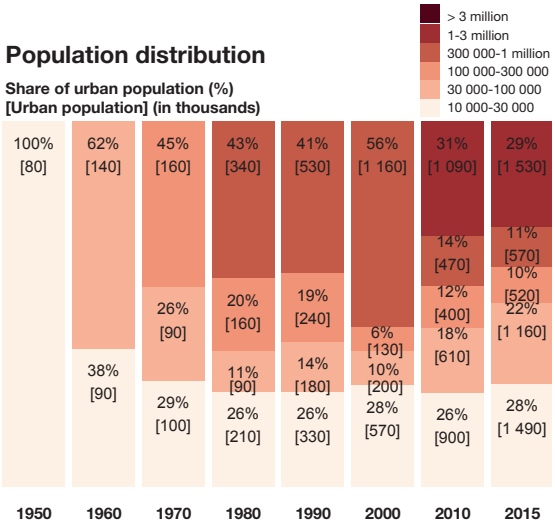
Benin

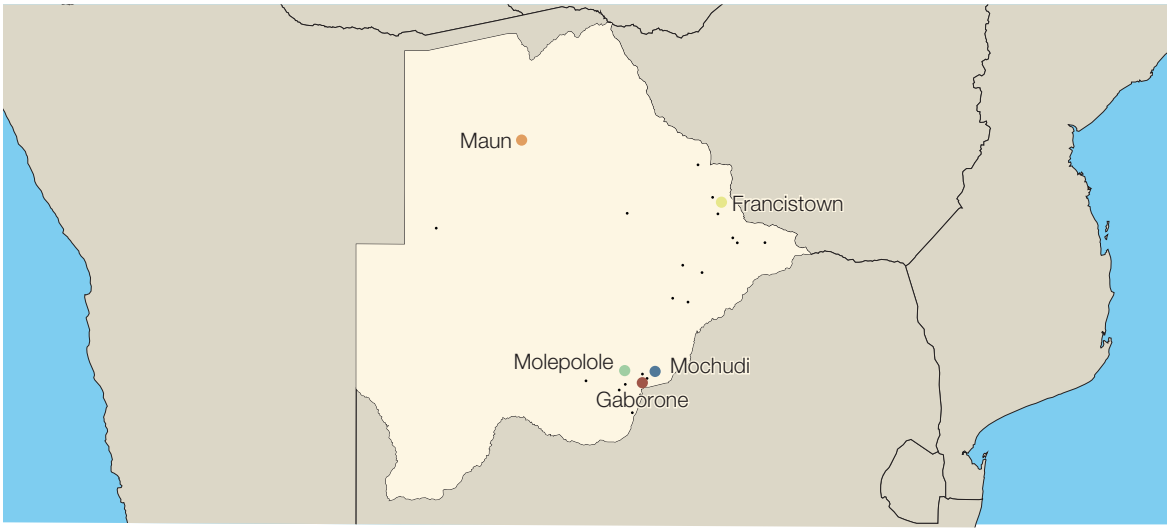
Population	Total population **10 749 000**	Urban population **5 272 000**	Urbanisation level **49 %**
Agglomerations	Number of agglomerations **122**	Metropolitan population **41 %**	Average distance between agglomerations **14 km**
Density	Average urban density **4 325 hab./km²**	Urban land cover **1 219 km²**	Urban land cover/ total land cover **1.1 %**

Major agglomerations



Population distribution

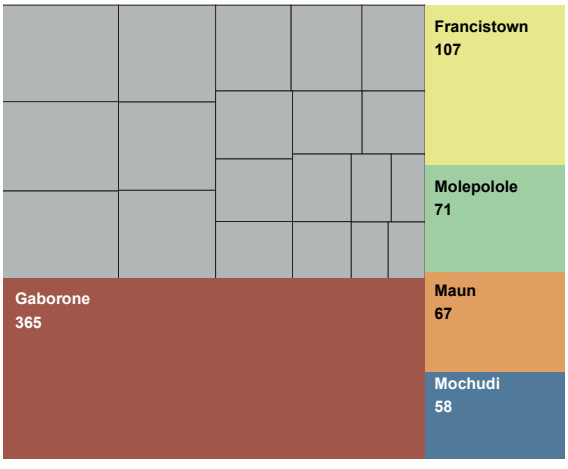




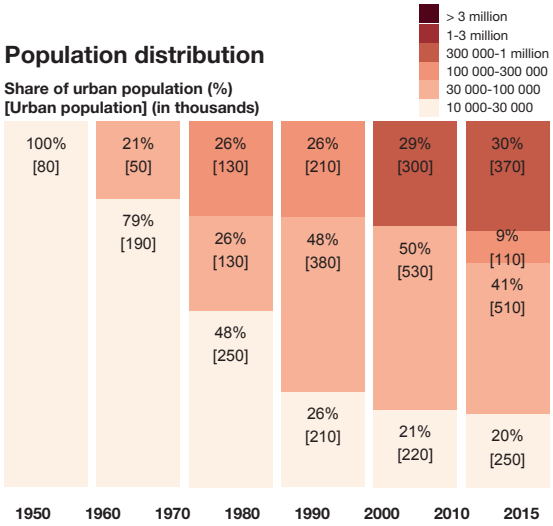
Botswana

Population	Total population **2 195 000**	Urban population **1 224 000**	Urbanisation level **56 %**
Agglomerations	Number of agglomerations **25**	Metropolitan population **30 %**	Average distance between agglomerations **55 km**
Density	Average urban density **1 607 hab./km²**	Urban land cover **762 km²**	Urban land cover/ total land cover **0.1 %**

Major agglomerations



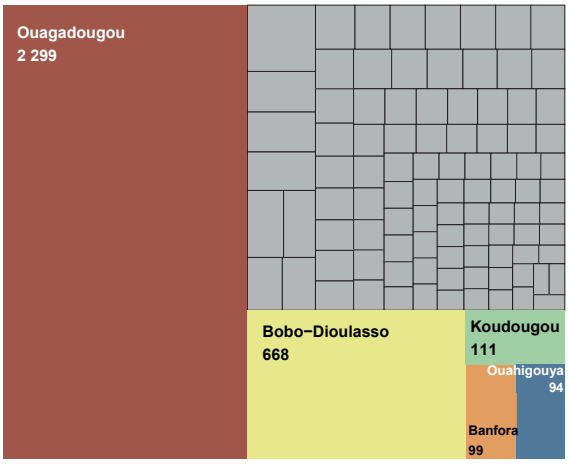
Population distribution



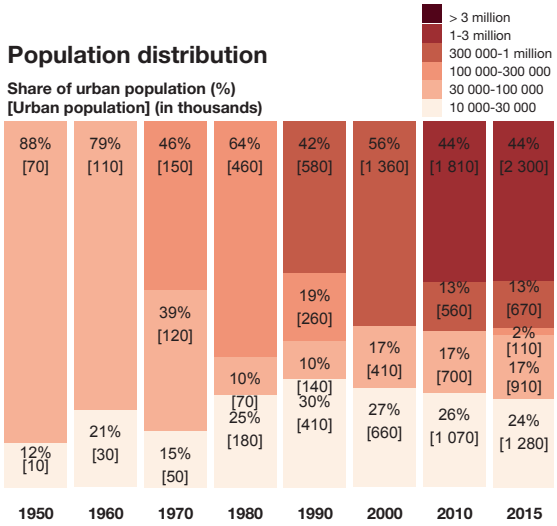
Burkina Faso

Population	Total population **18 450 000**	Urban population **5 272 000**	Urbanisation level **29 %**
Agglomerations	Number of agglomerations **101**	Metropolitan population **56 %**	Average distance between agglomerations **28 km**
Density	Average urban density **4 470 hab./km²**	Urban land cover **1 179 km²**	Urban land cover/ total land cover **0.4 %**

Major agglomerations



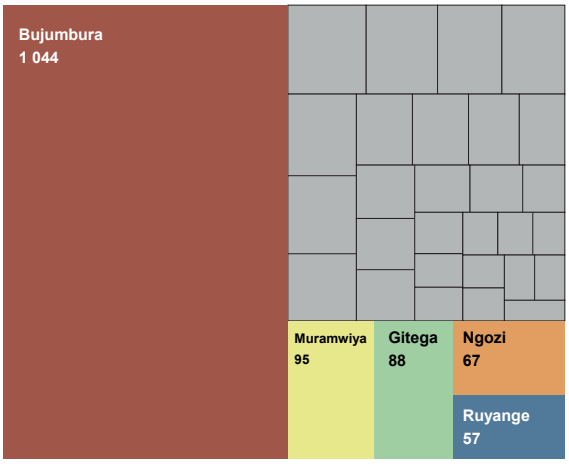
Population distribution



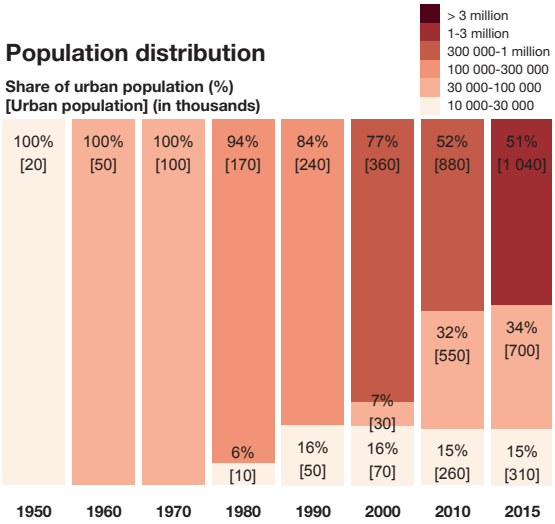
Burundi

Population	Total population **9 824 000**	Urban population **2 054 000**	Urbanisation level **21 %**
Agglomerations	Number of agglomerations **33**	Metropolitan population **51 %**	Average distance between agglomerations **15 km**
Density	Average urban density **3 879 hab./km²**	Urban land cover **529 km²**	Urban land cover/ total land cover **2.1 %**

Major agglomerations



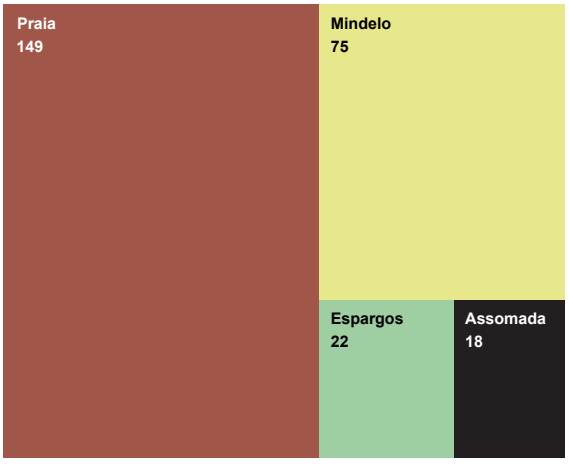
Population distribution



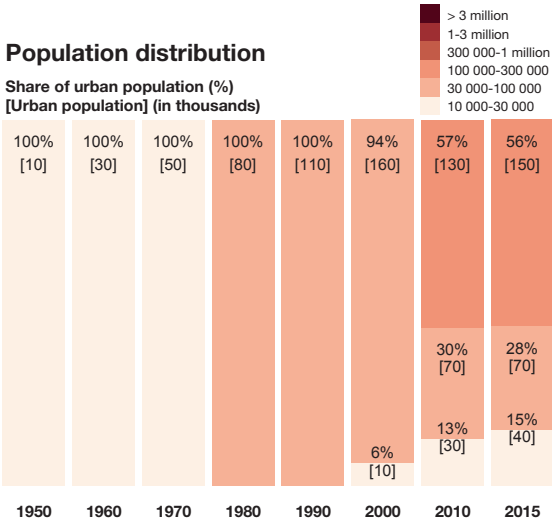
Cabo Verde

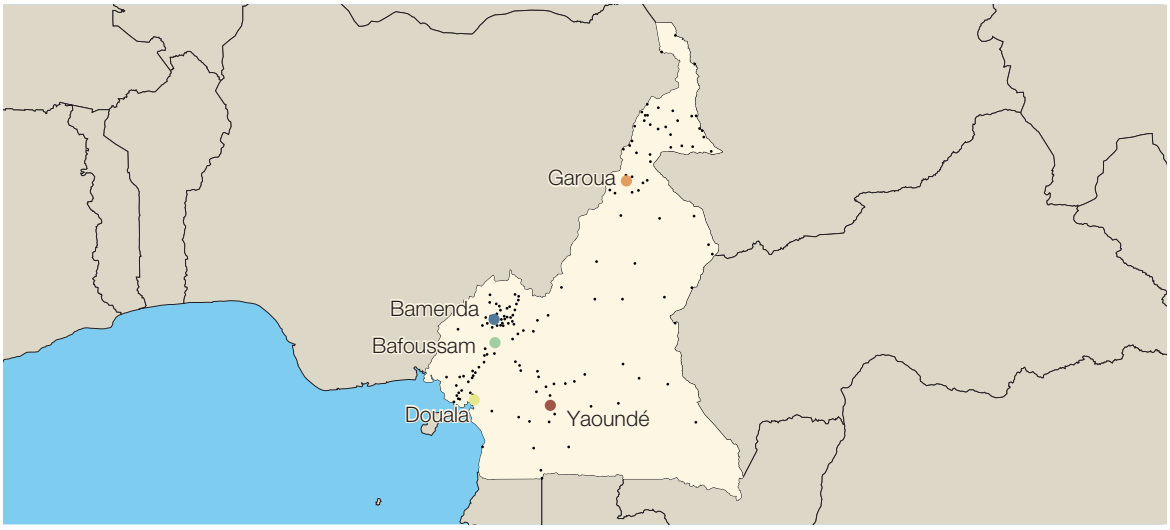
Population	Total population **525 000**	Urban population **264 000**	Urbanisation level **50 %**
Agglomerations	Number of agglomerations **4**	Metropolitan population **85 %**	Average distance between agglomerations **118 km**
Density	Average urban density **5 391 hab./km²**	Urban land cover **49 km²**	Urban land cover/ total land cover **1.2 %**

Major agglomerations



Population distribution

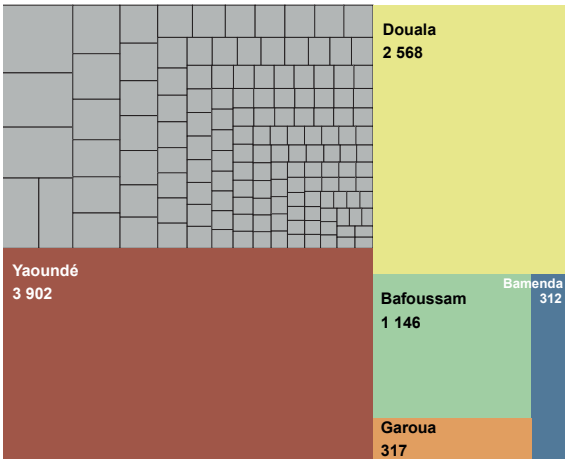




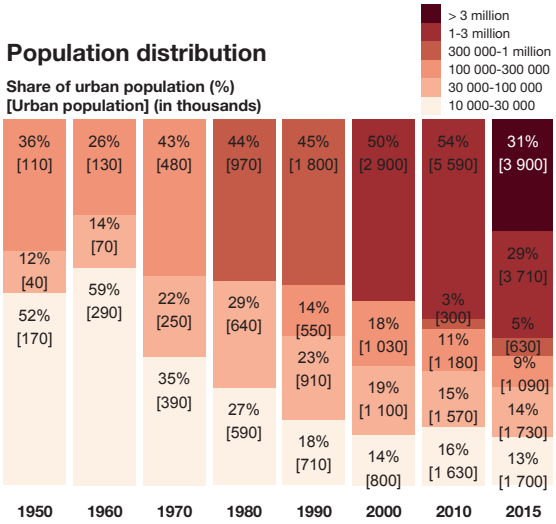
Cameroon

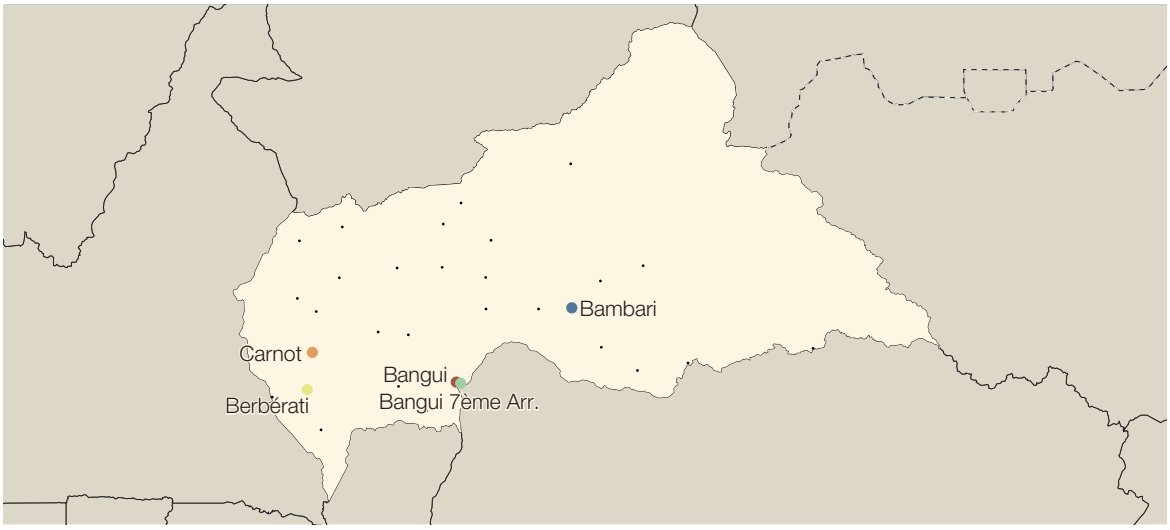
Population	Total population **22 180 000**	Urban population **12 754 000**	Urbanisation level **55 %**
Agglomerations	Number of agglomerations **147**	Metropolitan population **51 %**	Average distance between agglomerations **27 km**
Density	Average urban density **3 134 hab./km²**	Urban land cover **4 070 km²**	Urban land cover/ total land cover **0.9 %**

Major agglomerations



Population distribution

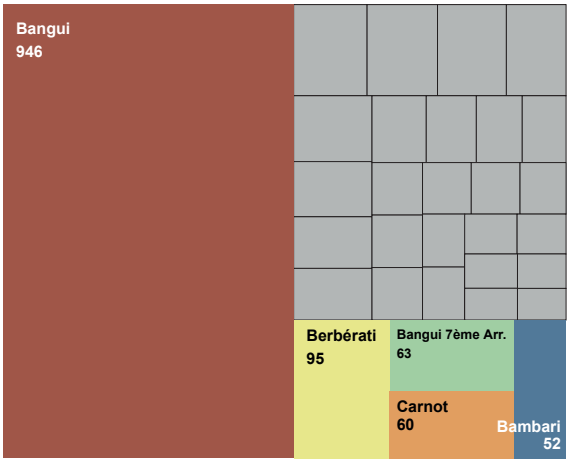




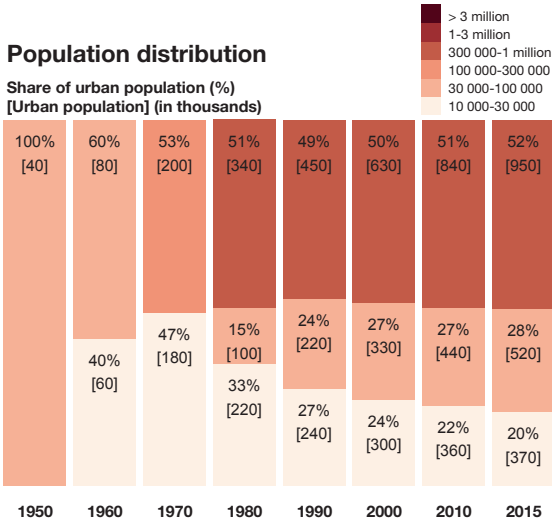
Central African Republic

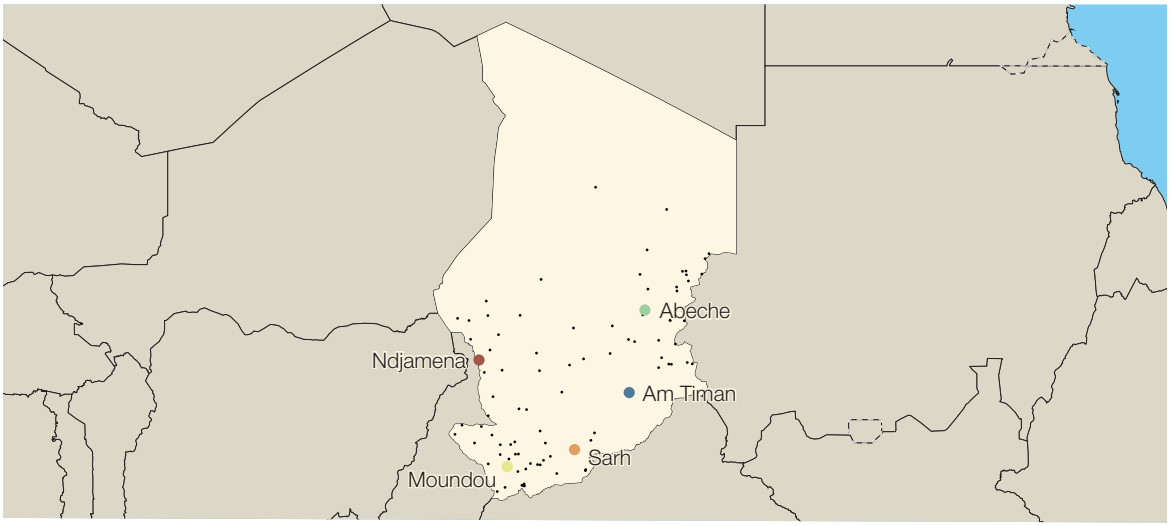
Population	Total population **4 972 000**	Urban population **1 833 000**	Urbanisation level **37 %**
Agglomerations	Number of agglomerations **31**	Metropolitan population **52 %**	Average distance between agglomerations **82 km**
Density	Average urban density **7 483 hab./km²**	Urban land cover **245 km²**	Urban land cover/ total land cover **0.04 %**

Major agglomerations



Population distribution

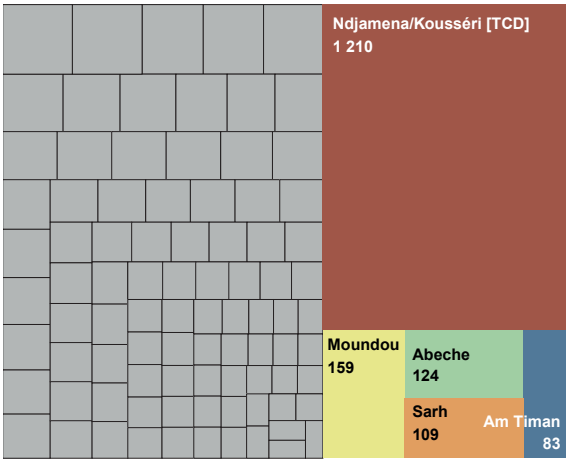




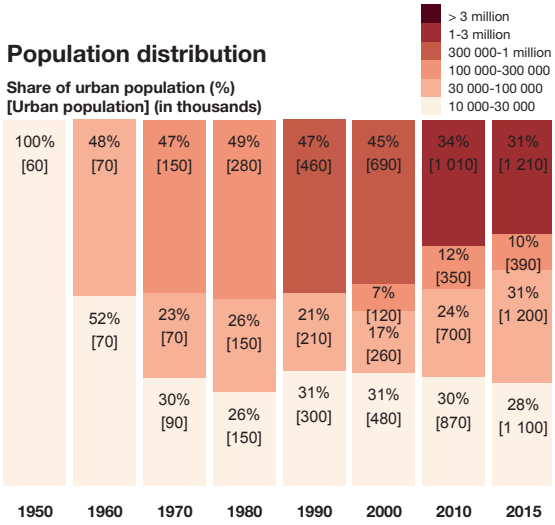
Chad

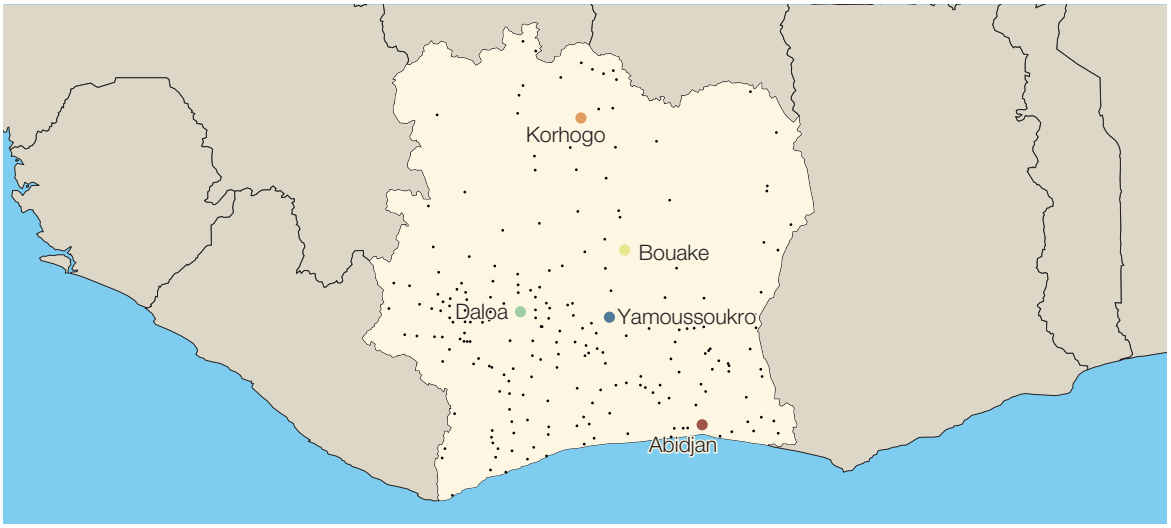
Population	Total population **13 670 000**	Urban population **3 899 000**	Urbanisation level **29 %**
Agglomerations	Number of agglomerations **93**	Metropolitan population **31 %**	Average distance between agglomerations **46 km**
Density	Average urban density **5 026 hab./km²**	Urban land cover **776 km²**	Urban land cover/ total land cover **0.1 %**

Major agglomerations



Population distribution

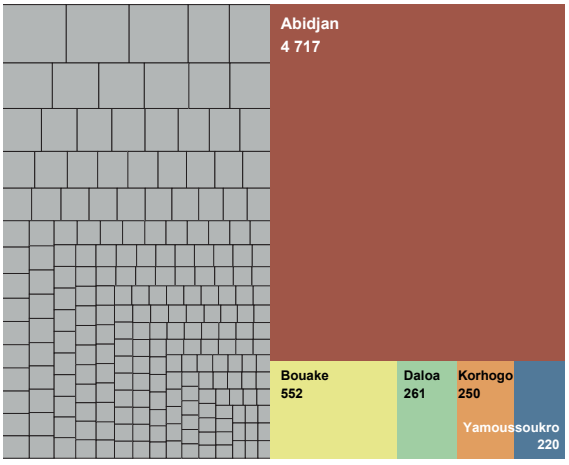




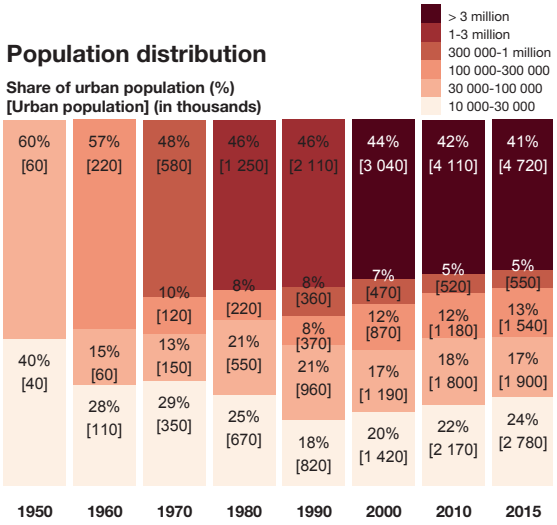
Côte d'Ivoire

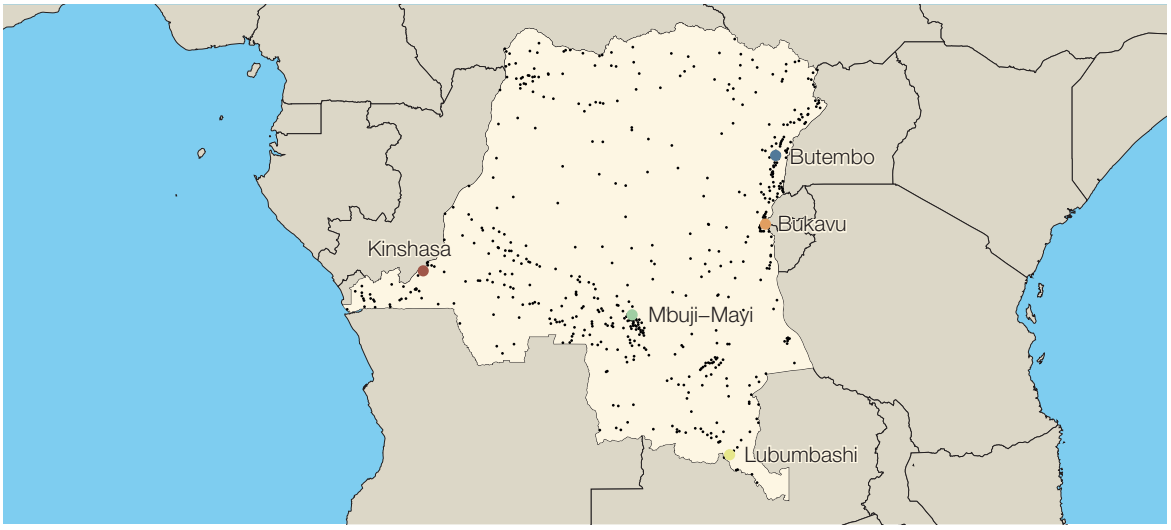
Population	Total population **23 300 000**	Urban population **11 490 000**	Urbanisation level **49 %**
Agglomerations	Number of agglomerations **220**	Metropolitan population **46 %**	Average distance between agglomerations **20 km**
Density	Average urban density **7 776 hab./km²**	Urban land cover **1 478 km²**	Urban land cover/ total land cover **0.5 %**

Major agglomerations



Population distribution

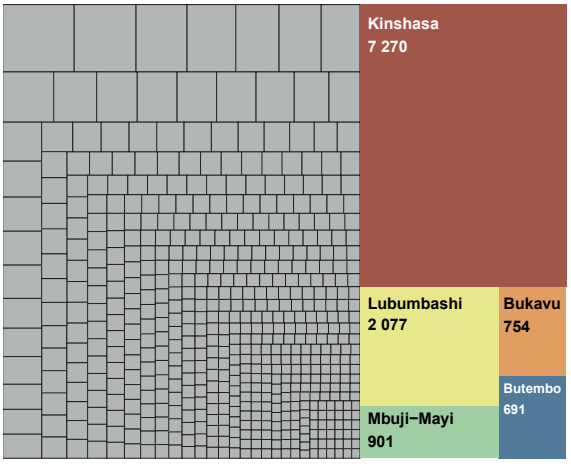




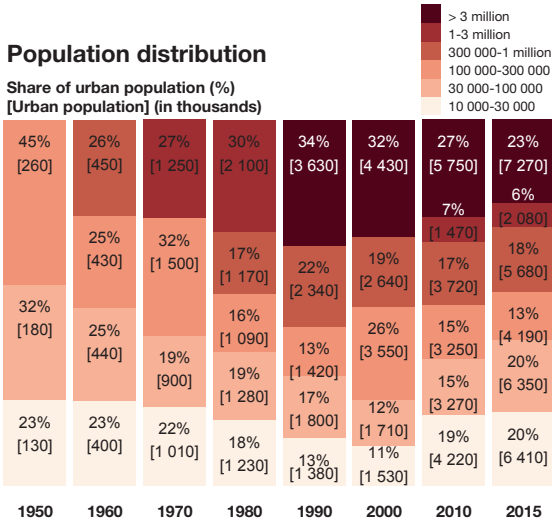
Democratic Republic of the Congo

Population	Total population **71 246 000**	Urban population **31 968 000**	Urbanisation level **45** %
Agglomerations	Number of agglomerations **553**	Metropolitan population **30** %	Average distance between agglomerations **29** km
Density	Average urban density **7 398** hab./km²	Urban land cover **4 321** km²	Urban land cover/ total land cover **0.2** %

Major agglomerations



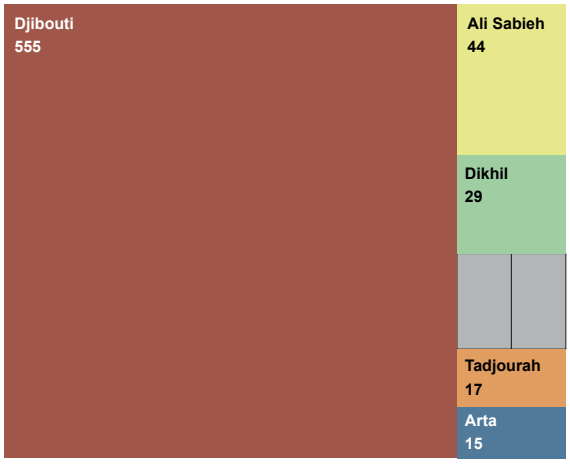
Population distribution



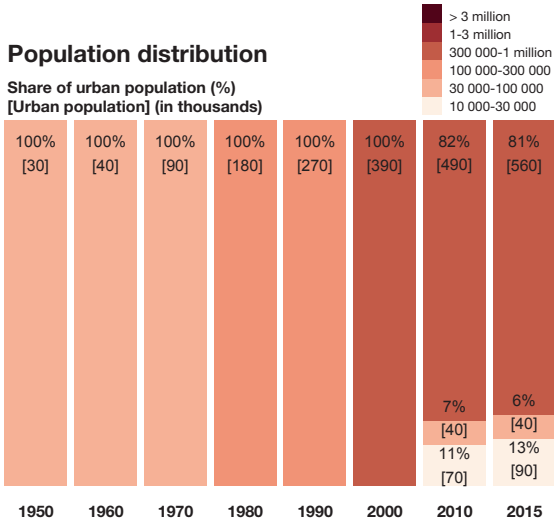
Djibouti

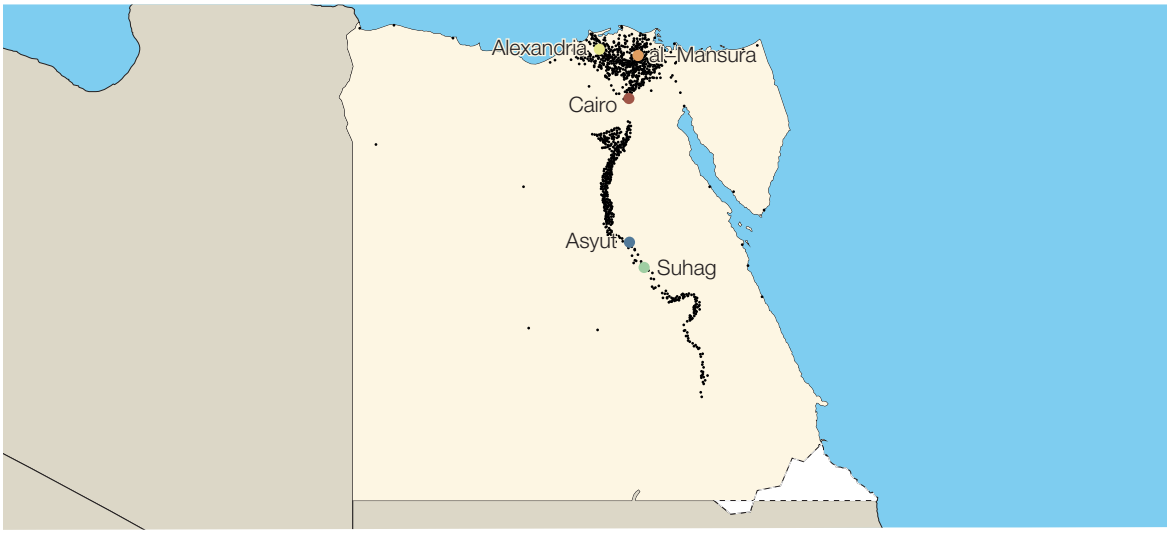
Population	Total population **956 000**	Urban population **689 000**	Urbanisation level **72 %**
Agglomerations	Number of agglomerations **7**	Metropolitan population **81 %**	Average distance between agglomerations **31 km**
Density	Average urban density **9 608 hab./km²**	Urban land cover **72 km²**	Urban land cover/ total land cover **0.3 %**

Major agglomerations



Population distribution

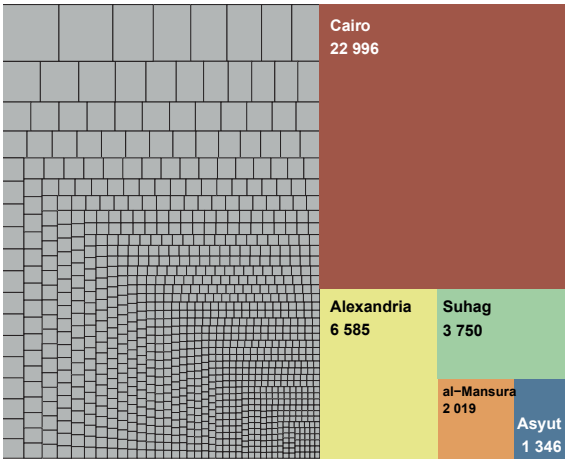




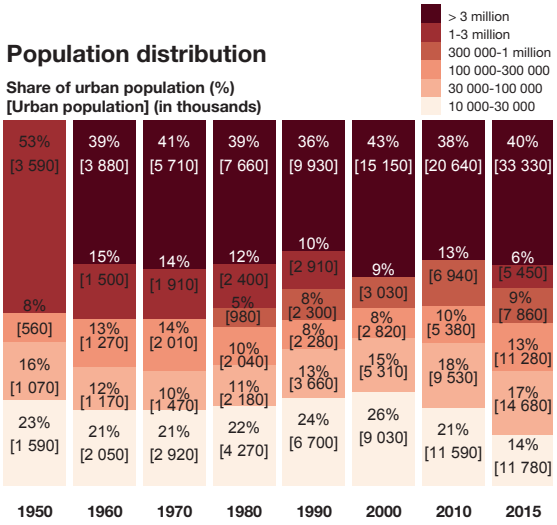
Egypt

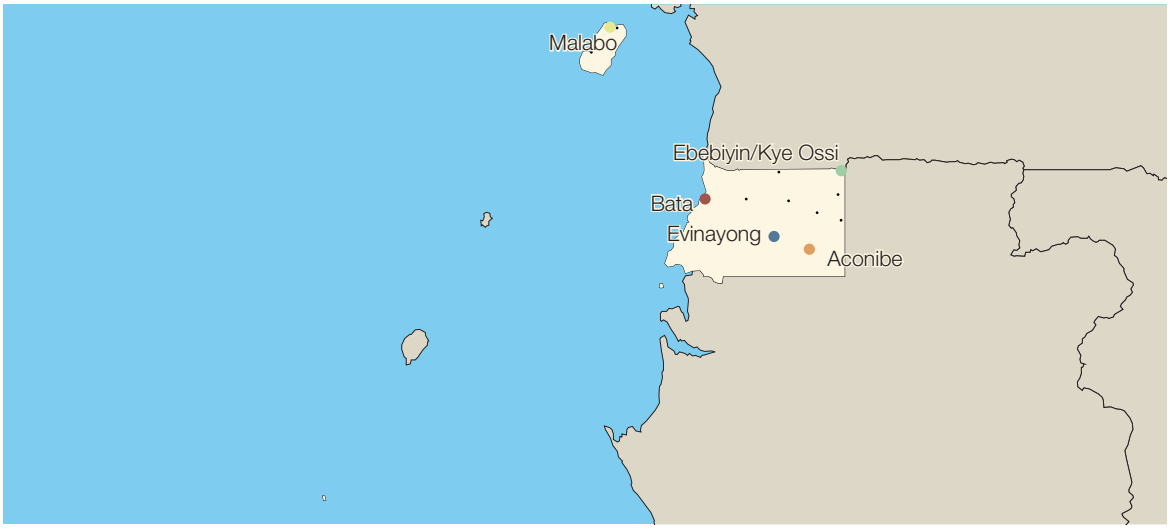
Population	Total population **90 627 000**	Urban population **84 376 000**	Urbanisation level **93 %**
Agglomerations	Number of agglomerations **1 061**	Metropolitan population **27 %**	Average distance between agglomerations **5 km**
Density	Average urban density **12 282 hab./km²**	Urban land cover **6 870 km²**	Urban land cover/ total land cover **0.7 %**

Major agglomerations



Population distribution

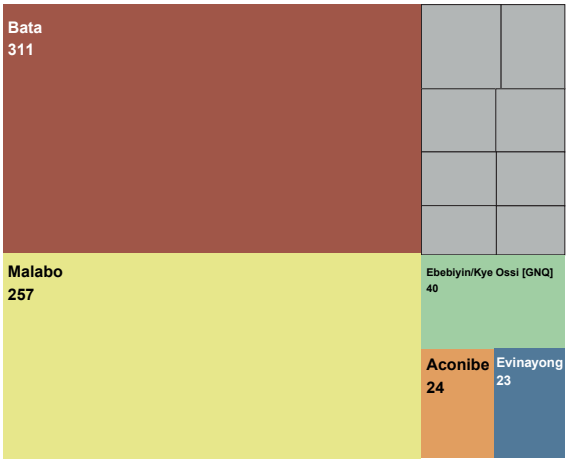




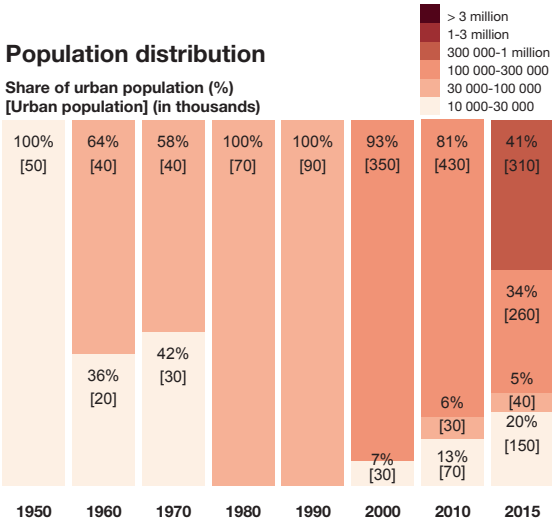
Equatorial Guinea

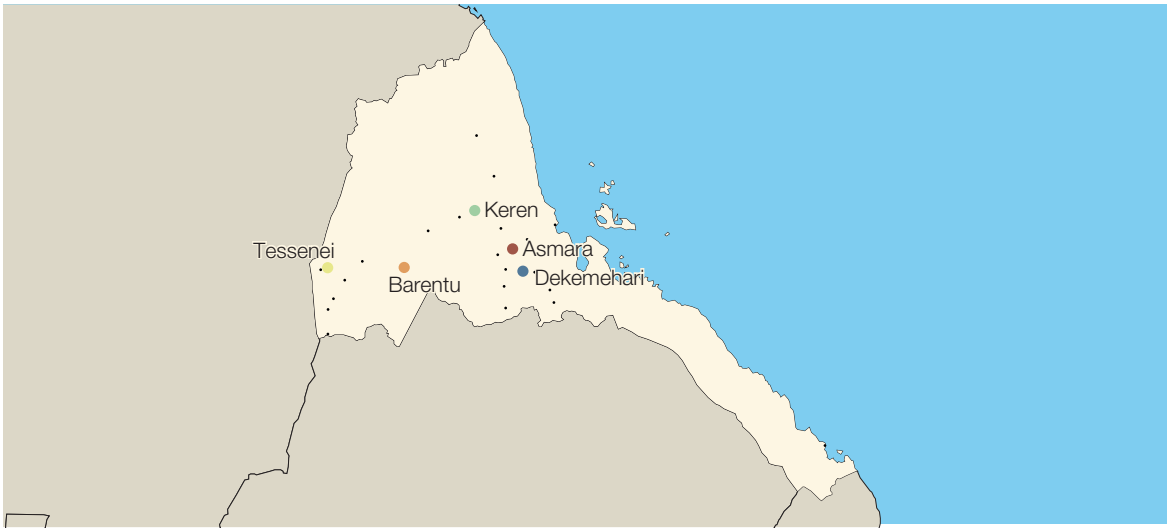
Population	Total population **1 222 000**	Urban population **762 000**	Urbanisation level **62** %
Agglomerations	Number of agglomerations **13**	Metropolitan population **75** %	Average distance between agglomerations **34** km
Density	Average urban density **3 256** hab./km²	Urban land cover **234** km²	Urban land cover/ total land cover **0.8** %

Major agglomerations



Population distribution

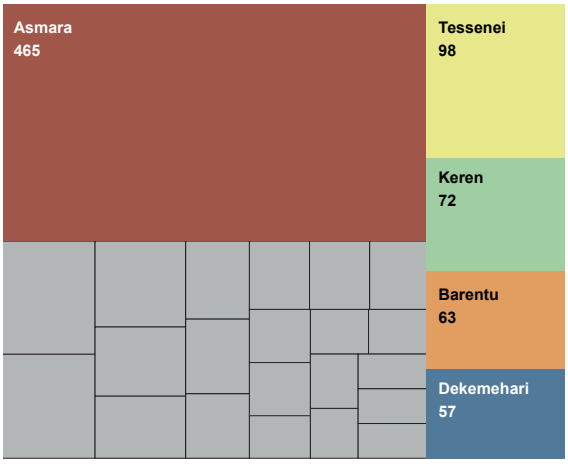




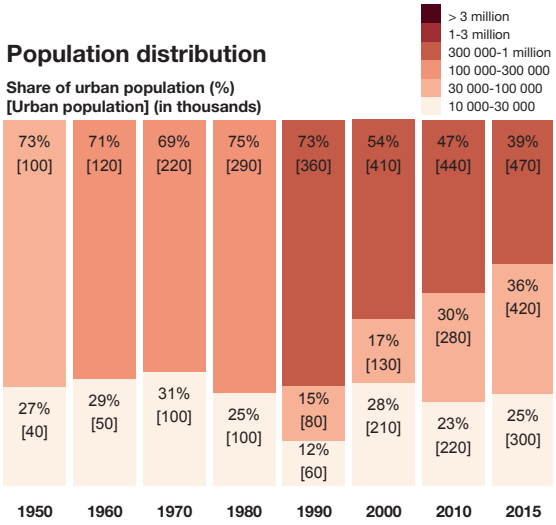
Eritrea

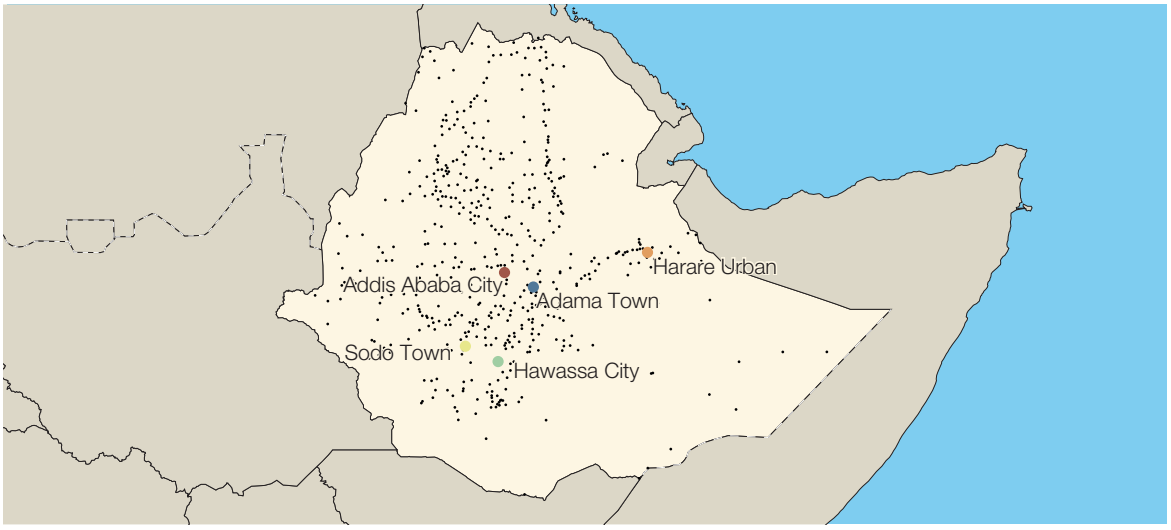
Population	Total population **4 847 000**	Urban population **1 185 000**	Urbanisation level **24 %**
Agglomerations	Number of agglomerations **26**	Metropolitan population **40 %**	Average distance between agglomerations **43 km**
Density	Average urban density **8 482 hab./km²**	Urban land cover **140 km²**	Urban land cover/ total land cover **0.1 %**

Major agglomerations



Population distribution

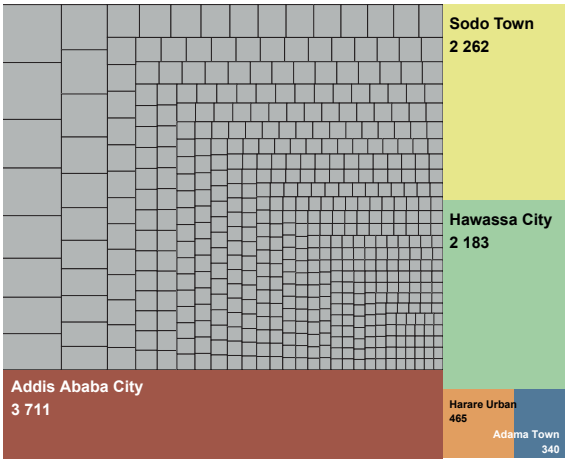




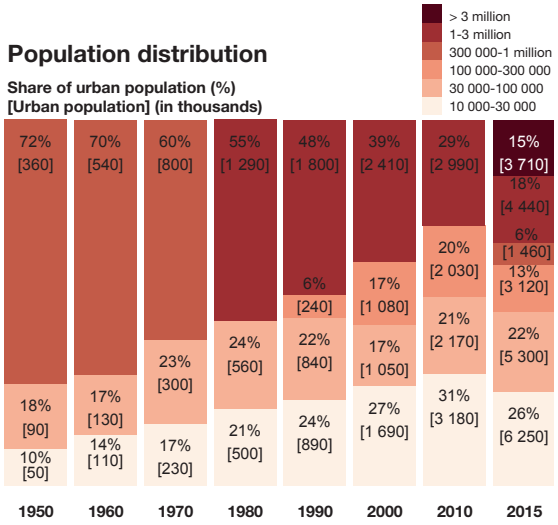
Ethiopia

Population	Total population **90 078 000**	Urban population **24 292 000**	Urbanisation level **27 %**
Agglomerations	Number of agglomerations **510**	Metropolitan population **34 %**	Average distance between agglomerations **19 km**
Density	Average urban density **3 264 hab./km²**	Urban land cover **7 442 km²**	Urban land cover/ total land cover **0.7 %**

Major agglomerations



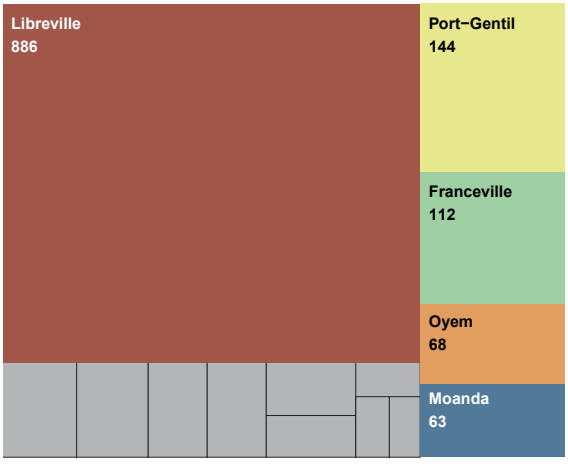
Population distribution



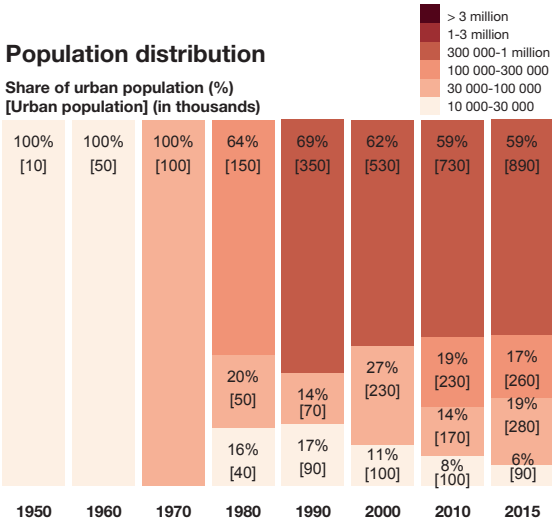
Gabon

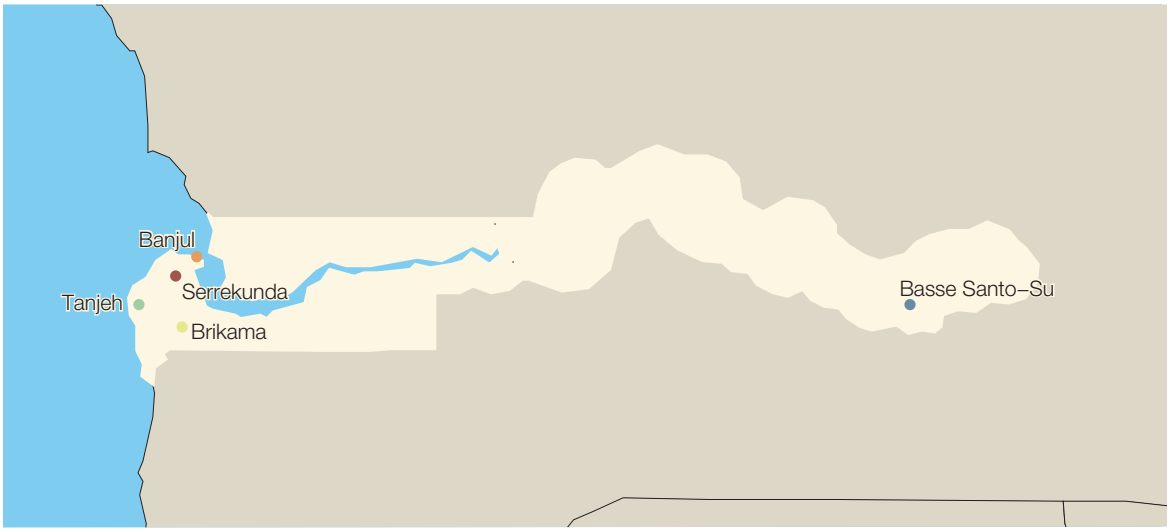
Population	Total population **1 866 000**	Urban population **1 506 000**	Urbanisation level **81 %**
Agglomerations	Number of agglomerations **14**	Metropolitan population **59 %**	Average distance between agglomerations **95 km**
Density	Average urban density **4 212 hab./km²**	Urban land cover **358 km²**	Urban land cover/ total land cover **0.1 %**

Major agglomerations



Population distribution

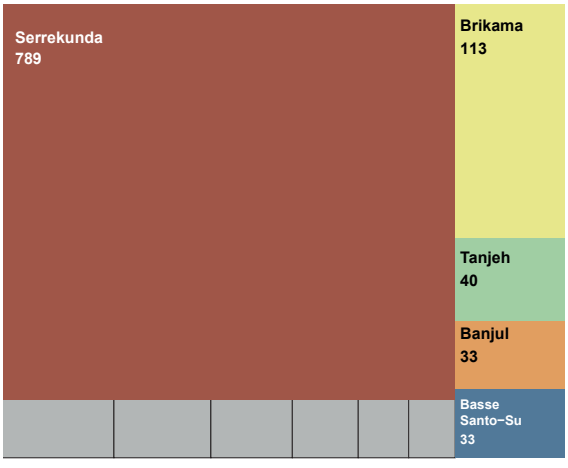




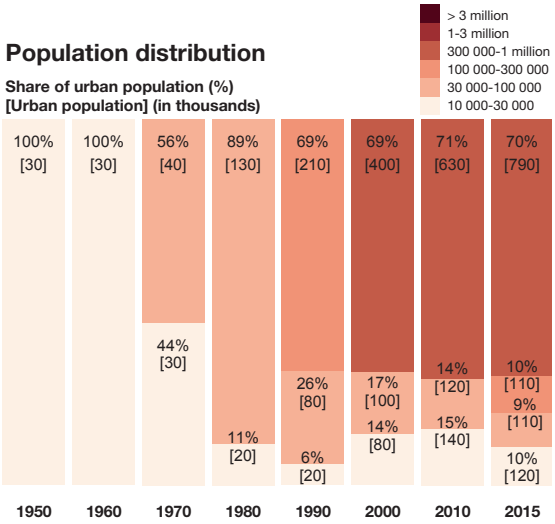
Gambia

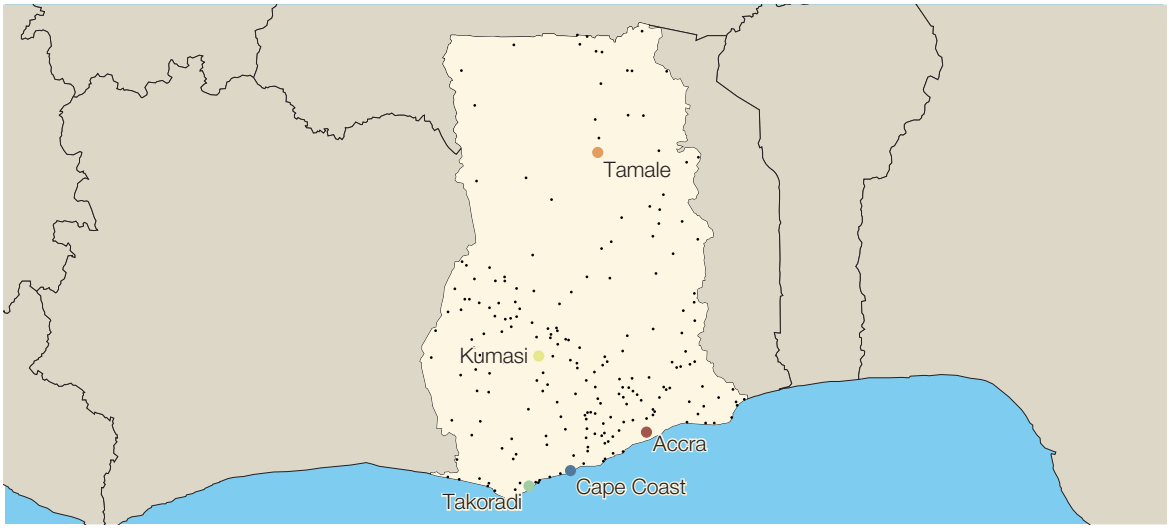
Population	Total population **2 024 000**	Urban population **1 126 000**	Urbanisation level **56** %
Agglomerations	Number of agglomerations **11**	Metropolitan population **70** %	Average distance between agglomerations **11** km
Density	Average urban density **3 962** hab./km²	Urban land cover **284** km²	Urban land cover/ total land cover **2.8** %

Major agglomerations



Population distribution

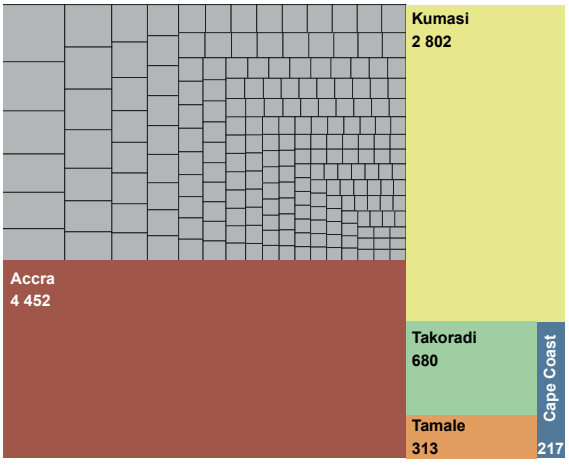




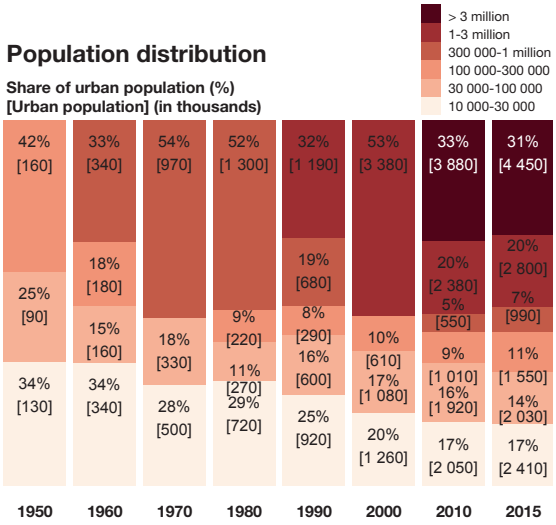
Ghana

Population	Total population **27 403 000**	Urban population **14 236 000**	Urbanisation level **52** %
Agglomerations	Number of agglomerations **209**	Metropolitan population **51** %	Average distance between agglomerations **17** km
Density	Average urban density **3 901** hab./km²	Urban land cover **3 650** km²	Urban land cover/ total land cover **1.6** %

Major agglomerations



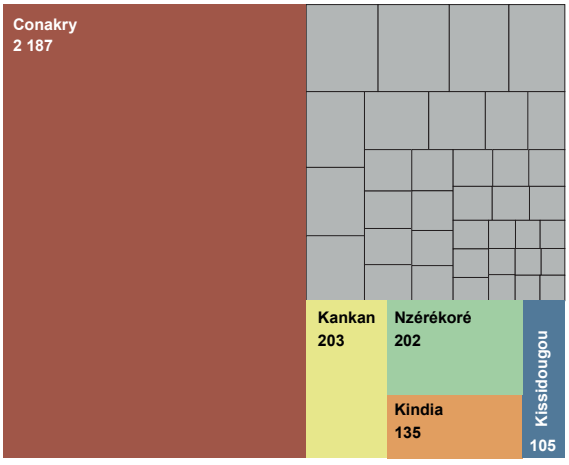
Population distribution



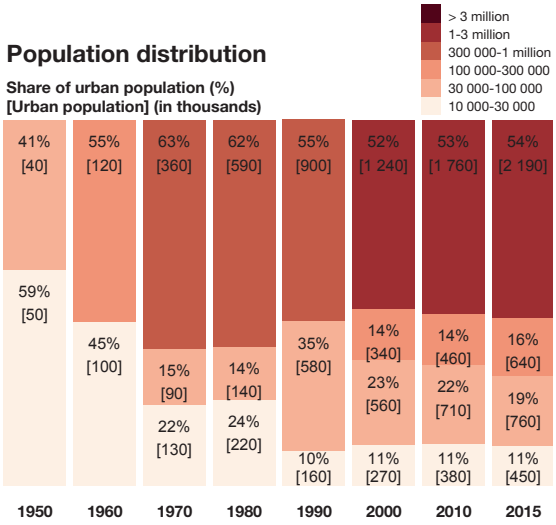
Guinea

Population	Total population **10 924 000**	Urban population **4 045 000**	Urbanisation level **37 %**
Agglomerations	Number of agglomerations **42**	Metropolitan population **54 %**	Average distance between agglomerations **45 km**
Density	Average urban density **5 020 hab./km²**	Urban land cover **806 km²**	Urban land cover/ total land cover **0.3 %**

Major agglomerations



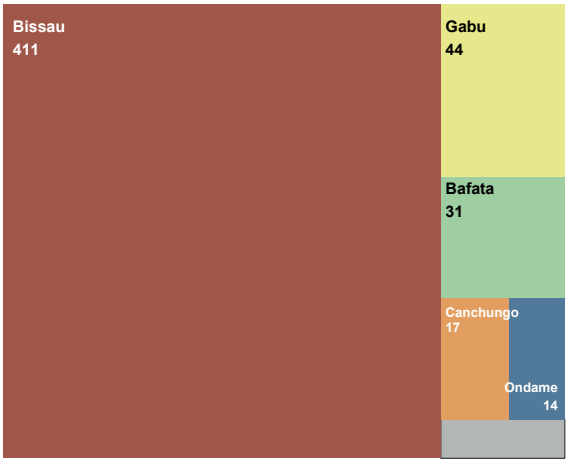
Population distribution



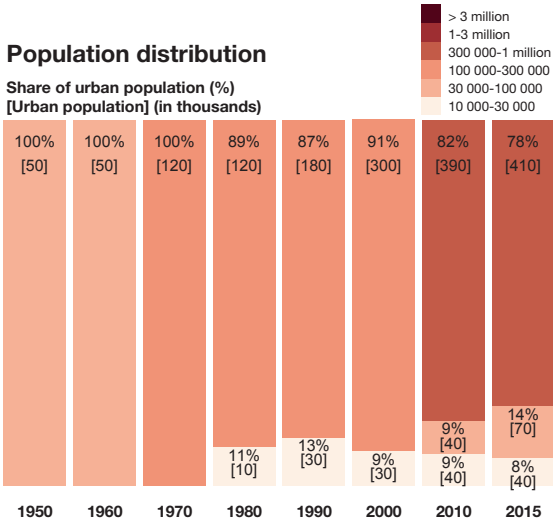
Guinea-Bissau

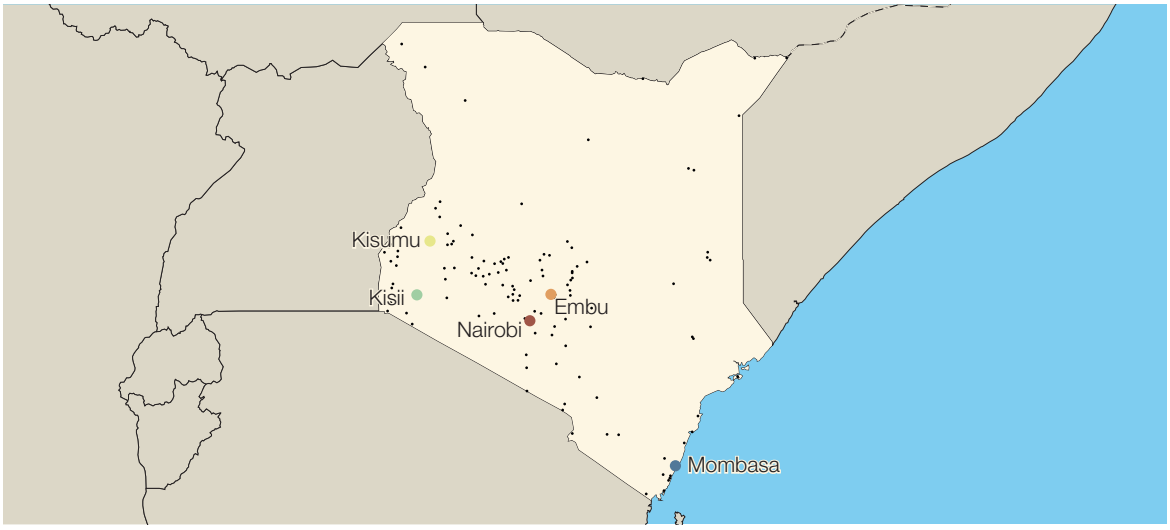
Population	Total population **1 531 000**	Urban population **525 000**	Urbanisation level **34 %**
Agglomerations	Number of agglomerations **6**	Metropolitan population **78 %**	Average distance between agglomerations **40 km**
Density	Average urban density **4 968 hab./km²**	Urban land cover **106 km²**	Urban land cover/ total land cover **0.4 %**

Major agglomerations



Population distribution

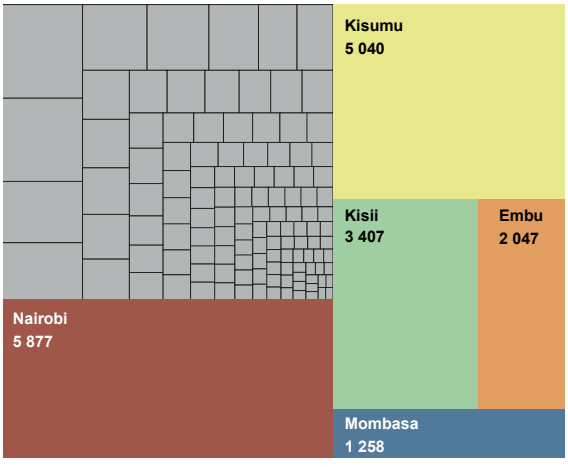




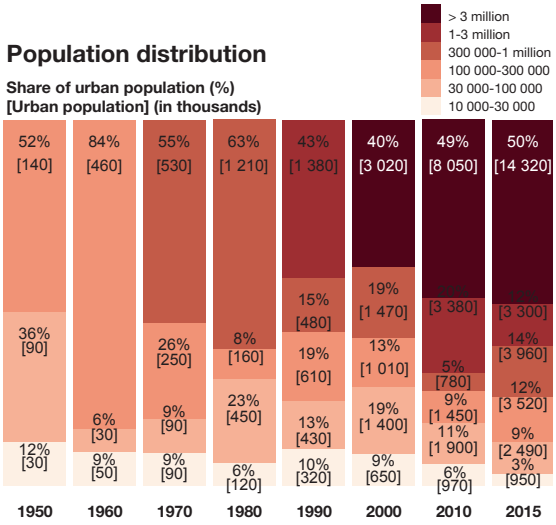
Kenya

Population	Total population **44 157 000**	Urban population **28 559 000**	Urbanisation level **65 %**
Agglomerations	Number of agglomerations **126**	Metropolitan population **25 %**	Average distance between agglomerations **28 km**
Density	Average urban density **1 235 hab./km²**	Urban land cover **23 131 km²**	Urban land cover/ total land cover **4.1 %**

Major agglomerations



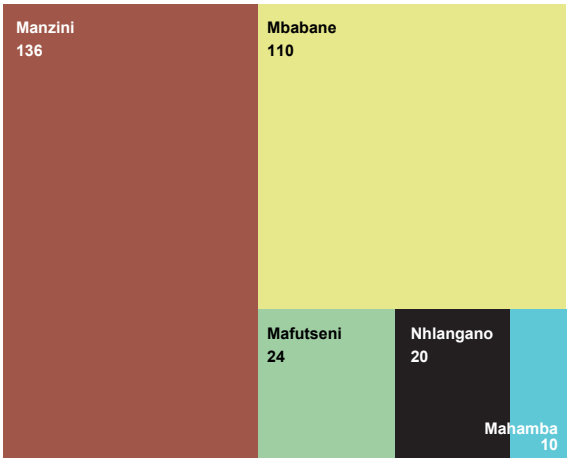
Population distribution



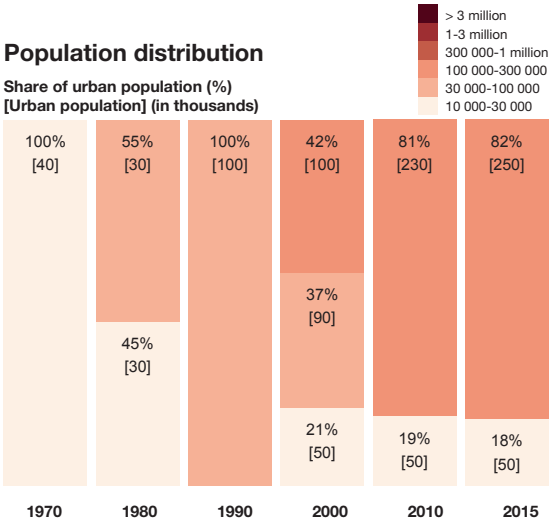
Kingdom of Eswatini

Population	Total population **1 079 000**	Urban population **301 000**	Urbanisation level **28 %**
Agglomerations	Number of agglomerations **5**	Metropolitan population **82 %**	Average distance between agglomerations **18 km**
Density	Average urban density **797 hab./km²**	Urban land cover **377 km²**	Urban land cover/ total land cover **2.2 %**

Major agglomerations



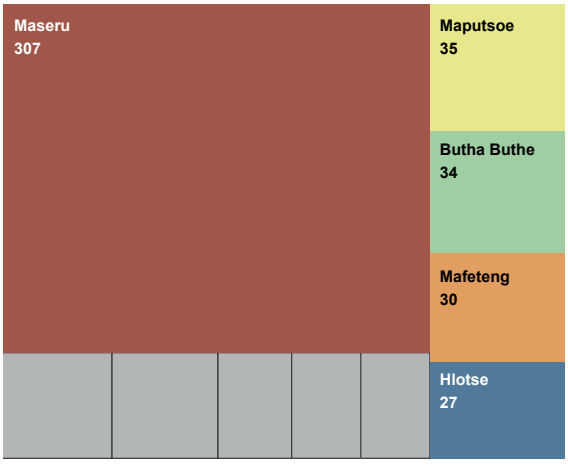
Population distribution



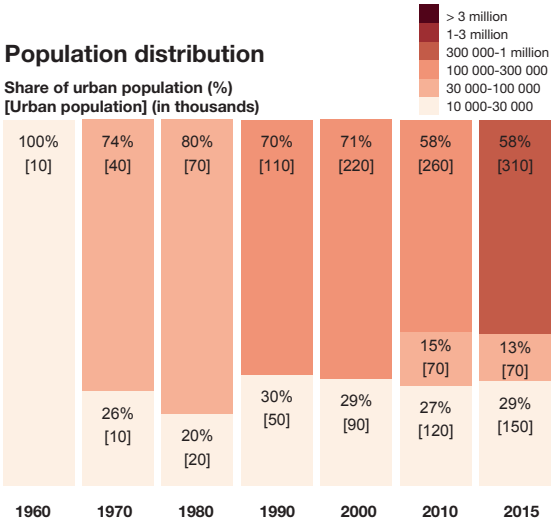
Lesotho

Population	Total population **1 999 000**	Urban population **525 000**	Urbanisation level **26 %**
Agglomerations	Number of agglomerations **10**	Metropolitan population **58 %**	Average distance between agglomerations **23 km**
Density	Average urban density **1 644 hab./km²**	Urban land cover **319 km²**	Urban land cover/ total land cover **1.1 %**

Major agglomerations



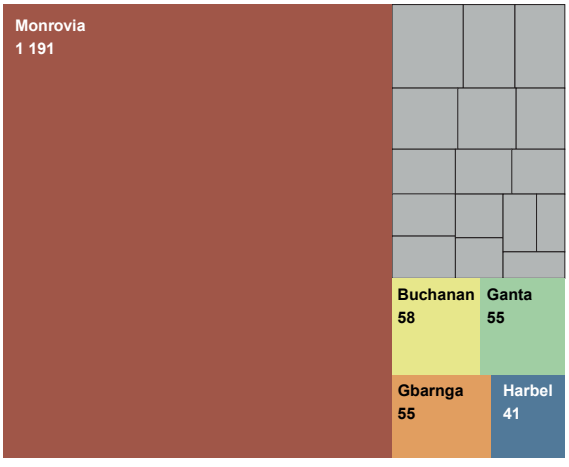
Population distribution



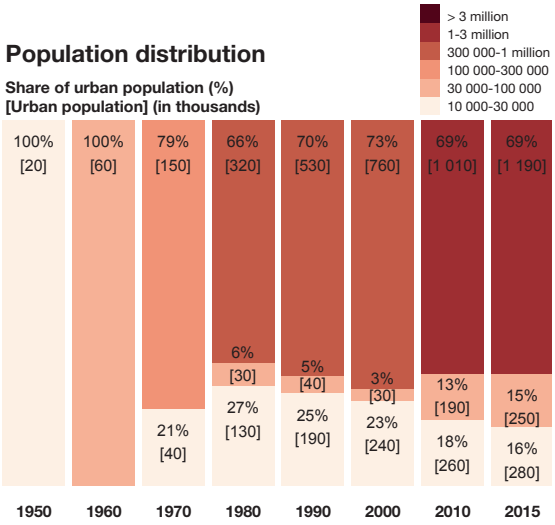
Liberia

Population	Total population **4 045 000**	Urban population **1 716 000**	Urbanisation level **42** %
Agglomerations	Number of agglomerations **21**	Metropolitan population **69** %	Average distance between agglomerations **35** km
Density	Average urban density **4 039** hab./km²	Urban land cover **425** km²	Urban land cover/ total land cover **0.4** %

Major agglomerations



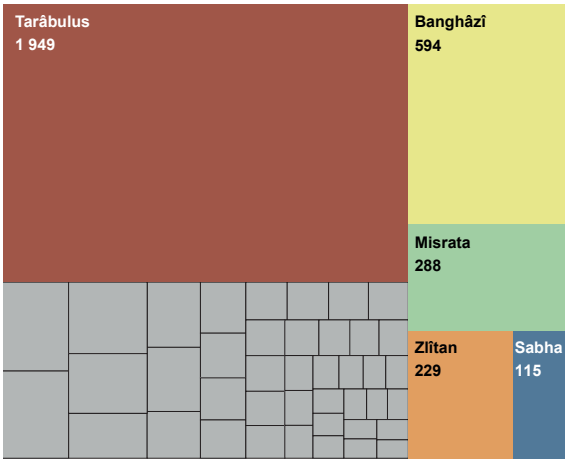
Population distribution



Libya

Population	Total population **5 467 000**	Urban population **4 411 000**	Urbanisation level **81** %
Agglomerations	Number of agglomerations **46**	Metropolitan population **44** %	Average distance between agglomerations **63** km
Density	Average urban density **1 428** hab./km²	Urban land cover **3 089** km²	Urban land cover/ total land cover **0.2** %

Major agglomerations



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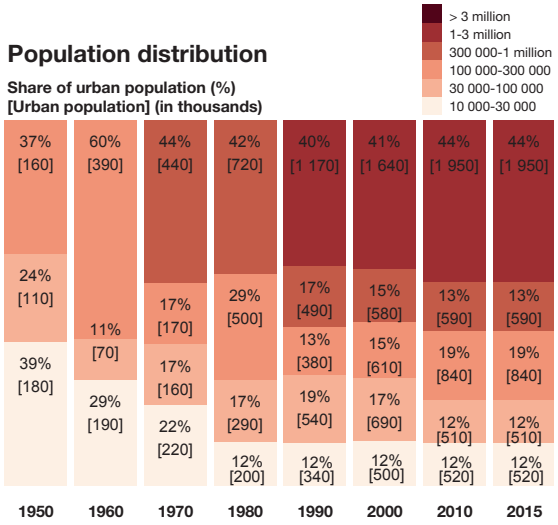
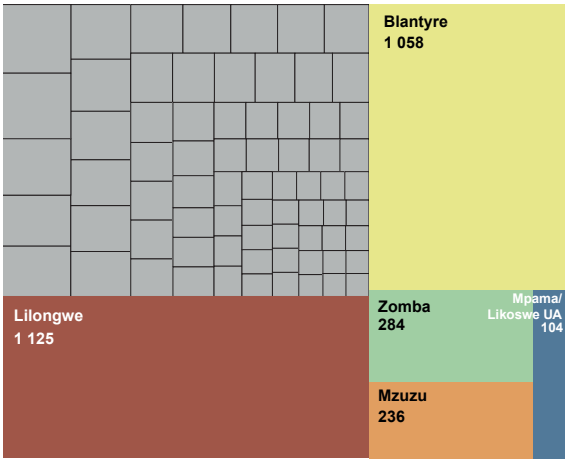


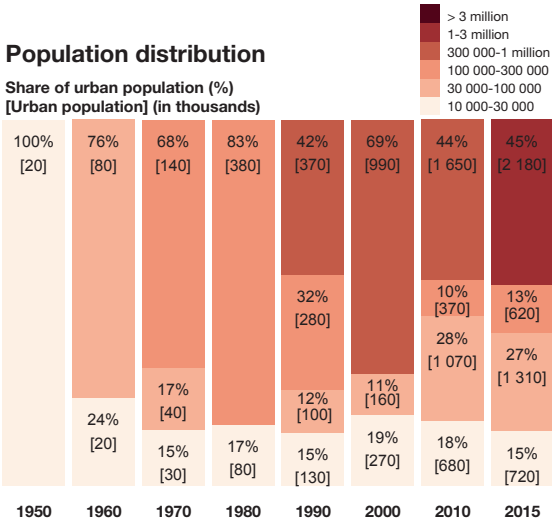
Malawi

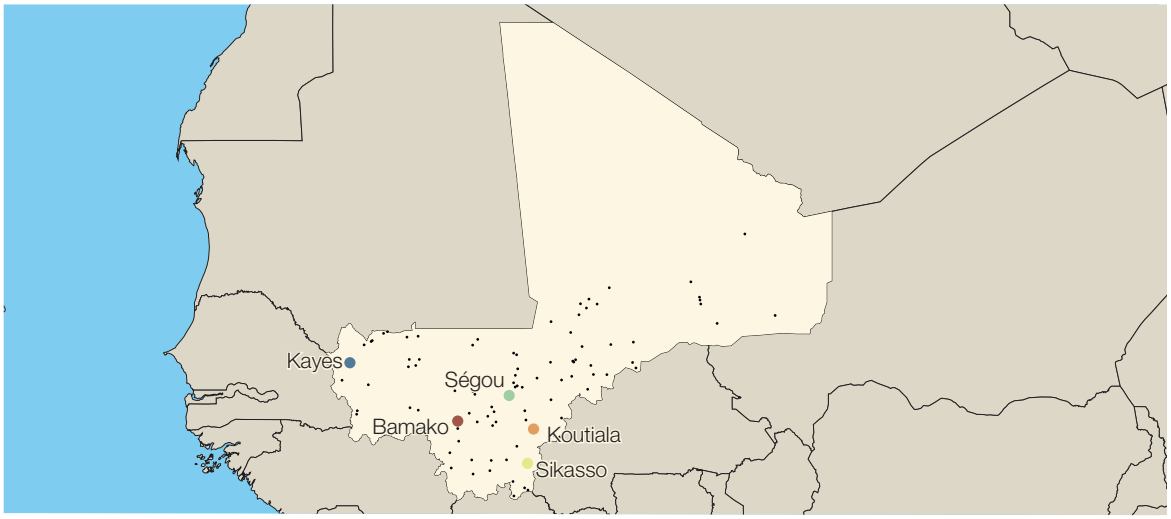
Population	Total population **16 310 000**	Urban population **4 836 000**	Urbanisation level **30 %**
Agglomerations	Number of agglomerations **77**	Metropolitan population **45 %**	Average distance between agglomerations **22 km**
Density	Average urban density **3 949 hab./km²**	Urban land cover **1 224 km²**	Urban land cover/ total land cover **1.3 %**

Major agglomerations



Population distribution

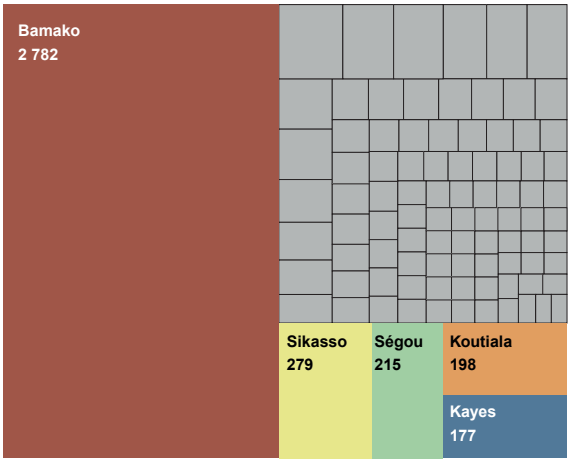




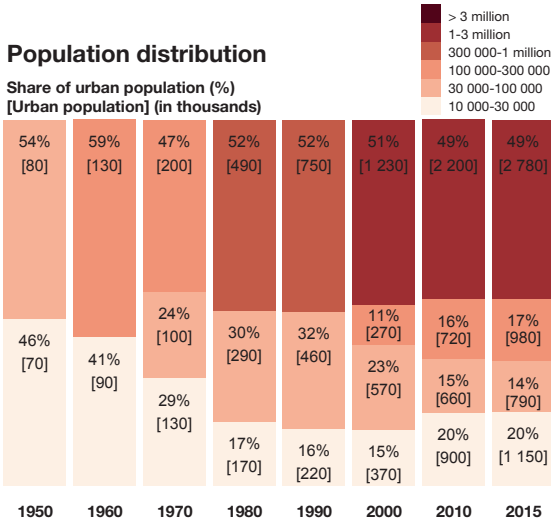
Mali

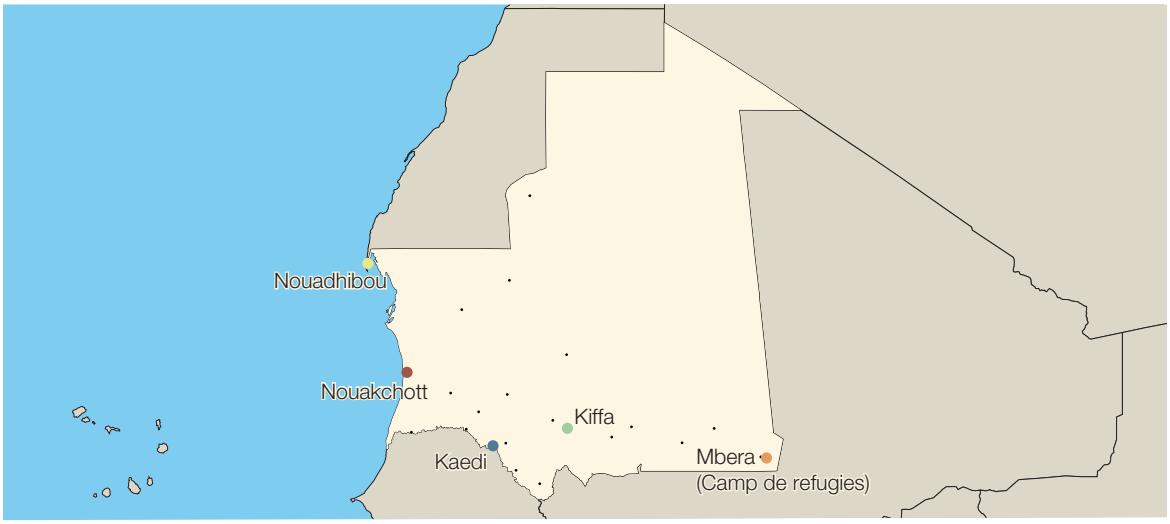
Population	Total population **17 819 000**	Urban population **5 697 000**	Urbanisation level **32 %**
Agglomerations	Number of agglomerations **94**	Metropolitan population **49 %**	Average distance between agglomerations **39 km**
Density	Average urban density **5 068 hab./km²**	Urban land cover **1 124 km²**	Urban land cover/ total land cover **0.1 %**

Major agglomerations



Population distribution

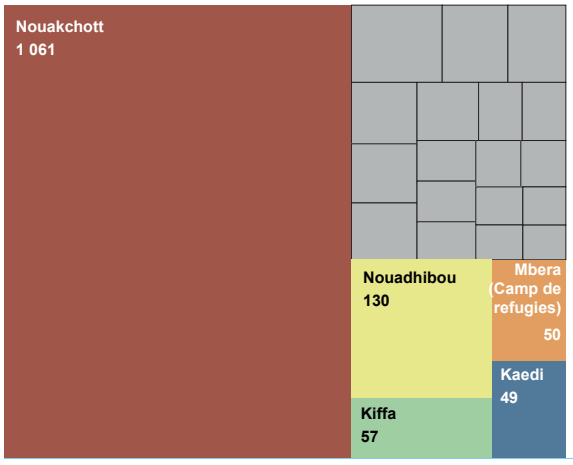




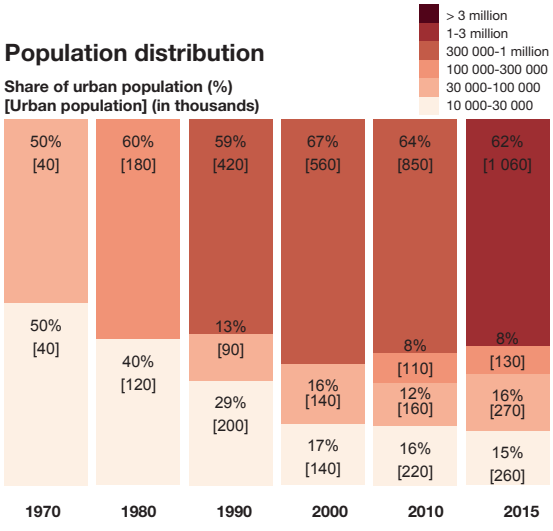
Mauritania

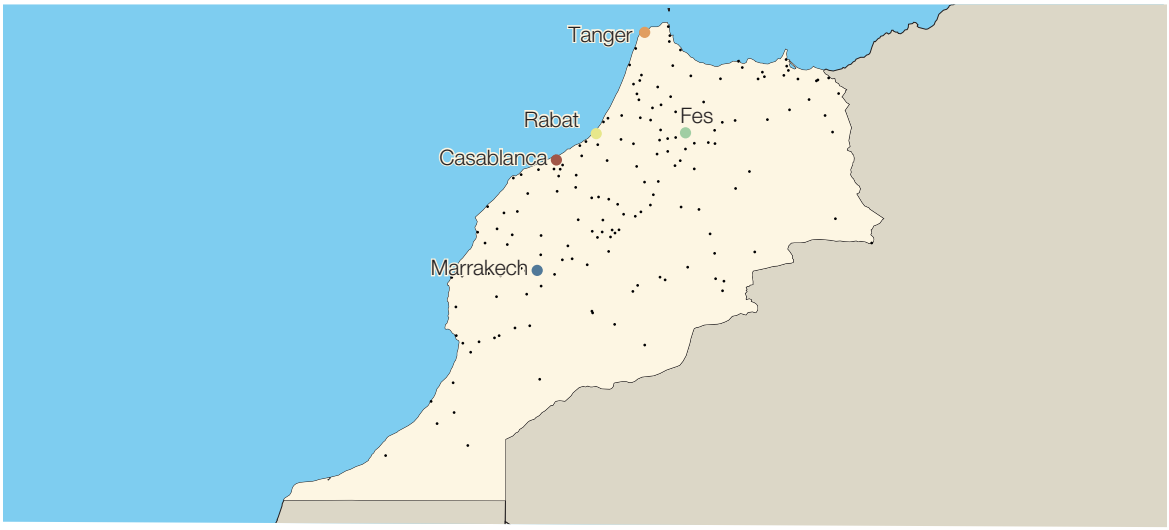
Population	Total population **4 034 000**	Urban population **1 713 000**	Urbanisation level **42** %
Agglomerations	Number of agglomerations **23**	Metropolitan population **69** %	Average distance between agglomerations **107** km
Density	Average urban density **4 408** hab./km²	Urban land cover **389** km²	Urban land cover/ total land cover **0** %

Major agglomerations



Population distribution

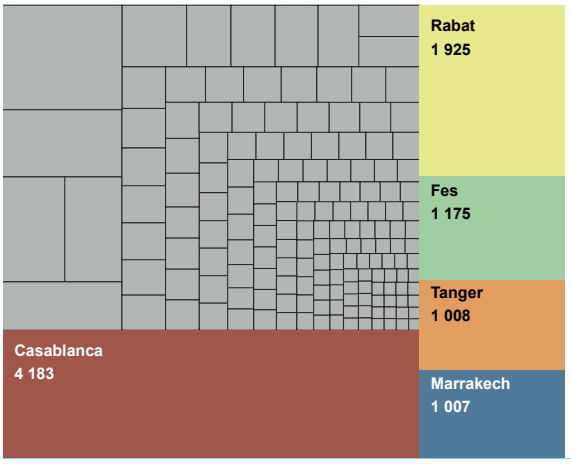




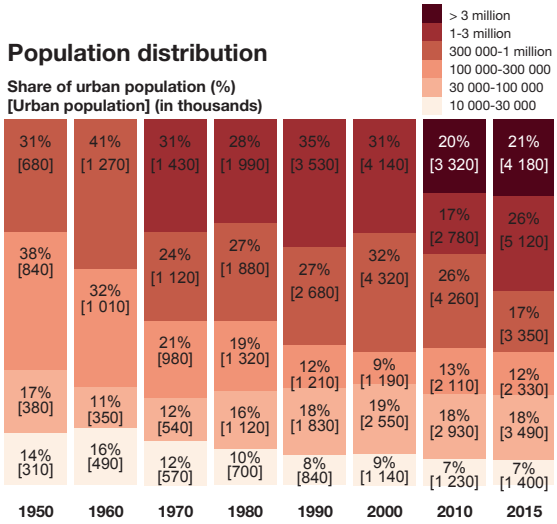
Morocco

Population	Total population **34 165 000**	Urban population **19 876 000**	Urbanisation level **60 %**
Agglomerations	Number of agglomerations **167**	Metropolitan population **20 %**	Average distance between agglomerations **29 km**
Density	Average urban density **7 065 hab./km²**	Urban land cover **2 875 km²**	Urban land cover/ total land cover **0.6 %**

Major agglomerations



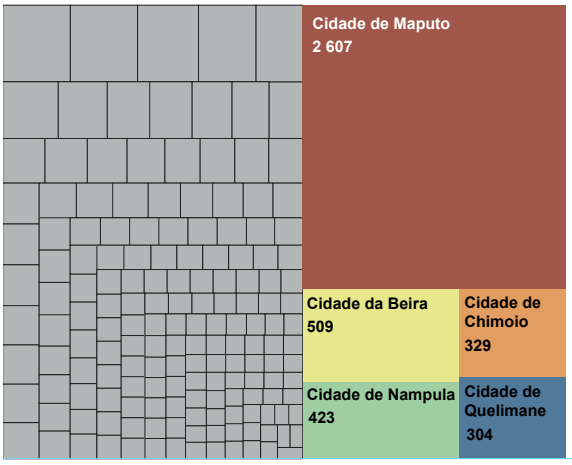
Population distribution



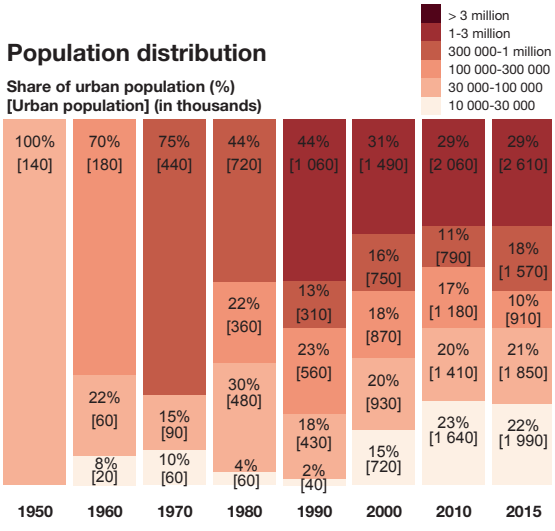
Mozambique

Population	Total population **26 961 000**	Urban population **8 927 000**	Urbanisation level **34 %**
Agglomerations	Number of agglomerations **167**	Metropolitan population **30 %**	Average distance between agglomerations **29 km**
Density	Average urban density **3 133 hab./km²**	Urban land cover **2 850 km²**	Urban land cover/ total land cover **0.4 %**

Major agglomerations



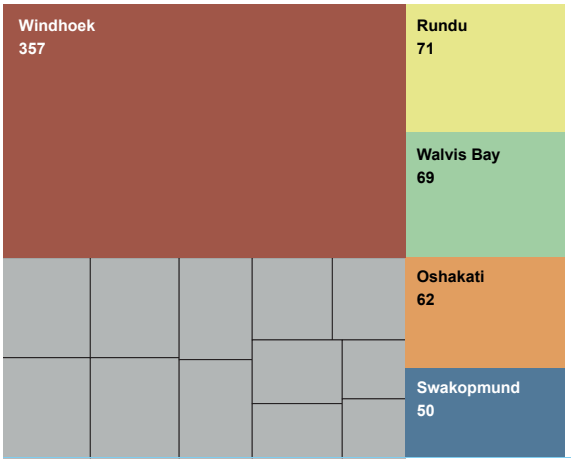
Population distribution



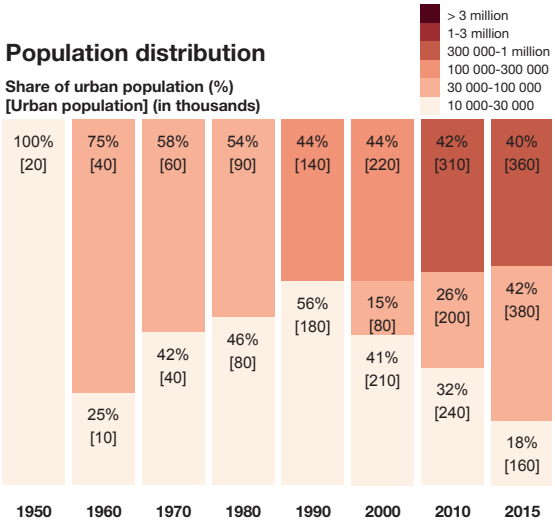
Namibia

Population	Total population **2 210 000**	Urban population **891 000**	Urbanisation level **40 %**
Agglomerations	Number of agglomerations **17**	Metropolitan population **40 %**	Average distance between agglomerations **134 km**
Density	Average urban density **2 804 hab./km²**	Urban land cover **318 km²**	Urban land cover/ total land cover **0 %**

Major agglomerations



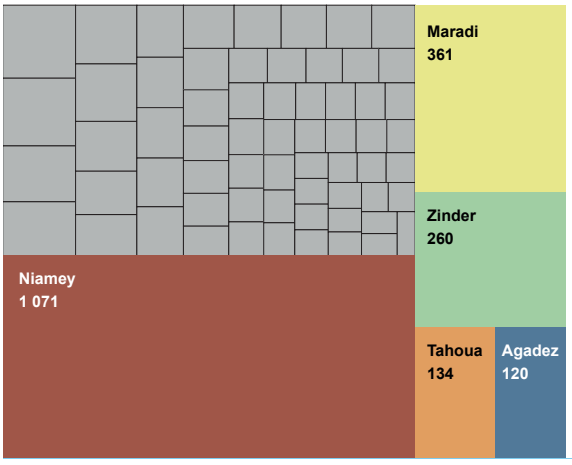
Population distribution



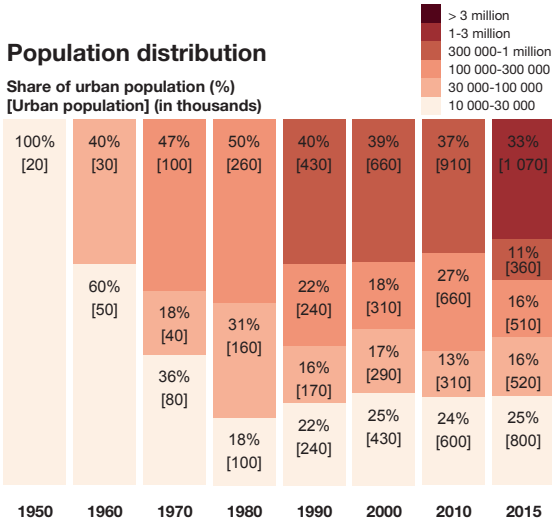
Niger

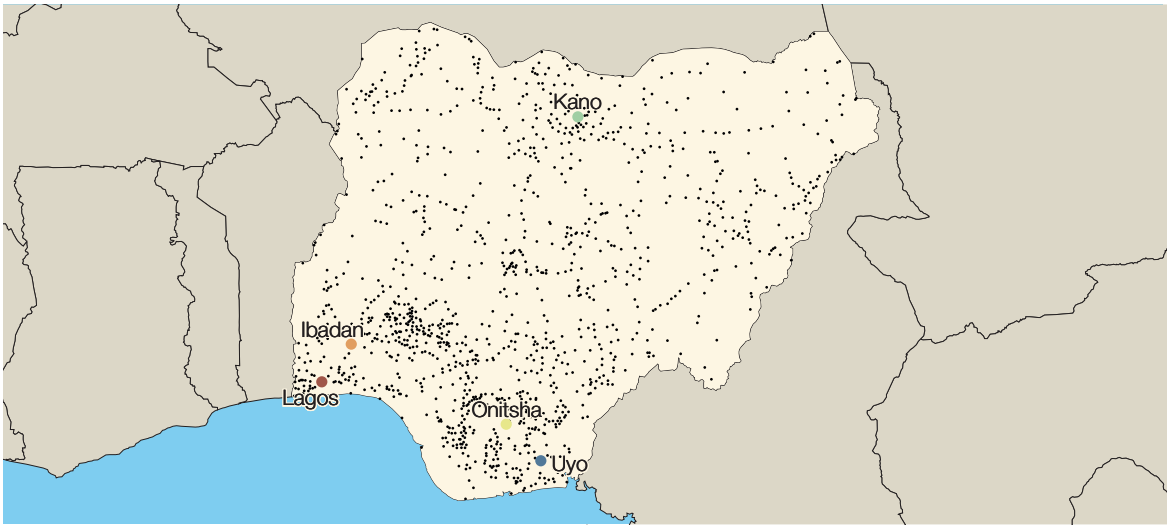
Population	Total population **18 851 000**	Urban population **3 270 000**	Urbanisation level **17 %**
Agglomerations	Number of agglomerations **68**	Metropolitan population **33 %**	Average distance between agglomerations **38 km**
Density	Average urban density **5 946 hab./km²**	Urban land cover **550 km²**	Urban land cover/ total land cover **0 %**

Major agglomerations



Population distribution

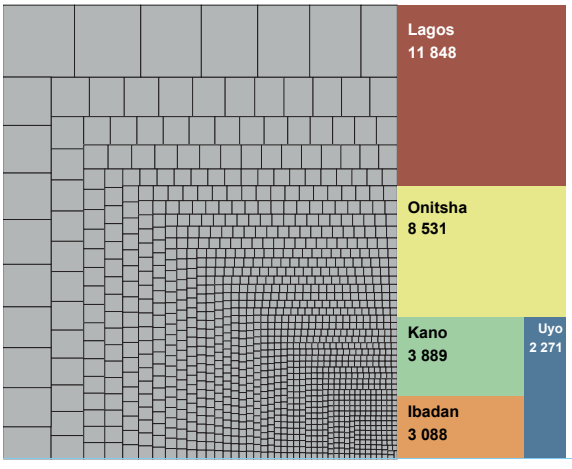




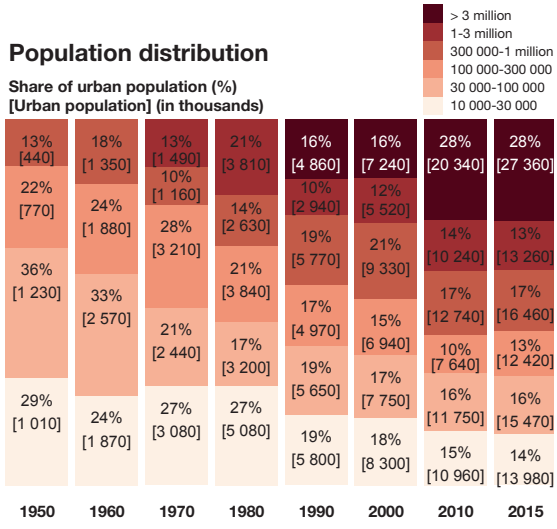
Nigeria

Population	Total population **186 940 000**	Urban population **98 951 000**	Urbanisation level **53** %
Agglomerations	Number of agglomerations **1 236**	Metropolitan population **21** %	Average distance between agglomerations **14** km
Density	Average urban density **5 023** hab./km²	Urban land cover **19 698** km²	Urban land cover/ total land cover **2.2** %

Major agglomerations



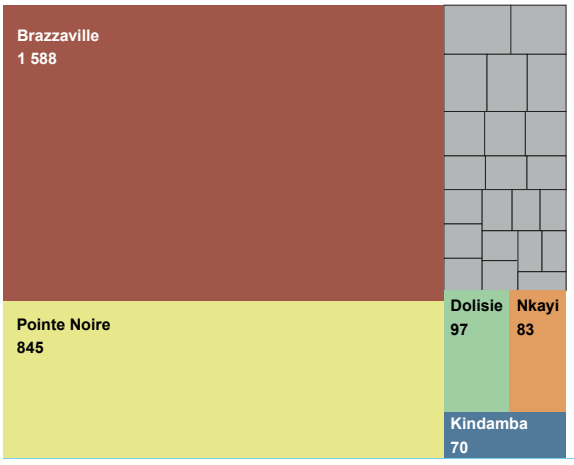
Population distribution



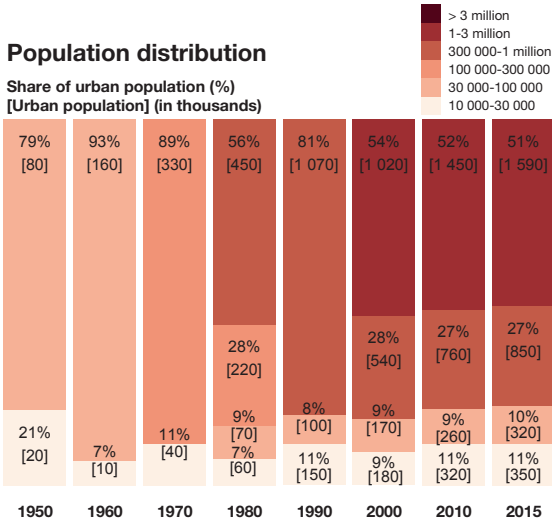
Republic of the Congo

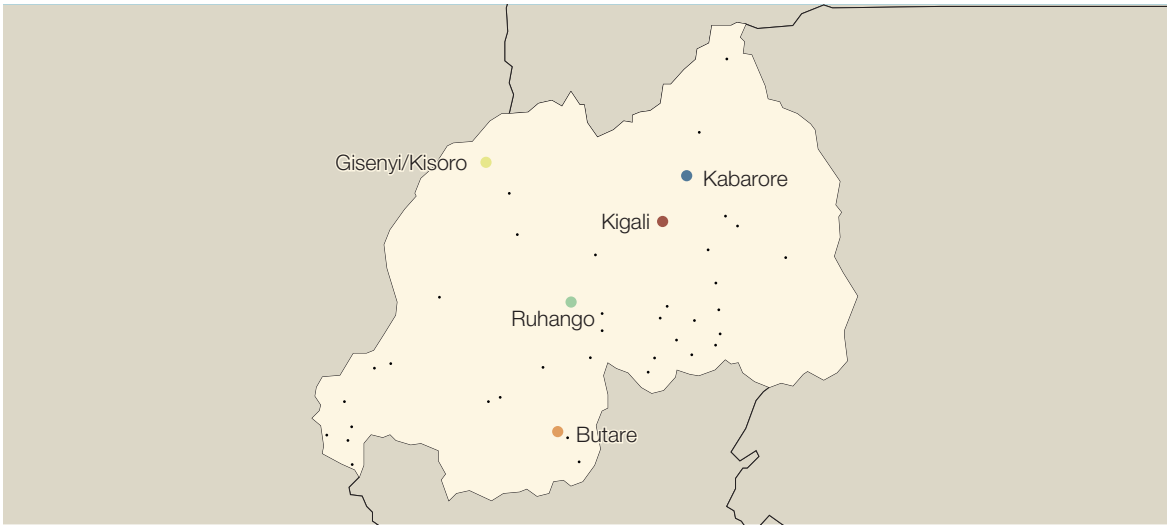
Population	Total population **4 688 000**	Urban population **3 108 000**	Urbanisation level **66 %**
Agglomerations	Number of agglomerations **27**	Metropolitan population **78 %**	Average distance between agglomerations **65 km**
Density	Average urban density **5 489 hab./km²**	Urban land cover **566 km²**	Urban land cover/ total land cover **0.2 %**

Major agglomerations



Population distribution

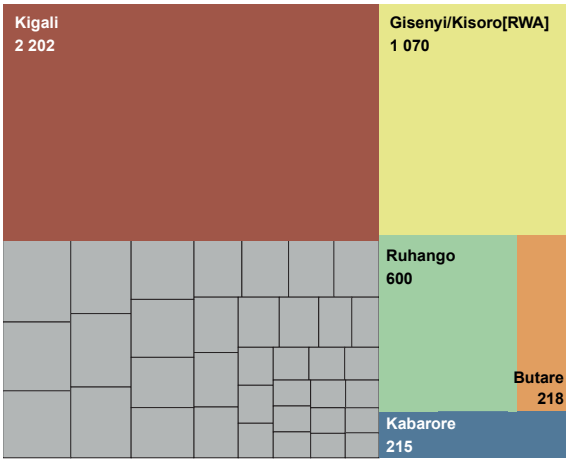




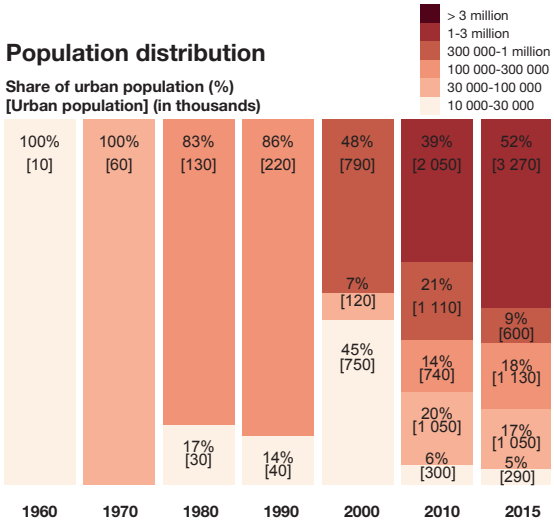
Rwanda

Population	Total population **11 346 000**	Urban population **6 335 000**	Urbanisation level **56 %**
Agglomerations	Number of agglomerations **41**	Metropolitan population **35 %**	Average distance between agglomerations **13 km**
Density	Average urban density **3 021 hab./km²**	Urban land cover **2 097 km²**	Urban land cover/ total land cover **8.5 %**

Major agglomerations



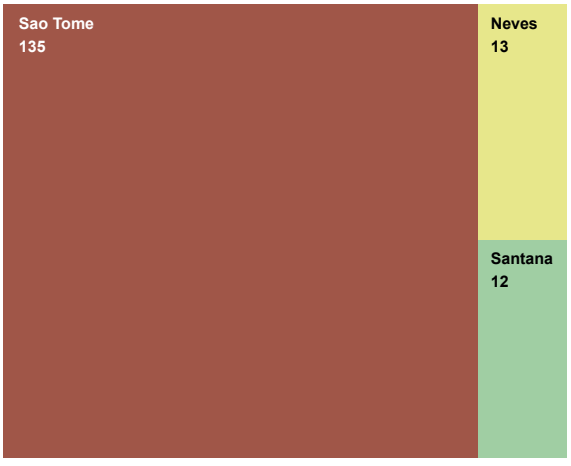
Population distribution



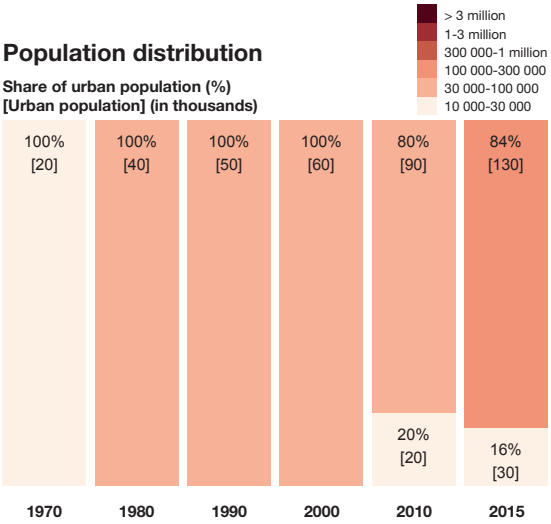
Sao Tome and Principe

Population	Total population **199 000**	Urban population **160 000**	Urbanisation level **80 %**
Agglomerations	Number of agglomerations **3**	Metropolitan population **84 %**	Average distance between agglomerations **12 km**
Density	Average urban density **3 710 hab./km²**	Urban land cover **43 km²**	Urban land cover/ total land cover **4.5 %**

Major agglomerations



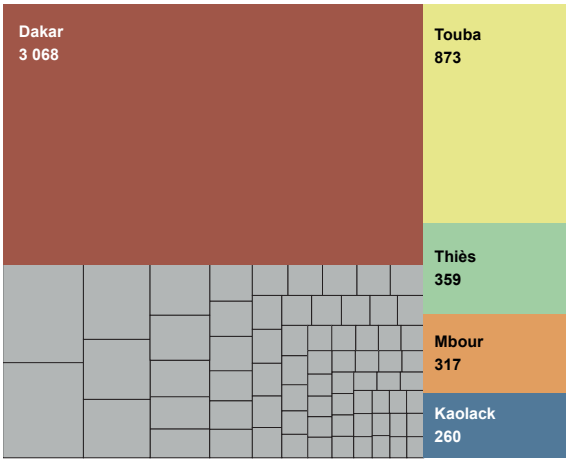
Population distribution



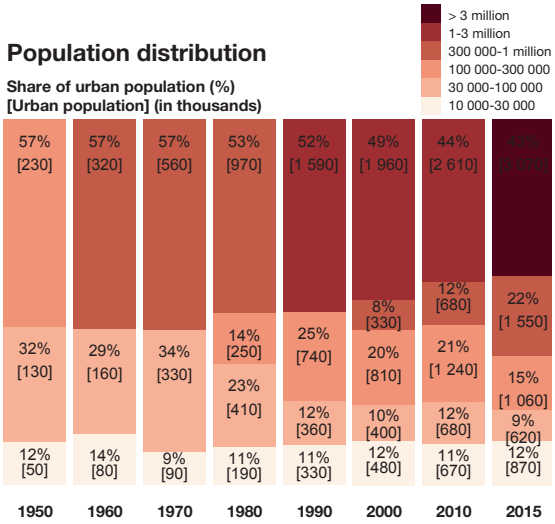
Senegal

Population	Total population **14 143 000**	Urban population **7 157 000**	Urbanisation level **51 %**
Agglomerations	Number of agglomerations **74**	Metropolitan population **55 %**	Average distance between agglomerations **25 km**
Density	Average urban density **7 465 hab./km²**	Urban land cover **959 km²**	Urban land cover/ total land cover **0.5 %**

Major agglomerations



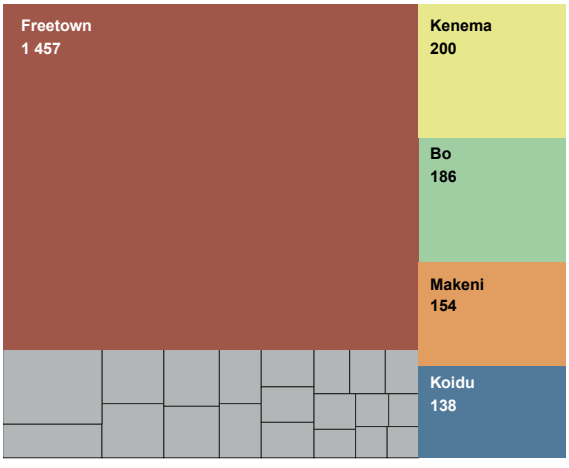
Population distribution



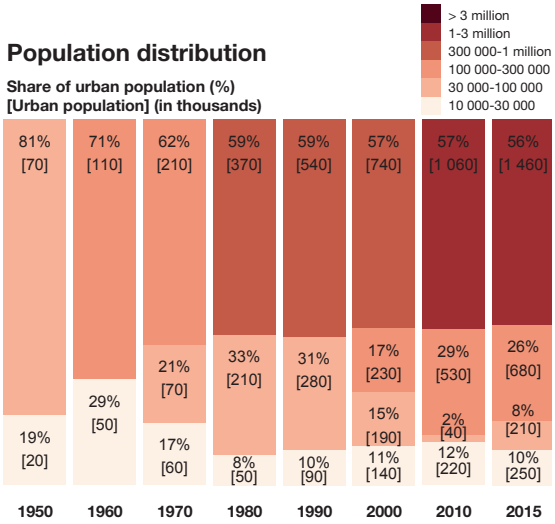
Sierra Leone

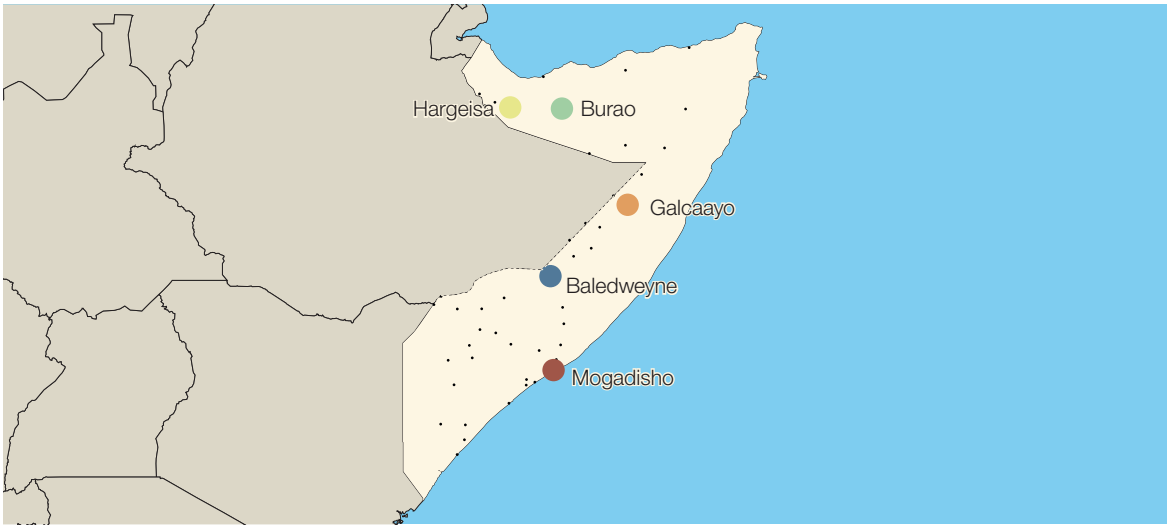
Population	Total population **7 092 000**	Urban population **2 592 000**	Urbanisation level **37 %**
Agglomerations	Number of agglomerations **25**	Metropolitan population **56 %**	Average distance between agglomerations **31 km**
Density	Average urban density **5 780 hab./km²**	Urban land cover **448 km²**	Urban land cover/ total land cover **0.6 %**

Major agglomerations



Population distribution

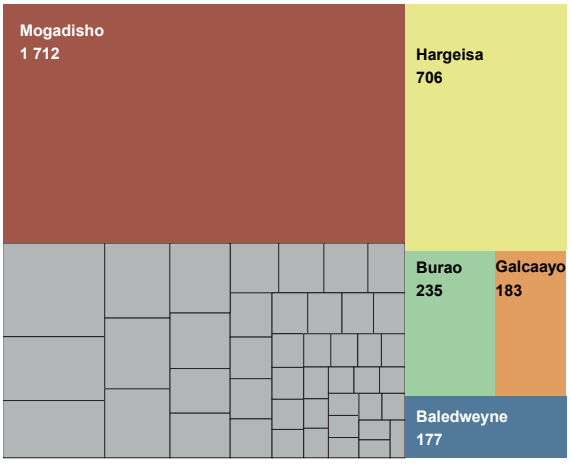




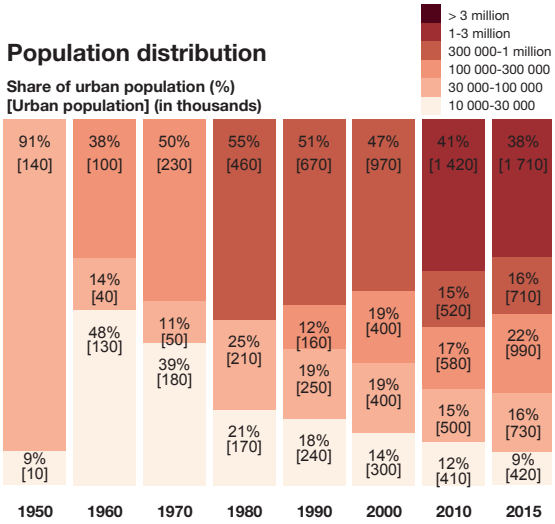
Somalia

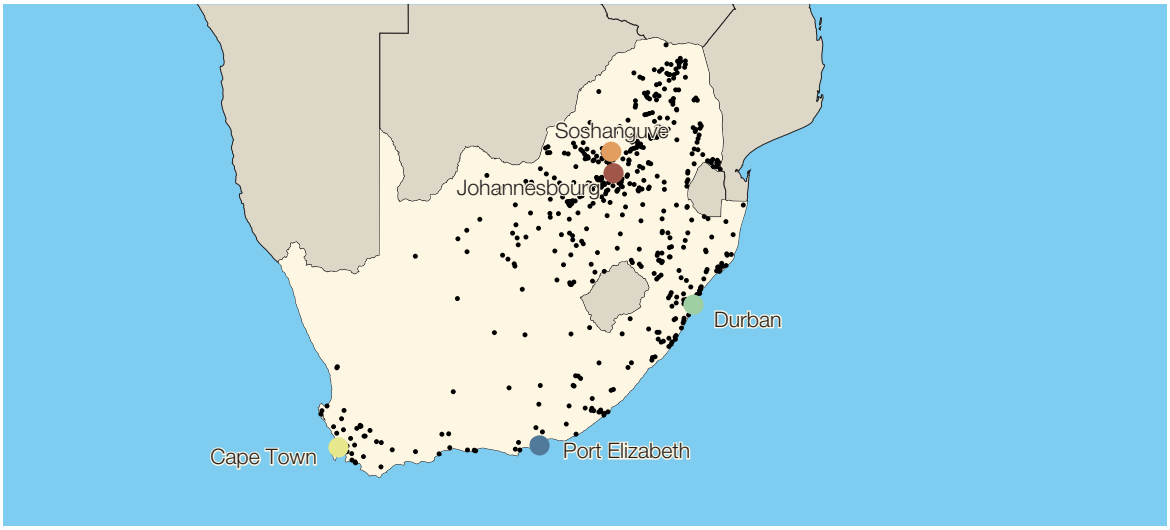
Population	Total population **12 675 000**	Urban population **4 554 000**	Urbanisation level **36 %**
Agglomerations	Number of agglomerations **49**	Metropolitan population **53 %**	Average distance between agglomerations **65 km**
Density	Average urban density **8 795 hab./km²**	Urban land cover **518 km²**	Urban land cover/ total land cover **0.1 %**

Major agglomerations



Population distribution

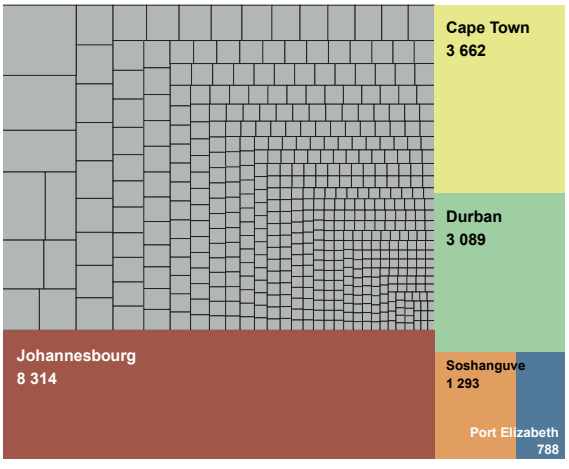




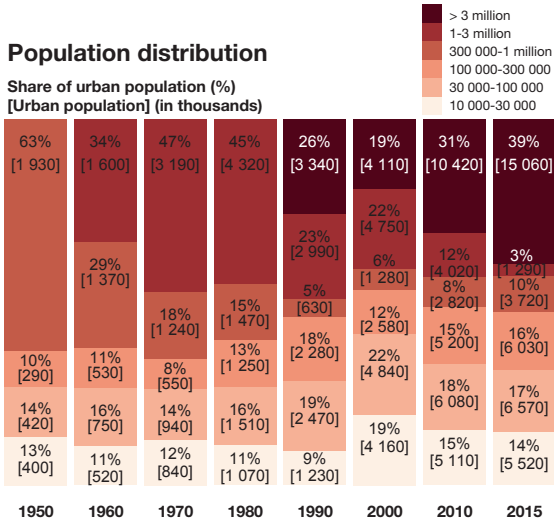
South Africa

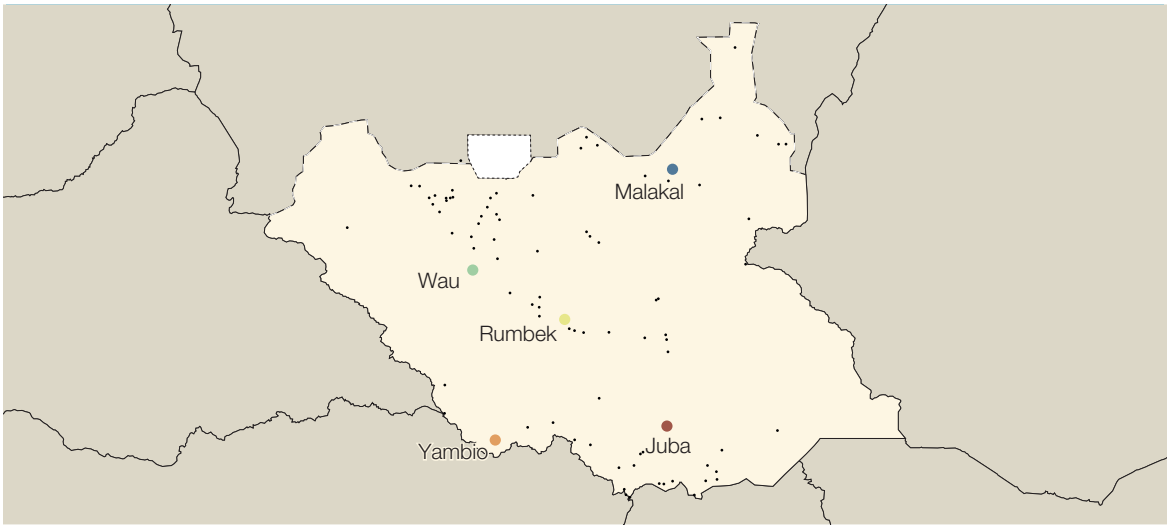
Population	Total population **54 647 000**	Urban population **38 201 000**	Urbanisation level **70** %
Agglomerations	Number of agglomerations **502**	Metropolitan population **39** %	Average distance between agglomerations **17** km
Density	Average urban density **3 098** hab./km²	Urban land cover **12 330** km²	Urban land cover/ total land cover **1** %

Major agglomerations



Population distribution

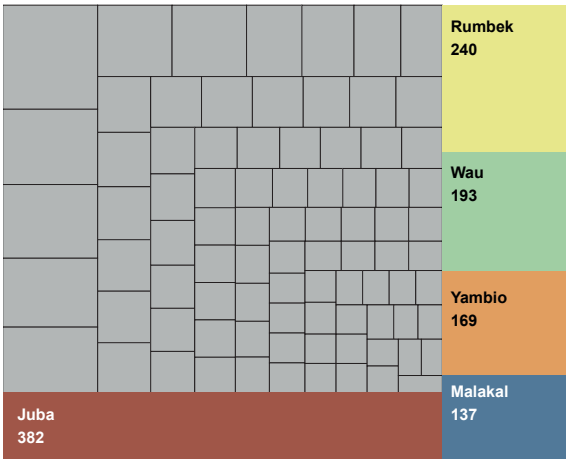




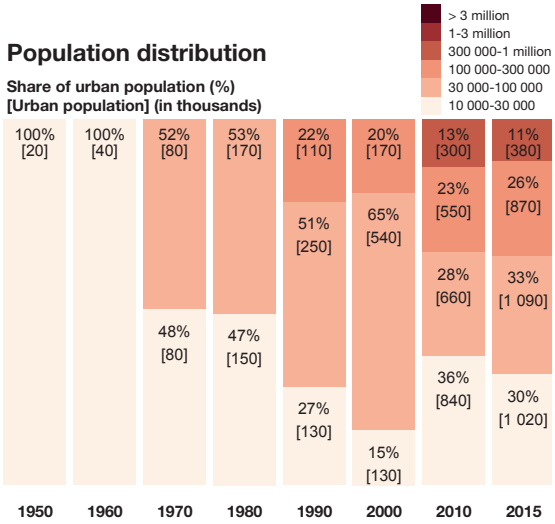
South Sudan

Population	Total population **12 408 000**	Urban population **3 362 000**	Urbanisation level **27** %
Agglomerations	Number of agglomerations **90**	Metropolitan population **11** %	Average distance between agglomerations **32** km
Density	Average urban density **2 936** hab./km²	Urban land cover **1 145** km²	Urban land cover/ total land cover **0.2** %

Major agglomerations



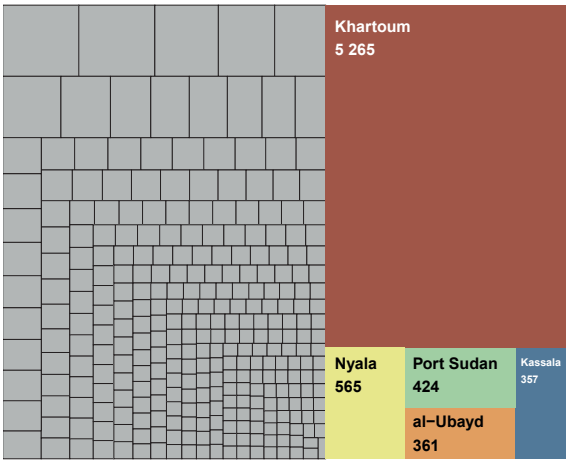
Population distribution



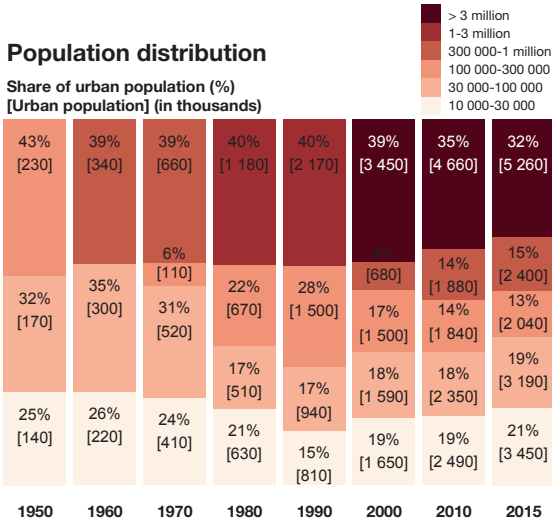
Sudan

Population	Total population **38 435 000**	Urban population **16 335 000**	Urbanisation level **43 %**
Agglomerations	Number of agglomerations **301**	Metropolitan population **33 %**	Average distance between agglomerations **25 km**
Density	Average urban density **4 917 hab./km²**	Urban land cover **3 322 km²**	Urban land cover/ total land cover **0.2 %**

Major agglomerations



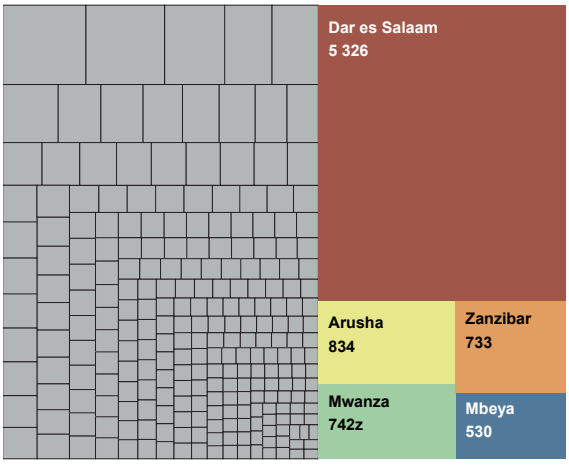
Population distribution



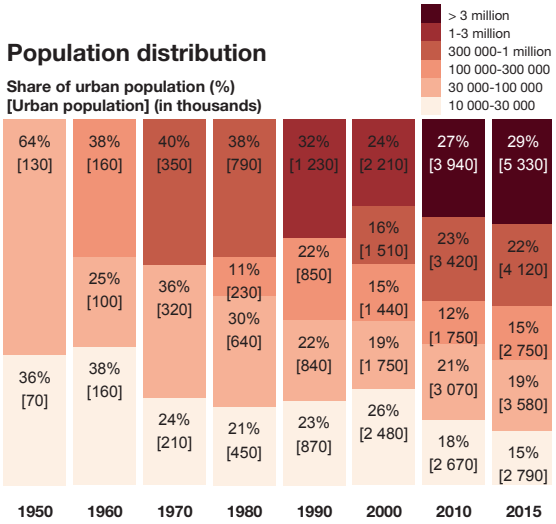
Tanzania

Population	Total population **48 786 000**	Urban population **18 567 000**	Urbanisation level **38 %**
Agglomerations	Number of agglomerations **249**	Metropolitan population **29 %**	Average distance between agglomerations **24 km**
Density	Average urban density **3 357 hab./km²**	Urban land cover **5 531 km²**	Urban land cover/ total land cover **0.6 %**

Major agglomerations



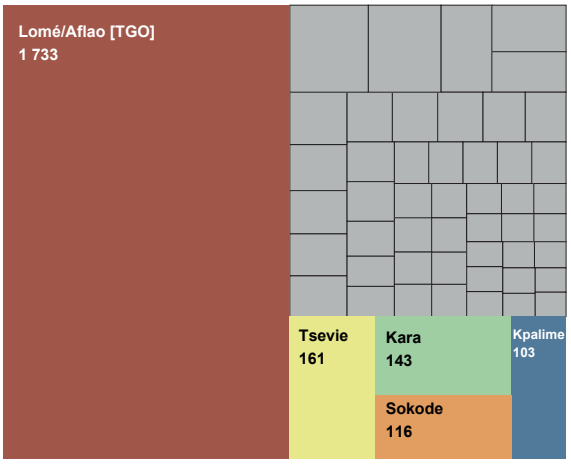
Population distribution



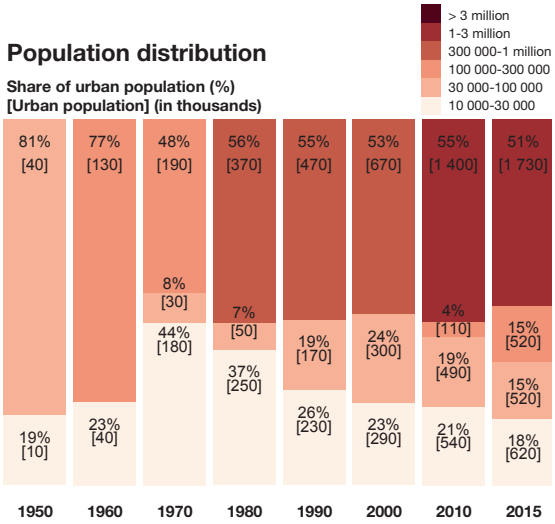
Togo

Population	Total population **6 835 000**	Urban population **3 402 000**	Urbanisation level **50** %
Agglomerations	Number of agglomerations **53**	Metropolitan population **51** %	Average distance between agglomerations **18** km
Density	Average urban density **3 513** hab./km²	Urban land cover **968** km²	Urban land cover/ total land cover **1.8** %

Major agglomerations



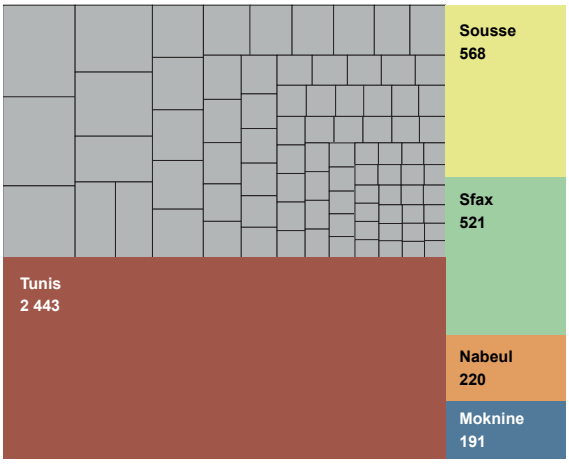
Population distribution



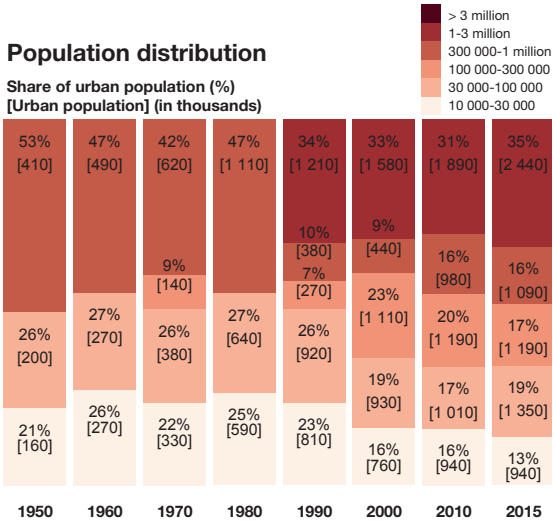
Tunisia

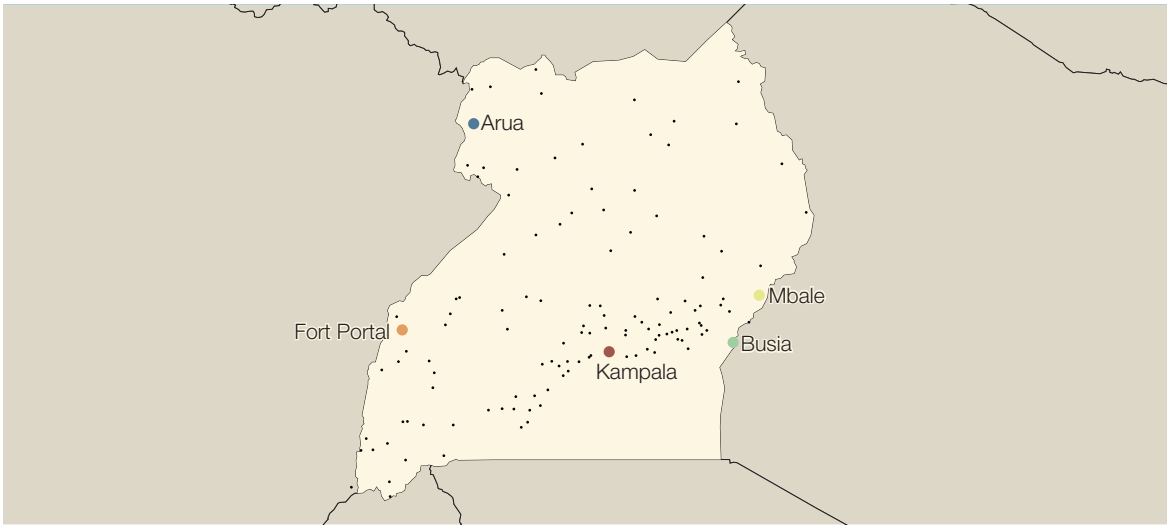
Population	Total population **11 119 000**	Urban population **7 010 000**	Urbanisation level **63 %**
Agglomerations	Number of agglomerations **89**	Metropolitan population **35 %**	Average distance between agglomerations **20 km**
Density	Average urban density **2 609 hab./km²**	Urban land cover **2 687 km²**	Urban land cover/ total land cover **1.7 %**

Major agglomerations



Population distribution

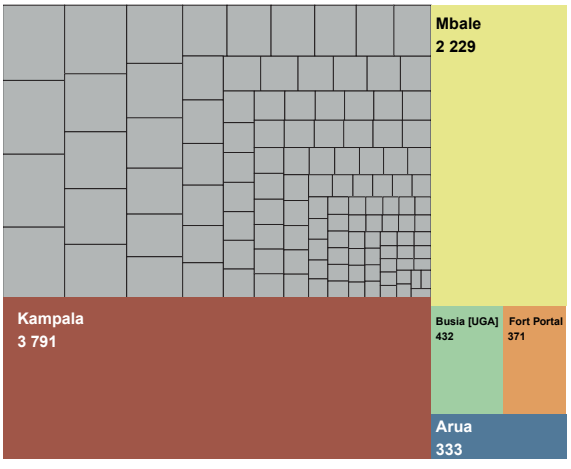




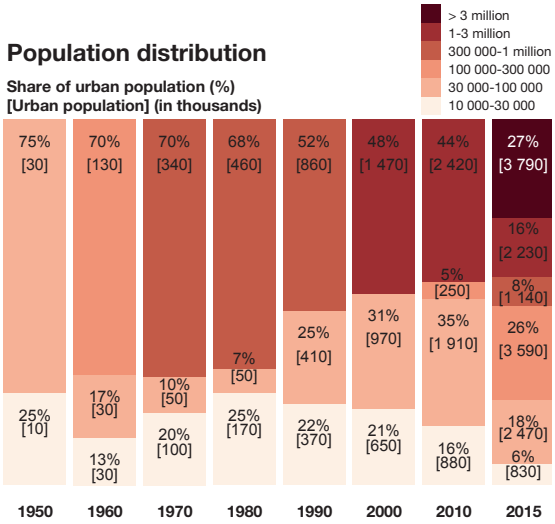
Uganda

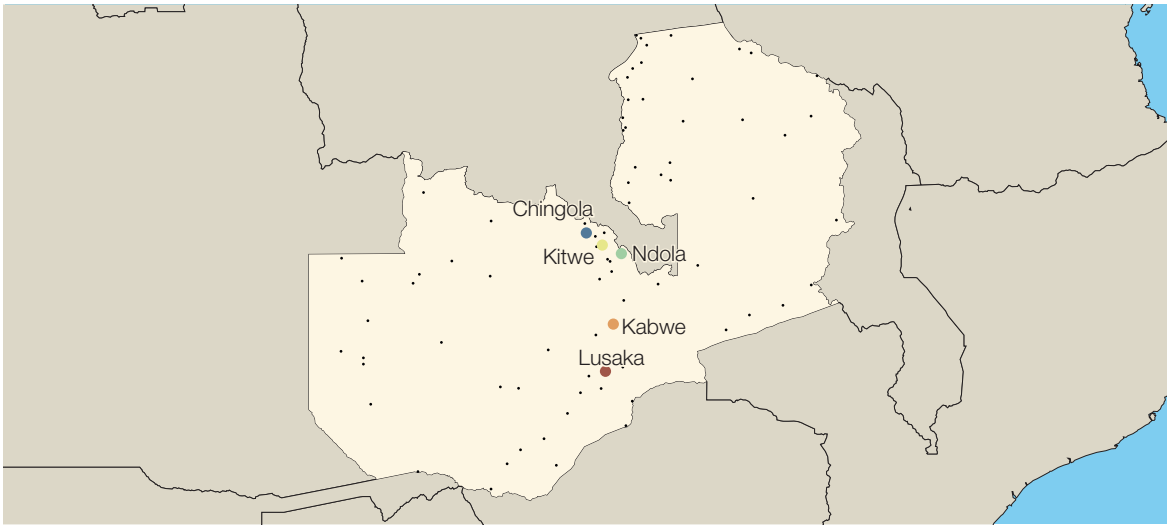
Population	Total population **35 551 000**	Urban population **14 041 000**	Urbanisation level **39 %**
Agglomerations	Number of agglomerations **125**	Metropolitan population **27 %**	Average distance between agglomerations **21 km**
Density	Average urban density **3 015 hab./km²**	Urban land cover **4 658 km²**	Urban land cover/ total land cover **2.3 %**

Major agglomerations



Population distribution

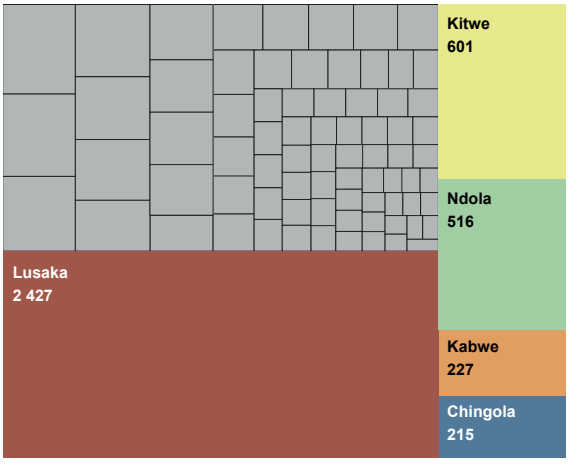




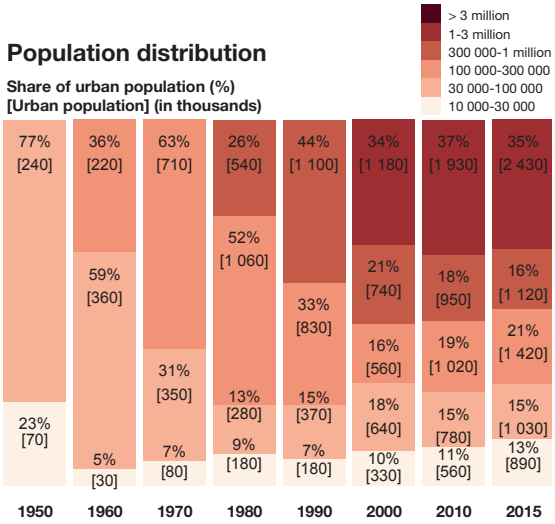
Zambia

Population	Total population **15 474 000**	Urban population **6 878 000**	Urbanisation level **44 %**
Agglomerations	Number of agglomerations **80**	Metropolitan population **52 %**	Average distance between agglomerations **56 km**
Density	Average urban density **3 180 hab./km²**	Urban land cover **2 163 km²**	Urban land cover/ total land cover **0.3 %**

Major agglomerations



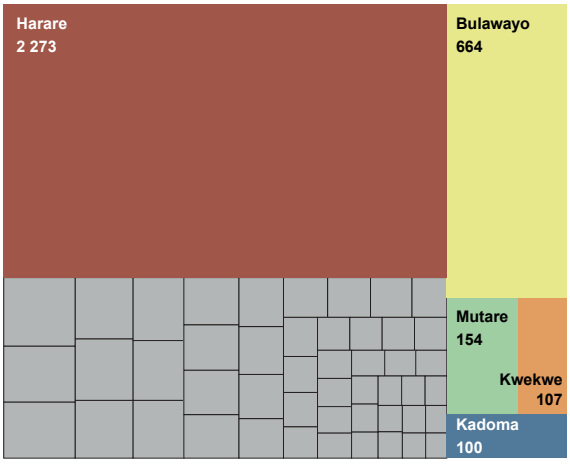
Population distribution



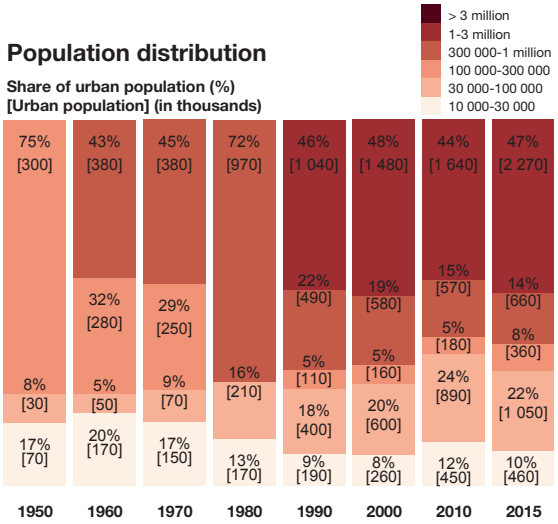
Zimbabwe

Population	Total population **13 943 000**	Urban population **4 801 000**	Urbanisation level **34 %**
Agglomerations	Number of agglomerations **53**	Metropolitan population **61 %**	Average distance between agglomerations **34 km**
Density	Average urban density **3 251 hab./km²**	Urban land cover **1 477 km²**	Urban land cover/ total land cover **0.4 %**

Major agglomerations



Population distribution



Glossary

Absorption
The disappearance of a local unit or agglomeration through its combination with another local unit or agglomeration.

Accessibility
The likelihood that an inhabitant will move to an agglomeration.

Agglomeration
A geographic milieu defined by the continuity of the built environment and/or demographic density. In some definitions, these two criteria can be associated or not. In Africapolis, an agglomeration is any urbanised settlement of at least 10 000 inhabitants in a continuous built-up area with less than 200 metres between buildings and constructions.

Attractor
There are three kinds of localised, geometric settlement structures: grouped settlement, linear settlement, and dispersed settlement. At the local level, these structures have a fundamental impact on urbanisation. These three elementary geometric forms — point, line, and surface — allow for a formal categorisation of the patterns that guide spatial agglomeration growth (size, density, and hierarchical form of agglomerations).

Bicephalic
Two-headed. Characteristics of a national urban system dominated by two large agglomerations.

City
In Africapolis, a territorial unit with a political or administrative status legally used by national statistics to define the “urban” population of a country. This notion should not be confused with agglomeration, which is purely morphological.

Conurbation
An agglomeration that has more than one functional centre.

Demographic pressure
Pressure exerted by a strong increase of the population on a given territory. With equal population growth, the smaller the territory, the greater the pressure per unit area.

Dispersed settlement
A form of settlement characterised by large distances between habitations.

Endogenously regulated
Designates a spatial trajectory that is governed by its own actors (self-regulated). For example, an urbanisation process that results from self-regulated trajectories is characterised by grouping.

Exogenously-regulated
Describes a spatial trajectory that is influenced by external actors or phenomena (for example, a refugee camp).

Functional (Functional approach)
This approach is based on the function of an agglomeration. This function is defined by the presence of political decision-making centres (chief administrative division). The notion is extended to commercial (market) and employment (industrial, commercial, administrative) functions. The functional approach is based on the centre-periphery movements of people (usually home-to-work commuting), tangible and intangible goods, and sometimes the density of networks.

Grouped settlement
Form of settlement characterised by minimising the distance between neighbours.

Interpolation/Retropolation
Interpolation is a mathematical operation that makes it possible to construct a curve from the data of a finite number of points, or a function from the data of a finite number of values. Retropolation refers to prolonging the curve into the past, and projection, towards the future.

Linear settlement
A form of settlement characterised by the distribution of population along linear attractors (roads, ridges, coastlines, etc.).

Local unit (LU)
For Africapolis, the smallest division of administrative territories in a state.

Locality
A locality is a geographically determined space.

Macrocephalic
"With a head disproportionate to the rest of the body". Character of a national urban system whose population of a big city or some big cities dominates other agglomerations.

Monocephalic
Single-headed. Characteristic of a national urban system in which one large agglomeration dominates.

Megacity
A very large city or agglomeration, usually with more than 10 million inhabitants.

Megalopolis
A very large urban area with a large number of agglomerations close to each other.

Merger
The combination of urban units into one.

Metadata
Information on given data.

Metropolis, metropolitan agglomeration
Agglomeration whose population is relatively high compared to the national urban system to which it belongs, distinguishing it from secondary cities. The vast majority of states have only one metropolitan agglomeration, but some countries have two.

Metropolised region (Metropolitan area)
Area that includes a set of urban or rural localities strongly connected to the core of the morphological agglomeration. The territory concerned is defined by the intensity of flows polarised by the centre of a large city.

Naturality
A characteristic derived from nature rather than human factors.

Nucleated (grouped) populations
A form of settlement characterised by a minimisation of distance between habitations.

Orography
Study of the topographic reliefs of mountains.

Planned area
Limits of a territory laid out according to a scheme or plan as planned by a public actor (municipality, state).

Population density
Number of inhabitants per square kilometre.

Population stratum
All human settlements belonging to the same scale in a territory: "metropolitan" stratum (political or economic centre), "urban" stratum, "rural" stratum, etc.

Polycentric
The characteristic of a national system dominated by several large agglomerations.

Primacy (index of)

Indicator calculated by dividing the population of the largest agglomeration by that of the second-largest agglomeration to measure the importance of the first city of a country compared to others within the same urban system (a country in general). By extension, one can calculate the relationship between agglomerations. These results are designated as Prim 1, Prim2, Prim3, etc.

Rural
Category of space or population living outside urban agglomerations. “Rural” should not be confused with “agricultural”.

Scalar
Pertaining to spatial scale.

Settlement system
Human settlements in a territory.

Spatialisation
Localisation in space.

Toponym
Name of a place.

Urban
What belongs to the “urbis”, that is, from inside the ramparts. Refers to the dense agglomerate part of a town or village.

Urban scattering
Rural countryside with a scattering of buildings/ construction.

Urban sprawl
The expansion of an urban built environment to the detriment of undeveloped spaces.

Urbanity
Perceived or expected character of what is urban.

West African Studies

Africa's Urbanisation Dynamics 2020

AFRICAPOLIS, MAPPING A NEW URBAN GEOGRAPHY

Africa is projected to have the fastest urban growth rate in the world: by 2050, Africa's cities will be home to an additional 950 million people. Much of this growth is taking place in small and medium-sized towns. Africa's urban transition offers great opportunities but it also poses significant challenges. Urban agglomerations are developing most often without the benefit of policies or investments able to meet these challenges. Urban planning and management are therefore key development issues. Understanding urbanisation, its drivers, dynamics and impacts is essential for designing targeted, inclusive and forward-looking policies at local, national and continental levels. This report, based on the Africapolis geo-spatial database (*www.africapolis.org*) covering 7 600 urban agglomerations in 50 African countries, provides detailed analyses of major African urbanisation dynamics placed within historical, environmental and political contexts. Covering the entire distribution of the urban network — from small towns and secondary cities to large metropolitan regions — it develops more inclusive and targeted policy options that integrate local, national and regional scales of urban development in line with African realities.

Consult this publication on line at ***https://doi.org/10.1787/b6bccb81-en***.

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AFRICAPOLIS
Visualise Urbanisation in Africa

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