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sein des réseaux urbains mondiaux*

*Delimitando las ciudades africanas (grandes regiones urbanas) para ser
comparadas en el marco de las redes urbanas globales*

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Delineating African cities (large urban regions) to compare them within global urban networks

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Introduction

- 1 Africa has only recently experienced urban transition, following the countries' independence (1960 for the majority), but with a very rapid rate of urbanization (Moriconi-Ebrard et al., 2020; OECD, 2020; Dorward et al., 2023). The African urban demographic explosion makes the urban landscape constantly changing in both build-up form and social content. According to the OECD, the ECA, and the AfDB (2022), urbanization is one of the most profound transformations that the African continent will experience in the 21st century. Nearly 4,500 new cities were created in Africa between 1990 and 2015, and the urban population share increased from 14% in 1950 to 35% in 2000 and is now around 43% (Dorward et al., 2023). The threshold of 50% of the population living in cities is expected to be reached in 2035, which represents almost one billion people settled in African cities. This change, which has affected the urban fabric of the entire African continent, has led to the transformation of certain cities into metropolises (Allemand et al., 1994), with their spatial and functional recompositions and the emergence of peri-urbanization (Dorier-Aprill & Domingo, 2004).
- 2 This local process is simultaneously embedded in the growing integration of cities in the national, regional, and international social and economic systems of interrelations. At the local scale, the dynamics of center-periphery interrelationships strengthen the

territorial anchorage of the whole economic and decision-making weight of metropolises and their capacity to strengthen their vitality (Chabi, 2013). New African spatial structures with imprecise boundaries constitute the most dominant form of interconnected urban areas (Chabi, 2013; Cheru, 2007; Delcourt, 2007).

- 3 In this context, an important issue is the openness of these cities to the world and their ability to develop their position in global city networks. Multinational firms have been present in African cities for a long time: they first came from colonialist countries and remained active and powerful after the countries' independence in the 1960s and 1970s. According to the United Nations Conference on Trade and Development (UNCTAD, 2022), foreign direct investment flows in African countries increased by 147% in 2021, from \$39 billion in 2020 to \$97 billion in 2021. Their locations are mostly inside the largest metropolises and in their surrounding peripheries. Therefore, it would be important to assess the capacities of African cities to develop policies to foster their entire local development and interconnectivity. But how can the capacities of African metropolitan areas be assessed when there is still no common concept of the city to compare them together and with other cities in the world?
- 4 The objective of this paper is to delineate African cities in a comparative way. We first discuss the concept of the city in the African context, and after reflecting on the general concept of cities and on the existing attempts to delineate African cities, we develop a methodology for delineating Large Urban Regions (LURs) from the perspective of multinational firms' locations and to make them comparable to each other and to other cities in the world. The results show that taking this delineation allows to encompass more than 98% of all the companies linked with multinational global networks.

1. Reflecting on the city concept in Africa

- 5 Starting with the history of African cities will allow to show the different processes that made them emerge, specifically with the colonization effects, and thus better understand their actual structures. It partly explains why there is not unified definition of cities in Africa until today. A general conceptualization of cities will help us to reflect on cities' definition in the African context: recent debates on the specific notion of cities in the South should be presented and discussed. It led us to adapt the Large Urban Regions' (LURs) criteria and concepts when applying them in the African context.

1.1 The history of African cities

- 6 From a historical point of view, the expression of a real African urban civilization was nourished by the contacts of Africans with Arab merchants from Asia between the 13th and 14th centuries (Picon-Loizillon, 1985; Coquery-Vidrovitch, 1988). If we look at the formation processes of African cities, we can notice that some cities appeared earlier. The urbanization in Africa dates back to the Neolithic period between 5,000 BC and 1,000 AC (Oliver & Fagan, 1975; Hull, 1976; Munson, 1980; McIntosh & McIntosh, 1980; Coquery-Vidrovitch, 1988). Throughout African history, a locality, regardless of the size of its population, generally became a (modern) city when power was transferred from the customary to the state (Piermay, 1981, 2002).

- 7 Three main periods of city formation can be distinguished, corresponding to distinct processes: pre-colonial cities, colonial cities (often port cities), and (postcolonial) cities of state independence.

1.1.a Pre-colonial cities or traditional cities

- 8 Archaeological, historical, and contemporary research (Coquery-Vidrovitch, 1988, 1993; McIntosh & McIntosh, 1993, 2014) has shown that pre-colonial towns were the result of independent kingdoms founded by families, tribes, or clans around the kings (Balandier, 1955; Dresch, 1950; Mabogunje, 1965; Amankwah-Ayeh, 1996; Childress, 1989). Among the oldest cities are Djenné-Djeno and Timbuktu (Mali), Kumasi (Ghana), the Sawili cities, the cities of Egypt and Nubia along the Nile, etc. The cities of the Maghreb and some of sub-Saharan Africa are also representative of pre-colonial cities (Tunis, Cairo, Casablanca, Djenne, Kumasi, etc.). Most of these cities dated from the Egyptian, Phoenician, Greek, Roman, or medieval periods and reached their peak around the 11th and 12th centuries (Lézine, 1969; Oliete & Magrinyà, 1975). They were characterized by mosques, palaces, and souks (markets). Some of them kept their architecture until today, for example, Timbuktu (Mali).
- 9 Most of the developments of sub-Saharan cities would have been largely supported by Arab merchants to control the outlets of the trans-Saharan trade (Coquery-Vidrovitch, 1988, 1993) Africa's trade networks and cultural cross-fertilization with the Arab world have had an impact on urban architecture in Africa (Beck, 2010). Pre-colonial or traditional cities had their own structures of urban governance and management of spatial extension (Hull, 1976; Igue, 2008). These cities were centers of political and religious power, as well as important commercial centers. The historical impact of colonialism has increased the complexity and diversity of African urban formations (O'Connor, 2013).

1.1.b Colonial cities or 'white' cities

- 10 According to urban history, it is clear that colonization didn't bring the city to Africa, but it did mark the rise and emergence of modern cities in most of African countries (Coquery-Vidrovitch, 1988, 1990). Even though there were urban areas in Africa before colonization, it was during the colonial period (1870 to 1960) that most of the modern African cities existing today were born. The colonial cities can be seen as a "colonial construction", not in the sense that they didn't exist before but by creating cities with administrative centers, the colonizers attempted to control populations to develop an economy based on human power (Howard, 2003). The construction of ports, railroads, and other infrastructure contributed to the emergence of certain African cities (Goerg, 2006) and the development of a long-lasting economy. During the colonial period, cities were firstly concentrated on the edges of the continent (port cities in the Mediterranean, Indian, and Atlantic oceans) to meet the need for commercial traffic, and later in the interior of the continent to occupy strategic territories and extract local natural resources (Oliete & Magrinyà, 1975; Coquery-Vidrovitch, 1988; Young, 1994; Oliete, 2002). Therefore, during the colonial period many cities were founded as economic (port cities) or political centers (Fourchard & Goerg, 2022). Colonial administrations took control of the urban management of pre-colonial cities, and they accelerated the process of urbanization for the needs of imperial management and

economy (export of agricultural products, mining) (Coquery-Vidrovitch, 1988). Most of these cities were named after the explorers or their masters (Brazzaville, Leopoldville [Kinshasa], Victoria [Seychelles], Fort Lamy [N'Djamena], ...). During these colonial years, the level of urbanization in Africa remained very low (Cour, 1995).

- 11 In fact, colonial urban policies did not expand so much the cities neither transform their morphology according to the socio-racial differentiation of neighborhoods (Binet, 1976). These cities were founded on a European urban model in the name of the state or of religion and for the sake of economic progress and medical welfare (Howard, 2003), with modern architecture. It resulted in a juxtaposition of two apparently contradictory urban models (Coquery-Vidrovitch, 1988) between former indigenous cities, and colonial cities. In some cases, colonial towns were a socio-spatial process of dispossession through which the colonial administration asserted its dominion over lands occupied by Indigenous peoples, generally at the request of an imperial state (Hugill, 2017), as was the case in South Africa, Zimbabwe, etc.
- 12 Unity in colonial cities was not territorial, it was racial and communal identity (Gervais-Lambony, 2004). Neighborhoods were divided between white or administrative neighborhoods and black or indigenous neighborhoods (Guillaume, 1997). In the black neighborhoods, the inhabitants grouped themselves ethnically or communally and each found unity with their community leader (Fourchard & Goerg, 2022). This separation of populations within a city is found throughout all the colonized countries, but the cases of Kenya, Rhodesia, and South Africa are the most prominent (Houssay-Holzschuch, 1995; Giraut, 2017). Apartheid or post-apartheid cities are the typical models of colonial cities. These cities were fragmented into townships where black Africans were separated from exclusive white neighborhoods (Guillaume, 1997). These colonial cities were perceived as foreign spaces from the practices of African populations (Chouin, 2022).

1.1.c Postcolonial or modern cities

- 13 Post-colonial cities are a continuation of the colonial construction of cities by Africans after decolonization (Goerg, 2006). After the independence years, African countries implemented urbanization and industrialization policies based on colonial footprints to promote economic development and the integration of rural areas into the national and even international economy. Most of Africa's urban landscapes have relatively recent origins, and the legacy of colonialism is still very much evident (Myers, 2003).
- 14 Post-colonial or modern cities were developed in the aftermath of independence from the 1960s onwards, some of which are inherited from the European urban model and are therefore the result of history (Abu-Lughod, 1965; King, 2012; Jacobs, 1998). After the adoption and generalization of urbanization processes in Africa, the African leaders tended to promote capital cities and metropolises to the detriment of other cities (Chabi, 2013; Aloko-N'Guessan et al., 2010), despite that most political capitals of states were inherited colonial cities, except Abuja (Nigeria), Dodoma (Tanzania), Lilongwe (Malawi) or Yamoussoukro (Ivory Coast). Other post-colonial cities were developed by economic dynamics (exploitation of natural resources and trade) and rural exodus (Bocquier & Traoré, 2000; Lardeux, 2011). In addition to the desire to urbanize African countries, the influx of multinational firms has led to the growth of cities around natural resources (e.g., Johannesburg [South Africa], Lubumbashi [Democratic Republic

of Congo)], Beira [Mozambic], Oran and Annaba [Algeria]), in commercial centers (Cotonou [Benin]), Lagos [Nigeria] and in industrial zones (e.g., Luanda [Angola]).

- 15 The rapid evolution of urbanization in Africa, largely due to demographic growth, has taken place within a conceptual approach that varies from country to country (Moriconi-Ebrard et al., 2021; Dorward et al., 2023), given the complexity of the causes of urbanization and political objectives. The concept of the city in Africa is a complex and constantly evolving phenomenon, resulting from the interaction of numerous local historical, political, social, economic, and environmental factors.

2. The challenge of the heterogeneous definitions of cities in Africa

- 16 Even considering this long urban history in Africa, the word 'city' was rarely used in African languages (Piermay, 2003) despite the notion of the city being adopted since the colonization and the global contexts. The city is therefore mostly considered as a political-administrative unit whose geographical limits and legal status are defined by national governments according to various criteria of the contexts with administrative, political, and functional objectives. It results in the criteria for defining the city differing from country to country.

2.1 Existing concepts of cities in Africa

- 17 Making a unique and harmonious concept for delineating African cities comes up against the heterogeneity of the urban definitions encountered in African countries, based on a series of criteria. Today, among the 54 African countries, 25 countries use politico-administrative criteria, 15 countries use numeral (or demographic) criteria, and 13 countries use function (administrative regional or national capital) criteria (OECD/WAC, 2020, p. 22-23).

- The **politico-administrative criteria** define a city with political-legal boundaries: the category of the city includes “all localities in full administrative exercise and chief towns of sub-prefectures, prefectures, communes, etc. with more or less population” (UN, 2018a; OECD/SWAC, 2020, p. 22-23). Among the countries that use these criteria we find Libya, Chad, Lesotho, South Africa, Uganda, This definition excludes many localities that do not have an administrative status but a large population. It can also create some confusion to the extent that a commune with different parts is mistaken for a single city. This definition can lead to under- or overestimation the urbanization in Africa.
- The **numeral or demographic criteria** are based on a population threshold. The minimum population threshold varies from 1,500 to 20,000 inhabitants to define a locality as a city. These criteria are used for example in Senegal (10,000 inhabitants or more), Zambia and Botswana (5,000 inhabitants or more), Liberia (2,000 inhabitants or more), ... This definition criterion is dependent on the statistics of the national population censuses of each country.
- **Function criterion** (provincial capital, government seat, etc.). This criterion is defined by the presence of political decision-making headquarters. This is the case of cities defined in Burkina-Faso, Egypt, Sudan, Equatorial Guinea, ... For others, such as Comoros and Kenya, in addition to the administrative capital function, basic service infrastructures (paved roads, electricity, and hospitals) are added to this criterion.

- 18 Table 1 below highlights the various criteria used to define urban areas. These criteria vary from one country to another.

Table 1: The national official definitions of cities in Africa

Countries	Criteria of the definition of urban
Algeria	The urban/rural delineation is performed after the census operation based on the classification of built-up areas. Groupings of 100 or more constructions, less than 200 meters 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 centers (45) plus 4 medium-sized towns are considered urban areas.
Burundi	Commune of Bujumbura.
Comoros	Every locality or administrative center of an island, region or prefecture that has the following facilities: asphalted roads, electricity, a medical center, 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 centers and localities with 300 dwellings and/or 1 500 inhabitants or more.
Eswatini	A geographical area constituting a city or town, characterized by higher population density and human construction in comparison to the areas surrounding it.
Ethiopia	Localities of 2 000 or more inhabitants.
Guinea	Administrative centers 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 centers.
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 recognized as urban by the law. These are all administrative centers 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 recognized as urban, and all areas recognized 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

- 19 The heterogeneity of definitions is a limitation for the comparability of African cities on a continental and global scale, and the exhaustive estimation of the level of urbanization in Africa. Therefore, general concepts could help to clarify the ones we could apply for African cities.

2.2 General approach to the city concept

- 20 The definition of a city is far from being uniform not only in Africa, but also all over the world. As many historic seminal cities' conceptualization proposed, regardless of the part of the world considered, a city can be defined as a social, religious, and political organization of human societies on a given territory (Fustel de Coulanges, 1866; Duby, 1985). This organization of cities leads to multiple socio-economic interactions with their surrounding territories and with other cities (Bairoch, 1985; Storper and Scott, 2016). The socio-economic interactions within and between cities allow the city to be considered as "*a system within a system of cities*" (Berry, 1964; Pumain, 1992, 1997; Rozenblat & Pumain, 2018). Therefore, cities interact with their regions with fuzzy limits, and different concepts could help to make these limits clearer. Various approaches are used to define a city or an urban area (OECD/SWAC, 2020): political-administrative, morphological, or functional. Four different conceptual approaches make it possible to define cities (Pumain et al., 1992):

- **Urban locality (MUNI):** The city is considered within its boundaries as an administrative unit or by its legal status. In Africa, the boundaries of the urban localities are often represented in this way with the administrative maps. This delineation privileges the governance aspects of local units, which are often called municipalities, communes, districts, subprefectures, or counties. The sizes and denominations of urban localities are

variable, depending on the countries and their land administration policies (i.e for Africa, tab. 1).

- **Morphological urban area (MUA):** This approach considers the morphology of the city by delineating the continuous built-up areas. The growth of a morphological urban area often corresponds to a physical expansion of the agglomeration accompanied by a sprawl of built-up areas, new basic infrastructures, and public transportation. A morphological urban area refers to the continuity of the built-up area irrespective of administrative boundaries: it may encompass one or more urban localities contiguous settlements and a certain number of inhabitants. An urban locality can be independent or juxtaposed with others to form a large morphological urban area. This approach is useful for all the policies linked to the built environment (roads, water, communication, and energy networks). This approach was used by Pumain et al. (1992) who delineated the cities with more than 200,000 inhabitants in Western Europe. Moriconi-Ebrard (1994) systematized this approach at the global scale including “African agglomerations” (Africapolis, OECD, 2020) that we will explain further below.
- **Functional urban area (FUA):** Thanks to the generalized rapid transportation means, the large central cities have extended their areas of influence beyond the usual limits to reach even their remote peripheries (Lefèvre & Jouve, 1999). These peripheries, sometimes forming satellite cities, are influenced by the urban center around which they gravitate. A functional urban area may encompass one or more morphological urban areas forming a unique urban cluster. FUAs are considered as a set of compactly located settlements and territories, connected by the joint use of infrastructure and united by intensive economic, social, and labor links. They are generally defined by the estimated number of people who commute to the city center (or to the morphological urban area) for work or study, creating regular commuter flows (Berry, 1968; Terrier & Blum-Girardeau, 1980; Pumain et al., 1992; Parr, 2007). Started in USA in the 1960s and later in the developed countries, delineations of FUAs require statistics of these commuting flows (Terrier & Blum-Girardeau, 1980; Polyan, 1988; Halbert et al., 2012; Guérois et al., 2014). Due to the lack of commuter statistics, the delineation of FUAs has remained limited in the case of Africa (OECD, 2019), sometimes replaced by the density of clusters with the GHSL/DEGURBA data created by the European Joint Research Center (JRC, 2023) in collaboration with OECD and European Union (Dijkstra et al., 2021).
- **Polycentric urban regions/Large Urban Regions (LURs):** This last approach refers to regions defined as continuous spaces including several polarizing urban centers (Gottmann, 1957; Gottmann & Fund, 1964; Pumain et al., 1992; Parr, 2004; Scott, 2019). Often polycentric urban regions are the product of several urban agglomerations, which were initially separated but merged because of their geographical spread. The city is considered here according to its capacity to polarize regional and international socio-economic exchanges around one or more core centers.

2.3 The adaptability of the city's concepts to the African context

- 21 From these four perspectives, we can wonder how far they could be applied and adapted to African cities in relation to the cities of the world. Recent debates in the literature have challenged the notions that have been brought in from research in the North to describe cities in the South. Recently, Dorward et al. (2023) criticized the GHSL/DEGURBA delineation arguing that the densities corresponded to European standards and were not adapted to the African local contexts. Dorward et al. (2023)

made varying different levels of densities and minimal clusters' populations, showing that the lower level of densities (600 people per km²) with minimal clusters of 5,000 inhabitants, corresponds to the global African estimation of the UN-WUP-2020 (World Urbanization Prospect: United Nations [2019]), despite some significant deviations for individual countries. They also demonstrate how far the GHSL/DEGURBA overestimates or underestimates the urban population, depending to different examples of African countries. In Africa or elsewhere in the world, we argue that a unique density level is not a good way to delineate cities that are in different contexts of regional densities. Infrastructural and regional patterns could better help to identify the limits of the cities' systems.

- 22 Theoretical debates raising this question of comparability of Southern and Northern cities have been numerous. They all agree that the demographic criteria, like population and density, are not sufficient to define a city (Wirth, 1969; Castells, 1970) because a city is a geographical entity that, beyond human concentration, maintains multiscale relationships with its peripheries (Storper & Scott, 2016). A debate that developed in the literature between 2014 and 2016 (Brenner & Schmitt, 2014; Scott & Storper, 2015, 2016; Robinson & Roy, 2016) opposed two sides. On the one hand, Scott and Storper (2015, 2016) defended a universal view of urban processes of agglomeration economies. They were countered by members of the post-modern school, notably Robinson (2015) and Roy and Robinson (2015), who reject these universal processes, pointing instead to the outcomes of these processes, producing cities which are not comparable. According to Robinson (2015), "*the logics of agglomeration associated with capitalist accumulation arrive on the urban scene long after residents have generated urban life as a platform for reproducing their bodies, sheltering their families and servicing their neighborhoods*" (Robinson, 2015, p. 6). Thus, according to Robinson (2015), "*African cities would be specific in their way of being sites of assemblage (producing both the possibilities of centrality and difference)*" (Robinson, 2015, p.5). She argues that more than elsewhere African cities need contrasts.
- 23 To overpass this debate, we can suggest that the two sides are therefore not reasoning on the same dimensions of urban systems: Scott and Storper (2015, 2016) are interested in the "incoming processes" that produce cities, which can result in different configurations depending on the context, while Robinson (2015) is more concerned with the "urban outcomes". This explains why this debate had no end and why we can agree with both sides.
- 24 For the delineation aspects of cities, we can focus on the "incoming processes" of city formation and therefore we can follow Scott and Storper in studying African cities while expecting quite contrasting results on the "urban outcomes" of these processes. The cities in Africa are places of concentration of populations and economic activities, and nodes of socio-economic relations. They integrate all the processes of urban building and attractiveness, like the agglomeration economies and evolving specialization, local spillovers, and their connections with their regions and with other regional, national, and foreign urban centers (Coret et al., 2020). Therefore, staying on the conceptual approach of "urban incomes" participating in the building and evolution of cities could support a unique delineation, despite the various "outcomes" depending on the national and local contexts.

3. Finding a unique concept for African cities' delineation

- 25 The issue at stake is therefore to find a unique concept for defining African cities. We can explore the existing attempts and evaluate how far we can use or extend them.

3.1 The existing homogenous cities' delineations in Africa

- 26 Addressing this lack of a common definition of urban localities in Africa, the Morphological Urban Area (MUA) definition was recently applied to African cities by F. Moriconi-Ebrard (OECD/CSAO, 2020): it is a homogeneous and rigorous delineation allowing to compare urban facts in Africa. This definition considers continuous built-up areas that are no more than 200 meters apart and represent more than 10,000 inhabitants. By this way, Africapolis succeeds in the realization of a homogenization of cities' delineation. Some Africapolis agglomerations not officially recognized by the States as urban, coexist with official cities not recognized as agglomerations by Africapolis. On the other hand, within the same agglomeration of more than 10,000 inhabitants, some parts may be officially urban and others rural (OECD/SWAC, 2020). Because of the strict application of similar criteria, the data constructed by Africapolis differ considerably from other sources (Moriconi-Ebrard et al. 2021) such as the World Bank database that collect non-homogenous data (2018). This database is very valuable for that. However, for our purpose to integrate multinational firms in regional urban economic systems, this delineation seems too restrictive: for example, in very urbanized regions, we often find several morphological areas that are very close to each other, obviously in strong interaction, but Africapolis considered them as independent. It is also too restricted because the urban agglomerations do not integrate satellite settlements which are not strictly continuous built-up areas with the compact part of the urban agglomerations.
- 27 The functional urban areas (FUAs) of the GHSL database (Global Human Settlement Layer, OECD, 2019) are supposed to be spatially more extended than the MUAs. However, it uses a unique density rate and continuity criteria in Africa, instead of commuting flows because of the lack of commuting data. As mentioned above, Dorward et al. (2023) demonstrated how far the variation of the thresholds of clustered populations and densities changed radically the results for each country. It results in urban areas that are restricted in their extension, very similar in many cases to the Africapolis delineations of morphological agglomerations. In addition, the list of delineated cities is more partial than Africapolis because they selected only the largest ones.
- 28 Therefore, these delineations are interesting for some aspects of urban planning, but not totally satisfactory for us. As elsewhere in the world, the firms in African cities are not necessarily located in the cores of cities, although they constitute hubs influencing the entire urban field around them through their local interconnections (Rozenblat & Pumain, 2018; Rozenblat, 2021). Hence there is a need to delineate much larger areas than urban agglomerations, that would correspond to polycentric urban regions overpassing the functional urban regions. The comparable delineation of African cities that we propose is therefore functional, based on socio-economic relations linked to access to institutions (state or regional), to services, and to infrastructures such as

transportation (notably their international airport providing necessary accessibility to the world).

3.2 Extending existing delineations

- 29 To make African cities comparable to other cities in the world (Pumain et al., 1992; Parr, 2007; Batty, 2018), we have retained the concept of Large Urban Region (LUR) developed by Rozenblat (2020). This approach makes it possible to delineate polycentric large functional regional urban areas, which are likely to encompass the location of multinational firms and their intra-city economic connections. The LUR consists in a multi-level nested delineation constituted by localities forming the basic units (equivalent to municipalities: MUNIs), aggregated by morphological urban areas (MUAs), then by Functional Urban Areas (FUAs) when they exist, and finally considering the regional economic interactions between FUAs inside Large Urban Regions (LURs). This nested method incorporates all the localities situated in-between aggregated zones. It should also contain at least one international or national airport to permit access to the world.
- 30 Therefore, the LUR concept is consistent with our expectation, following Pumain's (1997) evolutionary theory of city systems and Sassen's (1991) theory of global cities, which highlight the dynamism of cities' relationships with other cities at short, medium, and long distances. However, the empirical approach shows that using a single concept does not prevent the criteria from being adapted to each context (Pumain et al., 1992), and it is necessary to build a specific approach for African cities' delineation that would be adapted to the context and the availability of data.

4. Data and methodology

- 31 Our methodology is based on the exploitation of heterogeneous data and the processing of these data according to a succession of precise evaluation steps. Several databases were mobilized to inform the choices made in this delineation of urban areas in Africa (4.1) that we combined in different steps (4.2). Then the method consisted of identifying the main cores to aggregate other close centers (4.3) and applying different rules for the LUR aggregation (4.4) in an iterative way.

4.1 Data used for delineating cities as Large Urban Regions – LURs

- 32 To achieve our objective of delineating Large Urban Regions (LURs) in Africa, we exploited data from the following sources:
- **Africapolis (OECD) – 2020:** Africapolis was developed by François Moriconi for the OECD. It is a comprehensive and homogeneous geospatial database for all African countries, covering 7,720 African urban areas with more than 10,000 inhabitants. As already mentioned, it is based on a uniform definition of continuous built-up urban areas, using criteria (200 meters spacing in particular) already developed in Europe or in the rest of the world. It provides a GIS layer at the level of the agglomerations containing the contours of these agglomerations, their surface area, and their population. However, the Africapolis database does not provide the information of the basic local areas composing the MUAs. Therefore, we rebuilt this composition by crossing the Africapolis' layer with the local administrative layer (Tab.2). We

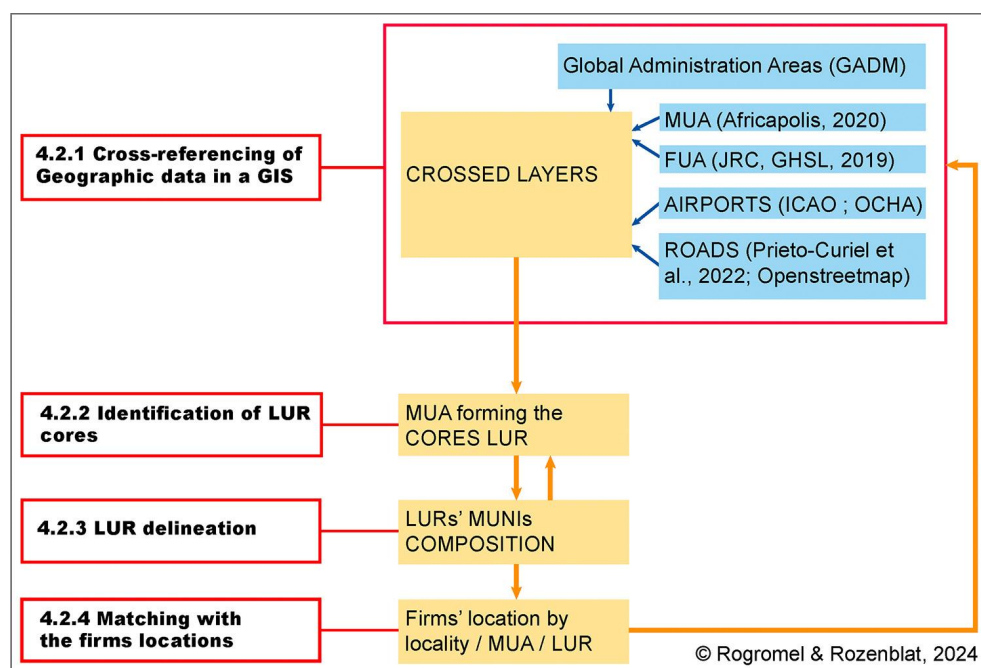
used Africapolis to identify the cores of Large Urban Regions (LURs) that we can consider as the Morphological Urban Areas (MUAs), but we did not restrict to these MUAs because we aggregated many of them within polycentric Large Urban Regions (LURs), including the in-between areas. We also used this data to define the first set of 73 largest African metropolises (see below in step 4.2.2.a).

- **Global Administrative Areas (GADM, 2022):** GADM is a database of vector contours of administrative boundaries and national administrative subdivision boundaries of all countries in the world. It contains all the information related to the geometry of objects or entities for the geographic information system. For some countries, we needed to complete this data by the information provided by the Coordination of Humanitarian Affairs (United Nations – OCHA, 2022).
 - **The United Nations International Civil Aviation Organization (ICAO) and the Office for the Coordination of Humanitarian Affairs (OCHA):** ICAO and OCHA are the geospatial databases for airports. There are 1,071 airports in Africa, of which 44 are very large airports, 414 are medium-sized airports and over 500 are small airports.
- 33 We cross-referenced the airport data with the municipality-agglomeration-population cross-reference data to identify agglomerations that could be integrated into the economic flows of globalization. We located airports in their municipalities of location, sometimes outside the agglomerations.
- **Local roads database (Prieto-Curiel et al., 2022) and OpenStreetMap:** the local roads database will give us more information about the intensity of local networks linking different urban entities. Prieto-Curiel et al. (2022) calculated centralities in road networks that permitted to locally hierarchize different closed MUAs and evaluate their accessibility.

4.2 Methodology for combining data to build African LURs

- 34 From the sets of initial data, we proceeded in different steps to combine them (Fig.1).

Figure 1 : Steps to delineate the African Large Urban Regions – LURs



Step 4.2.1

- 35 The first step indicated in the Figure 1 consists in cross-referencing in a GIS the different layers of heterogeneous information.

Step 4.2.1.a – Construction of the municipalities layer

- 36 The heterogeneity of the division levels in different African countries makes it necessary to modify the administrative grids by harmonizing and standardizing the database file of the municipal administrative divisions in each country. We therefore merged the national unit localities (MUNIs) layers into a single shapefile layer, to be able to join the attributes by location with the morphological urban zones in the next step. Note that the “MUNIs” level considered in this work considerably varies according to the countries. We privileged the lowest levels with a real administrative power (Tab.2 and Fig.2).

Table 2: Lower considered administrative level by countries to build the LURs

COUNTRIES	NAMES OF THE LOWEST ADMINISTRATIVE LEVEL	NUMBER OF ENTITIES	SOURCES	MINIMUM AREA (km ²)	MAXIMUM AREA (km ²)
Algeria	Commune	1,504	GADM, 2022	10,652	124706,31
Angola	Commune	527	GADM, 2022	1,317	18922,834
Benin	Arrondissement	546	GADM, 2022	1,695	4796,717
Botswana	City	519	OCHA, 2011	4,091	52237,42
Burkina Faso	Department	351	GADM, 2022	43,804	5137,609
Burundi	Commune	133	GADM, 2022	1,337	693,285
Cameroon	Arrondissement	360	GADM, 2022	11,367	15689,595
Cape Verde	County/Concelho	22	GADM, 2022	30,864	630,075
Central Africa Republic	Commune	175	OCHA, 2021	5,291	41180,289
Comores	Commune	54	OCHA, 2019	5,34	72,652

Congo	District/Commune	89	OCHA, 2019	6,408	28326,066
Chad	Commune	348	GADM, 2022	24,329	256238,611
Democratic R. of Congo	Territory/Town	240	GADM, 2022	15689,595	48803,598
Djibouti	District	21	GADM, 2022	195,518	2553,1
Egypt	Markaz or Kism/ Municipality	343	GADM, 2022	0,406	26,7898,735
Equatorial Guinea	District/Municipality	32	GADM, 2022	9.21	2,898.82
Eritrea	District	50	GADM, 2022	7.05	9,810.27
Ethiopia	Woredas/District	1,082	OCHA, 2021	0.37	12,493.85
Gabon	Department	48	OCHA, 2015	271.76	17,196.51
Gambia	District	115	OCHA, 2022	0.08	441.59
Ghana	Municipality/District	260	GADM, 2022	1.51	7,557.84
Guinea	Sub-prefecture	336	GADM, 2022	6.21	3,624.13
Guinea-Bissau	Sector	37	GADM, 2022	95.91	3,139.55
Ivory Coast	Commune/sub- prefecture	510	OCHA, 2018	28.77	9,079.72
Kenya	Constituency	300	GADM, 2022	2.90	40,384.44
Lesotho	Municipality Council	78	OCHA, 2019	30.62	1,326.44
Liberia	District	136	OCHA, 2019	20.04	3,127.30
Libya	District	22	GADM, 2022	842.00	420,956.37

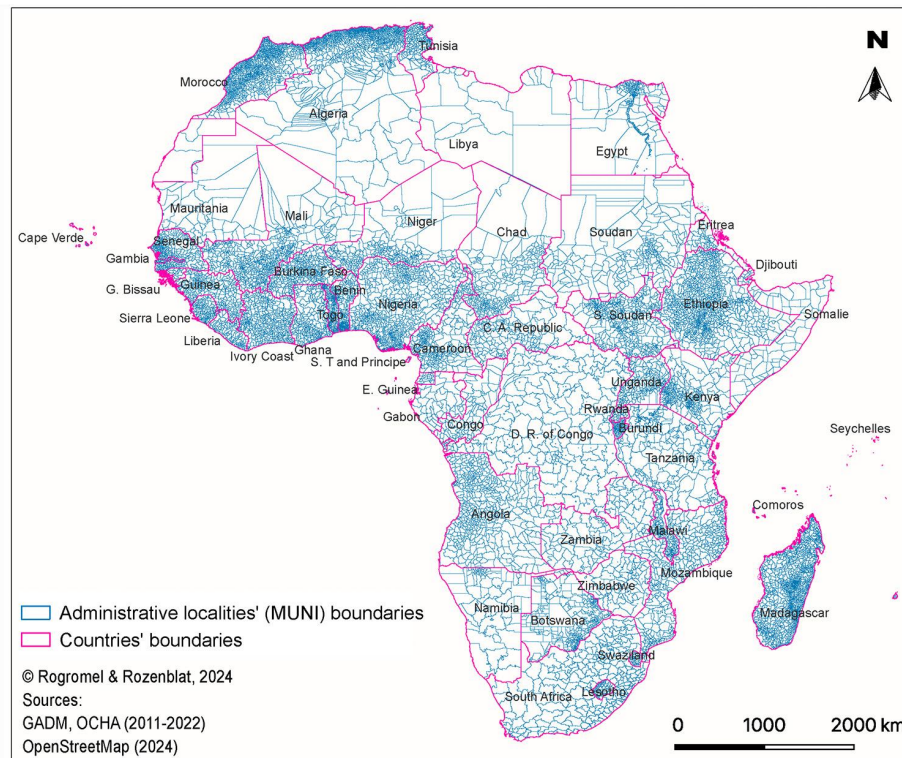
Madagascar	Commune	1,433	GADM, 2022	1.25	4,171.19
Malawi	Traditional Authority/ City/Urban	367	OCHA, 2019	0.27	2,344.45
Mali	Commune	704	GADM, 2022	3.85	259,312.39
Mauritania	Department	57	OCHA, 2020	16.63	168,249.44
Mauritius	District	12	GADM, 2022	6.81	299.22
Morocco	Commune	1,515	GADM, 2022	0.51	6,941.10
Mozambique	Locality	413	GADM, 2022	8.39	12,079.66
Namibia	Constituency	107	GADM, 2022	1.88	50,344.82
Niger	Commune	266	OCHA, 2018	10.19	156,026.41
Nigeria	Local authority	775	GADM, 2022	11.59	10,314.90
Rwanda	District	30	GADM, 2022	132.46	1,931.92
Sao Tomé and Principe	District	7	GADM, 2022	17.77	265.38
Senegal	Commune	433	GADM, 2022	0.33	9,286.30
Seychelles	District	26	GADM, 2022	0.94	237.79
Sierra Leone	Chiefdom	167	OCHA, 2016	0.65	2,407.23
Somalia	District	74	GADM, 2022	327.40	26,756.96
South Africa	Municipality	234	GADM, 2022	251.43	251.43
South Sudan	County/Payam	512	OCHA, 2022	2.26	23,779.99

Sudan	District	237	GADM, 2022	77.17	109,603.09
Swaziland	Inkhundla/Constituency	55	GADM, 2022	11.56	792.90
Tanzania	Wilaya/District	186	GADM, 2022	16.49	34,311.14
Togo	Commune	373	GADM, 2022	4.03	1,285.57
Tunisia	Delegation	264	OCHA, 2022	1.50	27,171.66
Uganda	County	137	GADM, 2022	4.87	9,619.55
Zambia	District	115	GADM, 2022	390.27	21,760.94
Zimbabwe	District	91	GADM, 2022	2.76	26,990.64
Total Countries		17,075			

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- 37 We merged the administrative layers of the MUNIs into a single shapefile layer. In total, 17,075 entities equivalent to municipalities were merged into a unique shapefile layer (Fig.2).

Figure 2 : Administrative layers of the localities (MUNIs) of African countries

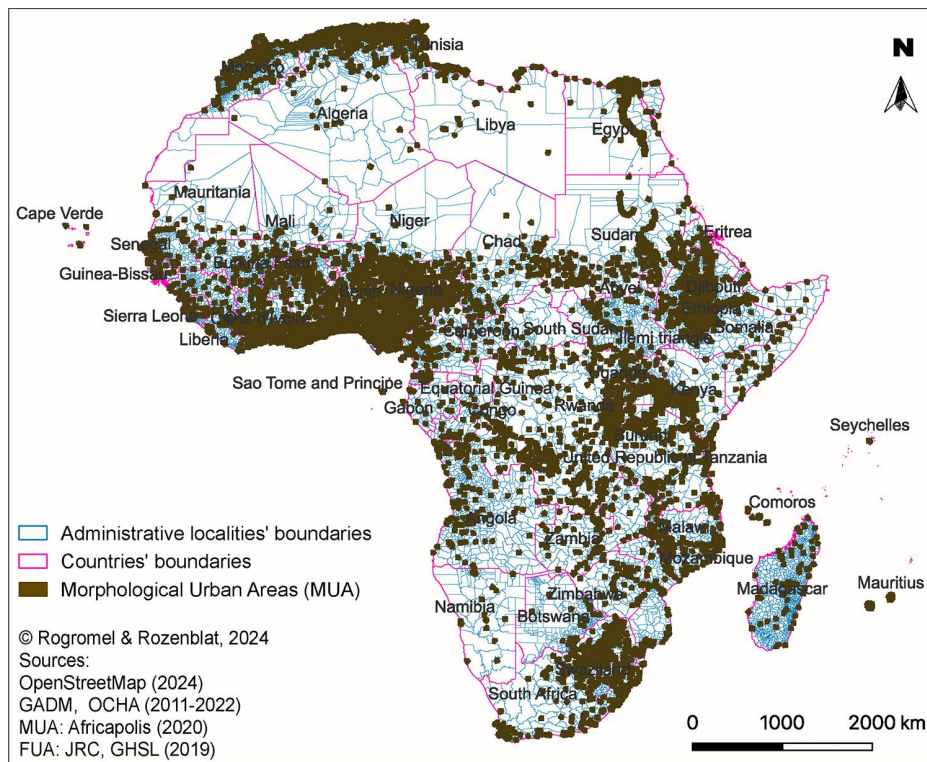


Source: Rogromel, 2024 from GADM, 2022; OCHA, 2011, 2015, 2016, 2018, 2019, 2020, 2021, 2022

Step 4.2.1.b – Cross-referencing urban localities (MUNIs) and morphological urban areas

- 38 As mentioned before, the merged MUNIs layer was cross-referenced with the Africapolis database to reconstruct the MUNI composition of the MUAs and to establish the complete grid of MUNIs surrounding the MUAs (or lying between them). By joining attributes by location in a GIS, each MUA includes the number of MUNIs over which it extends (Fig.3). In total, 12,627 MUNIs make up the 7,720 MUAs of Africapolis.

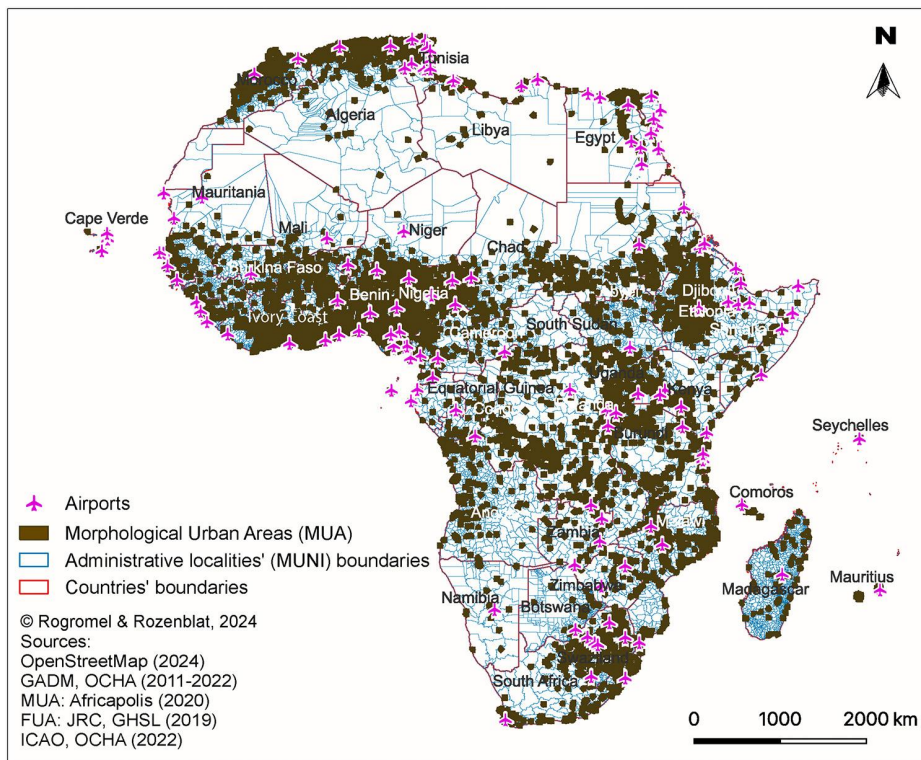
Figure 3 : Cross-referencing of urban localities (MUNIs) and Morphological Urban Areas (MUAs)



Step 4.2.1.c – Cross-referencing agglomeration-municipality and airport data

- 39 We cross-referenced the previous layer with the airports one, to identify agglomerations and areas that are likely to be accessible to the economic flows of globalization. Sometimes, airports are located outside of agglomerations for security reasons, but they often bear their names (Fig. 4). Thus, we added these MUNIs to the MUA's composition. These first three steps have resulted in the urban localities being identified which are the basic material for the multilevel systemic approach to the delineation of urban areas.

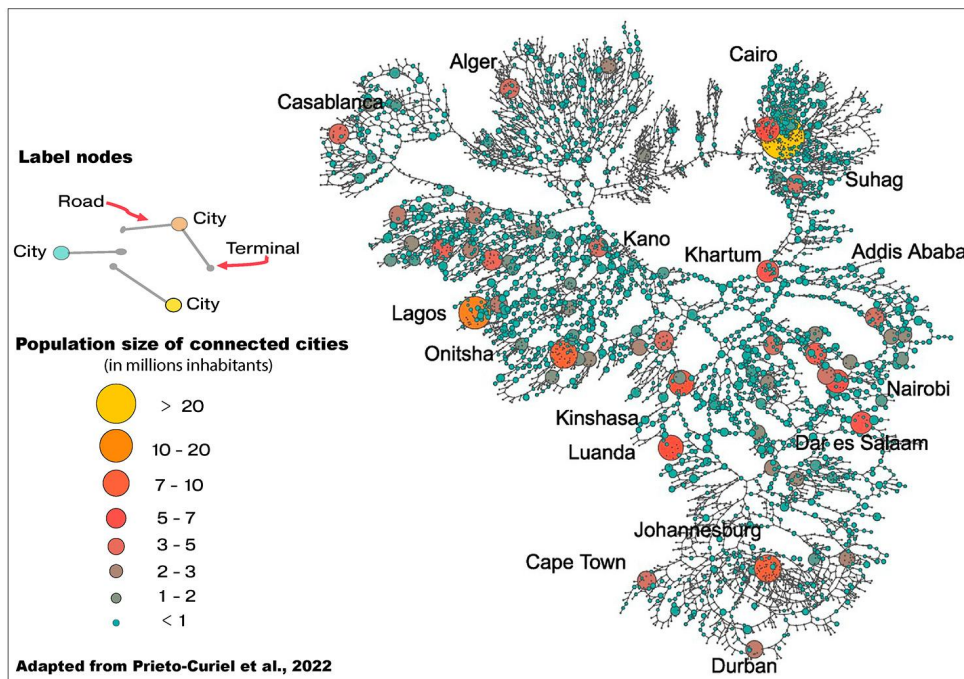
Figure 4 : Cross-referencing agglomeration-municipality and airport data



Step 4.2.1.d – Road and rail networks

- 40 Road and rail networks complete the airports by the fundamental local relations between cities and their surrounding regions. They support physical connectivity, economic exchanges, personal mobility, access to essential services, and many other aspects of urban life. Considering the importance of roads, we cross-referenced road data from the Prieto-Curiel et al. (2022) database with OpenStreetMap for interconnectivity and accessibility between the morphological urban areas – MUA of the Africapolis database (Fig.5).

Figure 5 : Local roads accessibility between Morphological Urban Areas (MUA) of Africapolis



4.2.2 Identification of LUR cores

- 41 Every city is a center, but some cities are (or became) satellites of other cities, and thus should be considered not independently but as part of whole urban regions (Parr, 2004; Pumain et al., 2006; Rozenblat, 2020). The urban centers that we have identified as the cores of LURs play the decisive roles (command, control, coordination, creation) that structure and hierarchize the metropolitan spaces (Troin, 2000; Gaschet & Lacour, 2002; Vanderstraeten & Van Hecke, 2019). Therefore, we proceeded in two successive steps to identify the cores of the LURs: first, we identified core metropolises (Step 4.2.2.a) and we aggregated other LURs around; and in a second step, we built the other LURs, also respecting a hierarchical order using different criteria (Step 4.2.2.b).

4.2.2.a – Considering metropolises from Africapolis as LUR's core

- 42 In its results, Moriconi (OECD/SWAC, 2020) qualified 73 MUAs as the main metropolises in Africa. Following these results, we chose these MUAs as the first sets of cores to start our delineations. We can note that these metropolises are not necessarily the largest African urban agglomerations in terms of population. The OECD/SWAC report does not specify any criterion to define them. They seem to be the main centers in their respective countries. For example, we find MUAs as Sao Tome (135,000 inhabitants in 2015) which is the only city on the national island, or Victoria (Seychelles) which is in fact the only large city on the island as well with only 68,000 inhabitants in 2015 (OECD/SWAC, 2020). On the other hand, large MUAs as Alexandria (estimated with 6.5 million inhabitants in 2015) or Onitsha (8.5 million), were not considered as metropolises by Moriconi, because of their proximity to other largest metropolises. Case by case we chose to either aggregated these MUAs to the closest metropolis, or we considered

them as independent according to rules that we applied generally to aggregate MUAs and MUNIs around the MUAs considered as cores or LURs (see step 4.2.4).

43 Therefore, according to the metropolises from Africapolis, we considered in a first step, the 73 LURs' cores of Africapolis (2020).

4.2.2.b – Criteria to select other LUR cores

44 It is only after having proceeded for the aggregations around the 73 metropolises defined in Africapolis OECD/SWAC (2020) in the step 4.2.3 (see below), that we defined all the other LURs according to the MUAs that could constitute LUR's cores and that were not included in the previous ones. The cores of LURs should have:

- A higher population size than the surrounding municipalities (but in case some peripheries overpass the historical center, we kept the historical center as the core)
- An independent national or international airport
- A local centrality in the road network
- The administrative function like national political capital is a condition that could avoid having the previous properties.

45 We proceeded case by case starting from the largest ones to the smallest ones in terms of population. In this approach:

- First, we defined as the LURs' cores, 49 MUAs which had:
 - More than 500,000 inhabitants
 - An importance of administrative status
 - The presence of an independent international airport
 - A local centrality in the road and rail networks
- Second, 11 MUAs were selected as LURs' cores according to the criteria of administrative function (political capital).

46 With the two steps (4.2.2.a & 4.2.2.b), we totalized 133 LURs' cores.

4.2.3 Rules for the delineation of LURs

47 The delineation of the LURs consists in aggregating the relevant MUAs and in-between MUNIs into LURs. For that, we applied several global rules that we adapted to the general density of cities and road networks.

4.2.3.a Geographic proximity and transportation networks to define LURs' influence areas

48 The aggregation of a MUA to another MUA's core was possible if the distance between MUAs' cores were, on average, up to 60 km, corresponding to approximately less than 1 hour of traveling. Peripheral areas within 60 km of the core MUA (i.e., 1 hour travel time) are considered as satellite areas of the core city (Polyan, 1988; Naimark & Zaslavskiy, 1988). In fact, due to the lack of commuter statistics to define the FUAs of the LURs, we decided to consider geographical proximity. To aggregate the MUAs or urban localities around a MUA-core to form a continuous LUR, a buffer zone of 60 km radius was delineated around each MUA-core. This distance was sometimes extended for larger metropolises when it came to obvious dependence and the distance was

restricted for smaller urban centers with no strict threshold, but depending on the existing settlement system, road networks, and administrative boundaries.

- 49 We cross examined with the availability and accessibility of road networks which determine the interactions between the poles and their areas of influence (Bourdeau-Lepage & Huriot, 2008). We evaluated if the road networks and the geographic relief permit easy travel. The determining factor for the aggregation of satellite MUAs to the core MUA is the road network. The visualization of the units to be aggregated was done on OpenStreetMap to check the geometric accessibility of these units to the MUA-core. All urban units that were connected by road networks to the MUA-core to form a LUR were aggregated around a MUA-core. Those that are not connected by road or rail to the MUA-core were not aggregated.

4.2.3.b Independent airports

- 50 From the point of view of the establishment of networks of multinational firms, the presence of an airport of international scope can be considered as a predominant criterion because beyond being the major transport infrastructures and symbols of contemporary globalization, airports allow managers a rapid accessibility to the distant linked establishments (Comtois & Slack, 2000; Fretigny, 2012). Conceptually, core MUAs of LURs are hyper-places that stand at the intersection of local networks and long-distance exchange networks (Hall, 1986), and should encompass an independent airport. Reversely, if a MUA hosts an international airport totally dependent on a larger MUA, we aggregated it to the core.

4.2.3.c Administrative functions

- 51 Administrative functions (especially political capitals) have been identified as important criteria for whether a MUA should be aggregated with another. They influence the delineation of LURs. Thus, based on administrative functions, we identified two specific cases of LURs:
- a. The case of the proximity of national political capitals: the example of Kinshasa and Brazzaville, two capitals very close to each other (separated by the Congo River), implied that in the context of this delineation, the criterion of geographical proximity, and transportation networks (4.2.3.a) had not been respected. These two national capitals were not grouped together in the same LUR, because of their national capital functions of two independent states: they have been delineated as independent LURs.
 - b. The case of proximity between national capitals and economic capitals such as Pretoria and Johannesburg (national capital) in South Africa, and Porto-Novo and Cotonou (national capital) in Benin: These national political capitals do not have large populations compared to their economic capital (1,473,000 inhabitants for Pretoria versus 7,561,000 for Johannesburg, and 565,500 inhabitants for Porto Novo versus 1,752,800 for Cotonou) and they do not have major airports in comparison with the economic capitals. Therefore, given their geographical proximity, transportation networks (4.2.3.a), and administrative functions (4.2.3.c), they have been considered as bipolar LUR: Johannesburg-Pretoria and Cotonou-Porto Novo.
- 52 Apart from these two capitals, which are considered as bipolar LUR, the other national capitals (52 in total) have been identified as LURs with a unique urban core.

4.2.3.d Making LURs as Continuous Areas

53 To make LURs continuous areas, we added all the localities found in between the aggregated MUAs. Beyond their morphological boundaries, the MUA cores are a framework that supports all the peripheral continuous zones around them in terms of exchange of commuting and of goods of all kinds.

4.2.3.e Naming the LURs

54 Once the African LURs were delineated, they were named according to the historical centers that are often the strongest centers' population size, economic importance, infrastructure (airports), and command functions. The main airport codes (IATA) were attributed to the LURs to build a "universal" code, which would be consistent at the world scale to avoid confusion with different cities names' translations.

4.2.4 Matching and location of multinational firms

55 Once we achieved all the previous steps, it resulted in a first attempt to locate the multinational firms in the LURs. A matching was made with the firms' database (BvD ORBIS, 2010, 2013, 2016, 2019, 2022) according to the place names because postal or administrative codes are not available in BvD ORBIS for African firms. The matching process allowed to extract 3,191 names of cities hosting multinational firms that did not match with the LURs composition, corresponding to 42,609 non-located firms. To correct these non-matching results of cities hosting multinational firms, we proceeded in different ways:

- a. We verified if the location was included in a LUR but with name mistakes: there was either an issue with the spelling of the address mentioned in ORBIS, or the address corresponded to a settlement or a city neighborhood that was included in a municipality. In these cases, we built a dictionary to correct and homogenize the names (about 2,900 cities names were corrected, therefore most of the non-matching names).
- b. If the location was close to an existing LUR, we evaluated the possibility to extend the LUR to include it (depending to the previous conditions as geographic proximity and accessibility [4.2.3.a]): 34 existing LURs were extended.
- c. If it was an independent city, we evaluated it according to the previous conditions (4.2.2 to 4.2.3) to create a new LUR, reiterating the approach to delineate and aggregate other MUAs and municipalities.

56 In total, 171 new LURs were delineated in this stage, in which 14 Small LURs with less than 100,000 inhabitants. Most of these small LURs have a major airport and a relative high frequency of multinational firms located in their areas of influence. In total, we obtained 304 LURs, made up of 947 FUAs, 1,844 MUAs and 5,522 MUNIs. The list of LURs is provided in Appendix 1. The total list of municipalities constituting the LURs is available in <https://doi.org/10.5281/zenodo.10402158> (Rogromel & Rozenblat, 2024).

5. Types of LURs

57 The defined LURs are however quite diverse in their form. Sometimes, the LUR area is part of a network of conurbations around one or more urban centers. The aggregation of all urban units located between a unique pole, or multiple poles affirms the spatial

continuity of the LUR's area of influence. After having delineated the LURs, we can classify the LURs into different types according to their composition (monocentric or polycentric) or their cross-border character.

5.1 Monocentric and polycentric LURs

58 We have identified two types of LUR (monocentric LUR or polycentric LUR), based on the total MUAs' populations as the main indicator of the structure and proximity of the main MUAs. In total, we delineated more monocentric LURs (252) than polycentric ones (52).

5.1.1 Monocentric LUR

59 A LUR is considered monocentric when it comprises one and only one polarizing urban center (MUA) that dominates, demographically and economically, the others in terms of transport infrastructures (airport or port), the presence of multinational firms (head offices of firms or their subsidiaries) and employment markets. This pole exerts a dominant political or economic hierarchy over the surrounding territories (Abozeid & AboElatta, 2021; Bretagnolle, 2009; Bretagnolle et al., 2020). We defined that the population of this monocentric pole should be at least two times higher than the size of the second pole (MUA) of the LUR. This balance was estimated according to the different cases we had in hand for African LURs. When two or more core MUAs were in close geographical proximity, we reviewed the size of their populations, verified the balance between them, and the existence of the main airport to identify if it was a monocentric LUR. If it was the case, we selected the one that would be the core of the LUR, the other MUAs being considered peripheral poles in the LUR.

60 The monocentric LUR operates on a center-periphery logic, linking other MUAs to the core- MUA, resulting in a hierarchical link and a centripetal transportation pattern. In Africa, the core-MUA of the LUR is often the historic center of the city, which remains the dominant economic and political center over time. However, the discovery and exploitation of natural resources can shift the centers of gravity in favor of peripheral new cities, as it was historically the case in Johannesburg (Vacchiani-Marcuzzo, 2005; Bretagnolle et al. 2007), where the discovery of gold in 1883 made it a center to the detriment of Pretoria. A bipolar city then emerges.

5.1.2 Polycentric LUR

61 Reversely, a LUR is considered as polycentric when it contains several poles that are quite balanced in terms of their population: the first MUA pole in terms of population is less than two times bigger than the second one, and eventually the same balance between the first one and the third one and so on... Polycentric LURs are LURs that operate around several poles, functionally linked by socio-economic interactions (Anas et al., 1998; Puissant, 1999; Dupont & Pumain, 2000). The secondary poles may correspond to a concentration of multinational firms to influence the spatial distribution of economic activities or population (McMillen & Lester, 2003; Brueckner, 2011). The different sub-centers are connected by the functional links of increasing daily travel flows, forming more complex and multidirectional interrelationships (Puissant, 1999; Vacchiani-Marcuzzo, 2005; Berroir et al., 2007, 2008; Fleury et al., 2012).

62 The sub-centers in a polycentric LUR may be the result of a specific development of a territory, a relocation/localization of specialized activities, or a morphological or transportation extension bridging existing major urban centers more interrelated (Cervero & Wu, 1997). Each center has its structure and complementary economic specialization. They are well connected in a relationship of economic complementarity or interdependence. A polycentric LUR is characterized by a network of interdependent and well-connected poles, but with different poles having their own population sizes and economic weight (Hall & Pain, 2006, 2012).

5.2 National and cross-border LURs

63 According to the geographical limits of the LURs' areas of influence, we distinguished two types of LURs: **national LURs** and **cross-border LURs**.

- The **national LURs** are characterized by their geographical functional boundaries within a unique national territory.
- The **cross-border LURs** are defined by their influence that transcends national borders and beyond their country of origin. These urban regions are often economic, political, cultural, and financial centers that interact closely with other urban agglomerations in different countries. According to the literature on cross-border exchanges, it is known that African borders are quite permeable and do not hinder exchanges between populations (Igue, 1995; Bach & Asiwaju, 1999; Sossou-Agbo, 2013). To this end, we have aggregated the MUAs and urban localities to the core-MUAs of the LURs beyond international borders when the geographic configuration of settlements, the administrative functions, and the geopolitics' contexts permitted it. As already mentioned above, we did not, however, merge the national capital LURs of Kinshasa and Brazzaville.

64 As a result, we have delineated 270 national LURs and 34 cross-border LURs for all 54 African countries.

6. Examples of LURs' delineations

65 To illustrate the detailed delineations, we chose some case studies representing different categories of LURs as we presented previously. We explain four examples, chosen by their geographical and type diversity:

- The monocentric LUR of the city of Yaounde in Cameroon;
- The polycentric LUR formed by the cities of Fez-Meknes in Morocco;
- The cross-border LUR of Arua in Uganda;
- The national capital Porto Novo with the economic capital Cotonou in Benin.

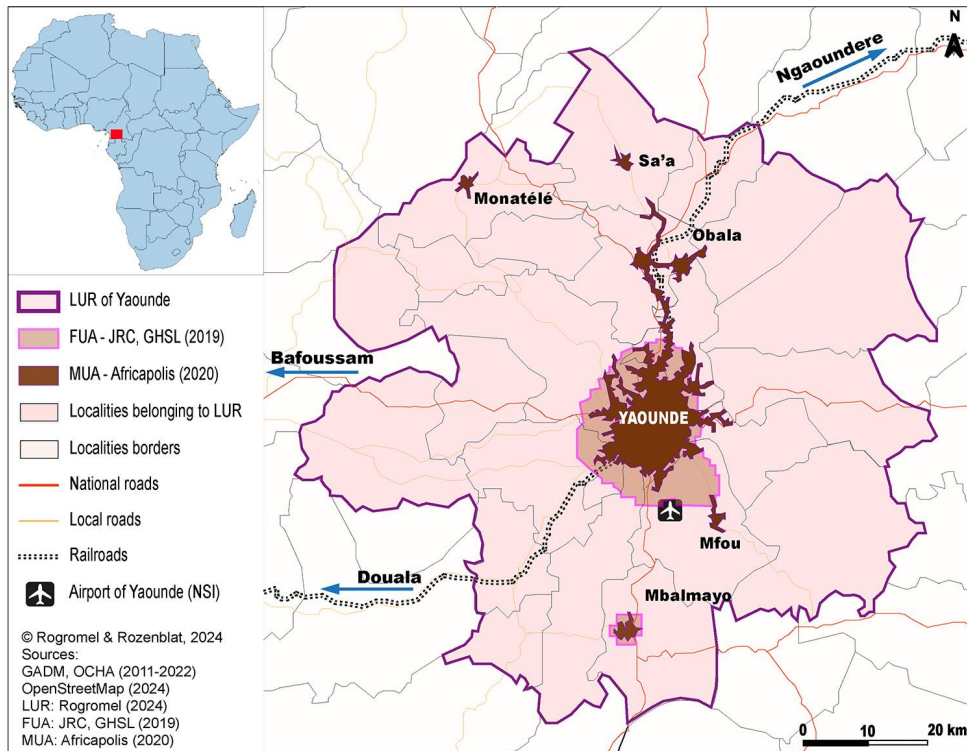
6.1 Monocentric LUR: the case of Yaounde (Cameroun)

66 Yaounde is the political capital of Cameroon, located more than 200 km from its maritime façade where Douala is the economic capital of the country. Yaounde is a colonial city, created by German explorers in 1888 from an old indigenous village and it bears the name of the military post 'Yaounde station' (Franqueville, 1984). It became the political capital of Cameroon in 1921 (Mbianda & Firmin, 2020). Its population exploded with the rural exodus after its independence (1960) from 59,000 inhabitants in 1957 (Franqueville, 1968; PDU, 1963) to 1,400,000 inhabitants in 2002 (PDU, INS, 2008) and

then 4,337,000 inhabitants were projected in 2020 (UN-World Population Project, 2022). For Africapolis, the MUA of Yaounde regrouped 3.9 million inhabitants in 2015.

- 67 For its metropolitan form, Yaounde is a monocentric city, a central city regarding its surrounding region (Fig.6).

Figure 6 : Delineation of the LUR of Yaounde (Cameroon)



- 68 The spatial development of Yaounde consists in a sprawling pattern, following two main radial national roads (North-South and East-West) (Mbianda & Firmin, 2020). To determine the boundaries of the Large Urban Region around Yaounde, it is important to evaluate the possible radius of influence of this city and the population distribution of the medium-sized cities in this area. The population of Yaounde is moving more and more towards the periphery in the surrounding communes of Soa and Obala in the North. The national road passing through Obala to the north is the busiest of the country after those to Douala (236 km) and Bafoussam (298 km). With these exchange of intense flows between Yaounde and the North, the morphological areas are denser. The commune of Soa forms a single agglomeration with the city of Yaounde and its population is already counted within the MUA of Yaounde (OECD, 2020). In fact, the construction of the University of Yaoundé 2 in the commune of Soa, as well as numerous social housing units and the Paul Biya Stadium, justify the morphological sprawl of the city of Yaounde towards the north (Mbianda & Firmin, 2020). The sprawl of the city of Yaounde towards the medium-sized towns of Soa, but also Obala and other small surrounding towns constitutes in fact what is recognized as the same local urban system (Mimche, 2011).
- 69 The extension to the South-East is justified by the presence of the Nsimalen International Airport (NSI) and the construction of the highway that links the commune of Mfou to downtown Yaounde. The expansion to the South-West was

encouraged by a highway and a national road linking Yaounde to Douala, economic capital.

- 70 To delineate the LUR of Yaounde, we used the smallest administrative locality level available in Cameroun, corresponding to the ‘commune’. Finally, we aggregated five peripheral MUAs and we added sixteen communes with smaller populations to create the LUR of Yaounde. As seen in figure 6, the Yaounde’s LUR is therefore much larger than the MUA. It represents a highly centralized territory, with a regional concentration of transport axes that are mainly organized along center-periphery radials. It confirms that the LUR of Yaounde is highly monocentric. Comparing the final LUR of Yaounde with other delineations of Africapolis (OECD, 2020) and GHSL (JRC, 2019) (Tab.3), we built a larger area in terms of population, trying to encompass the whole extension of Yaounde’s influence area.

Table 3: Population of the LUR of Yaounde according to different concepts

CITY DELINEATION CONCEPT	POPULATION OF MUAs IN 2015	POPULATION OF FUAs IN 2015	SOURCE
MUA – Yaounde	3,901,680		Africapolis OECD, 2020
Other MUAs in the LUR	139,318		Africapolis OECD, 2020
FUA – Yaounde		3,547,917	JRC, GHSL, 2019
Other FUAs in the LUR		94,991	JRC, GHSL, 2019
Large Urban Region (LUR)	4,040,998	3,642,908	Rogromel & Rozenblat, 2024

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6.2 Polycentric LUR: The case of Fez-Meknes (Morocco)

- 71 An example of polycentrism is the one of Fez and Meknes. These two cities, separated from each other by 60 km (from their respective centers), are historically Morocco’s most important imperial cities. They are interrelated and economically interdependent and thanks to their geographical location at the heart of the Kingdom of Morocco, they form a strategic crossroads for various socio-economic exchanges.
- 72 Both cities have distinct histories. Fez was founded in the 8th century by the Idrissid dynasty. It is one of the historic cities and the economic, cultural, religious, and political center of pre-colonial Morocco (El Fasskaoui & Kagermeier, 2014; Jelidi, 2006). Since the end of the 19th century, Fez has enjoyed growing international renown thanks to its medina (historic city) and its dynamic craft industry, which led nowadays to its classification by UNESCO as a “World Heritage Site” since 1981 (Jelidi, 2006). It is well connected to Meknes, its gateway to Rabat, Morocco’s political capital. Fez has a major airport serving Meknes and other small cities in its outlying areas.

- 73 Meknes is also one of Morocco's imperial cities, despite that it was founded later in the 11th century by the Berber Miknasa tribe. It was the capital of Morocco under the reign of Sultan Moulay Ismaïl Ben Chérif (1672-1727), where it saw several urbanistic achievements, as well as the construction of major mosques such as the Jamâa Al Kasba mosque and the Al Masjid El Atiq Mosque (El Fasskai & Kagermeier, 2014). With its religious monuments, Meknes is an important religious and touristic city. Besides tourism, the Meknes economy is diversified, including agriculture (on the Saïss plain), industry, and trade.
- 74 The interdependence and development of the Fez-Meknes LUR is based on a few key aspects (El Fasskai & Kagermeier, 2014; Boukharrazi & Baaddi, 2019):
- On the **transportation** aspect: Meknes and Fez are linked by road and rail infrastructures: The construction of the railroad by the French colonial administration from 1911 onwards linked Fez to Meknes in 1915. Public transport services, such as buses, also play a key role in linking urban and peri-urban areas...
 - On the **economic** aspect: Fez and Meknes constitute together a major economic center in Morocco. It is home to businesses, industries, markets, and industrial zones that make a significant contribution to the national economy. Agriculture, crafts, trade, tourism, and manufacturing are the economic drivers of the region.
 - **Culturally**: Meknes and Fez are famous for their cultural, architectural, and historical heritage. Tourism plays an essential role in the two cities' economy, attracting visitors from all over the world to discover their medinas (ancient cities), historic monuments, festivals, and cultural traditions.
- 75 Fez and Meknes are home to two major world heritage sites declared by UNESCO in 1981 and 1996 respectively (Jelidi, 2006; Boukharrazi & Baaddi, 2020). This UNESCO classification stimulated the construction of transport infrastructures that can provide connectivity between the different parts of the regional area. Figure 7 shows the rail and road networks linking the two poles and the secondary roads connecting the two centers to their nearest pole. Because of these numerous reasons, confirmed by the literature, we decided to create a unique polycentric LUR of Fez-Meknes covering an area of 886.680 km² and extending over 139 urban localities (MUNIs). They encompass 9 FUAs (Ain Taoujdate, Azzrou, Fez, Khemisset, Meknes, Sefrou, Sidi Kacem, and Sidi Slimane), and 13 MUAs (Ifrane, El Menzel, Tahla, Oued Amlil, Tissa, Karia Ba Mohamed, Taouante, Guigou, Agourai, El Hadjeb, Imouzzar Kandar, Sabaa Aiyoun, and Moulay Driss Zerhoun).

Figure 7 : Delineation of the LUR of Fez-Meknes (Morocco)

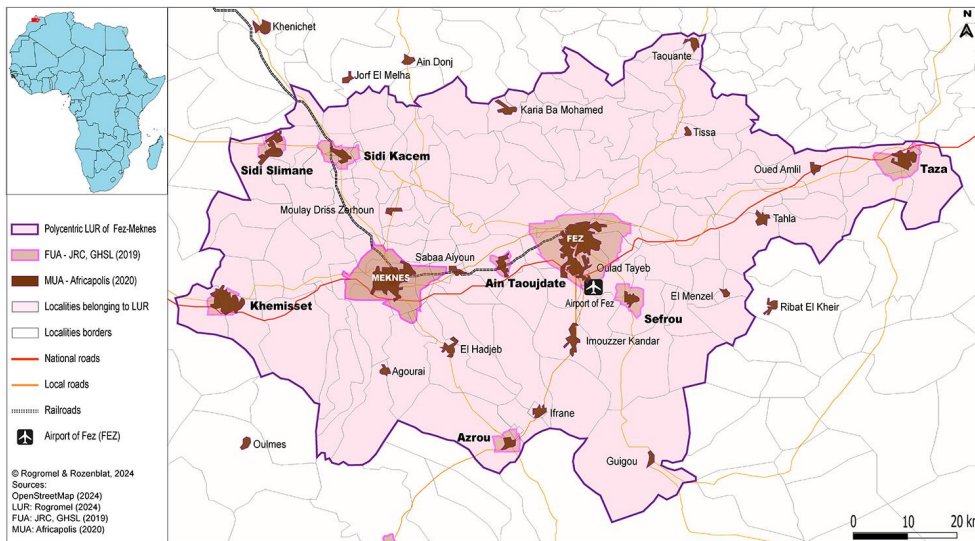


Table 4: Population of the LUR of Fez-Meknes according to different delineation concepts

CITY DELINEATION CONCEPTS	POPULATION OF MUAs IN 2015	POPULATION OF FUAs IN 2015	SOURCES
MUA - Fez	1,174,743		Africapolis, OECD, 2020
MUA - Meknes	629,519		Africapolis, OECD, 2020
Other MUAs in the LUR	876,171		Africapolis, OECD, 2020
FUA - Fez		1,282,846	JRC, GHSL, 2019
FUA - Meknes		698,287	JRC, GHSL, 2019
Other FUAs in the LUR		794,609	JRC, GHSL, 2019
Large Urban Region (LUR)	2,680,433	2,775,742	Rogromel & Rozenblat, 2024

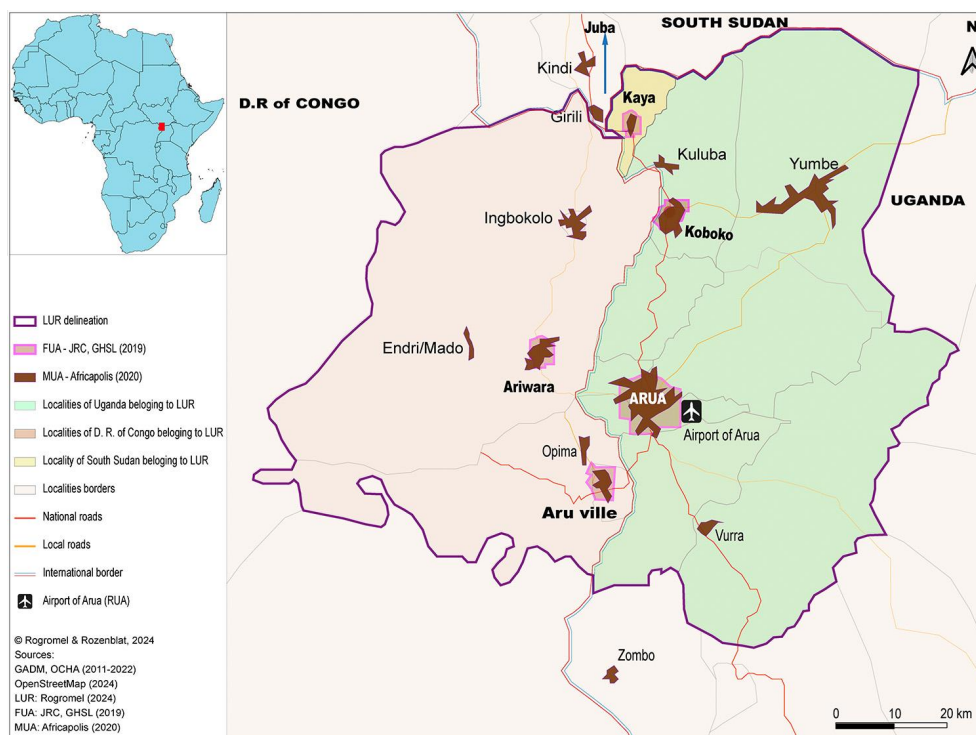
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76 The population of the Fez-Meknes LUR is an estimated 2,680,433 inhabitants (considering only the addition of all the MUAs' population (Africapolis, 2020)). This population is higher in Fez than in Meknes, but Fez does not exceed twice Meknes to follow our criterion of polycentrism. The table 4 compares the LUR population to the ones of the other delineation concepts.

6.3 Cross-border LUR: the case of LUR of Arua – Uganda, Democratic Republic of Congo, and South Sudan

- 77 We also focused on cross-border LURs which are metropolitan regions spanning the borders of two or more countries. They are characterized either by urban continuity or by economic exchanges that transcend national political boundaries. The cross-border LURs are the result of the dynamic growth of exchanges that take place on both sides of international borders in compliance with customs taxes. It is the case in many continents: For example, the Geneva cross-border LUR, encompassing MUAs in France (Annemasse), the San Diego cross-border LUR (USA) encompassing MUAs in Mexico (Tijuana), and the Basel cross-border LUR (Switzerland) encompassing MUAs in France (Mulhouse), and Germany (Freiburg im Breisgau). We identified 33 such cross-border LURS in Africa, like Arua which is a city in North-Western Uganda, close to the border with the Democratic Republic of Congo (DRC) and South Sudan.
- 78 Arua is the main town in the West Nile region. After Uganda's independence in 1962, Arua became the administrative and commercial center of the country's region, thanks to the British colonial infrastructure. As such, it acted as an interface for economic and social exchanges between Uganda, South Sudan, and the Democratic Republic of Congo (DRC) (Titeca, 2009). The history of trade between Uganda, the DRC, and Southern Sudan predates the colonial period. But after independence and with the construction of transport infrastructures, the area of influence of Arua was increasingly extended from Uganda to DRC and then to South Sudan. The dynamics of this triangular trade date back to the 1980s (World Bank, 2011; Calas et al., 2016). These commercial exchanges (most of them informal) helped to build an integrated tripartite (transnational) space, of which the city of Arua is the essential hub (Titeca & Kimanuka, 2012; Pendle et al., 2020).

Figure 8 : Delineation of the cross-border LUR of Arua (Uganda, DRC, and South Sudan)



79 As shown on the Figure 8, a major road network is being built to link Arua to South Sudan, via Koboko (Uganda), and Kaya toward Juba, the political capital of South Sudan (304 km). The Ariwara and Aru FUAs are linked to each other in the DRC and then to the Arua’s FUA, forming a highly dynamic interconnectivity between these cities. Road networks show the geographical accessibility of the MUA-core of Arua to other MUAs and satellite FUAs, and these stimulate cross-border trade. Covering an area of 5,644 km², the Arua’s cross-border LUR extends over 12 MUNIs (including 4 from DRC, 1 from South Sudan, and 7 from Uganda). It contains 5 main FUAs (Ariwara and Aru (Ituri Province, DRC), Arua and Koboko (Uganda), and Kaya (South Sudan)), and 4 major MUAs (Kuluba (Uganda), Optima, Endri/Mado, and Ingbokolo (DRC)).

Table 5: Population of the cross-border LUR of Arua according to different concepts

CITY DELINEATION CONCEPT	POPULATION OF MUAs IN 2015	POPULATION OF FUAs IN 2015	SOURCES
MUA – Arua (Uganda)	665,656		Africapolis, OECD, 2020
MUAs – D. R. of Congo	271,300		Africapolis, OECD, 2020
MUAs – South Sudan	45,300		Africapolis, OECD, 2020
Other MUAs of Uganda	171,570		Africapolis, OECD, 2020

FUA – Arua (Uganda)		223,373	JRC, GHSL, 2019
Other FUAs in Uganda		96,442	JRC, GHSL, 2019
FUAs – South Sudan		65,645	JRC, GHSL, 2019
FUAs – DRC		482,406	JRC, GHSL, 2019
Large Urban Region (LUR)	1,153,826	867,866	Rogromel & Rozenblat, 2024

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- 80 The total population of this LUR is estimated at 1,153,826 according to the sum of the MUAs (Africapolis, OECD, 2020) (Tab.5). Although the population of this LUR is relatively small compared to other LURs, the cross-border consideration multiplies by 4 the population of the Arua's core in Uganda.

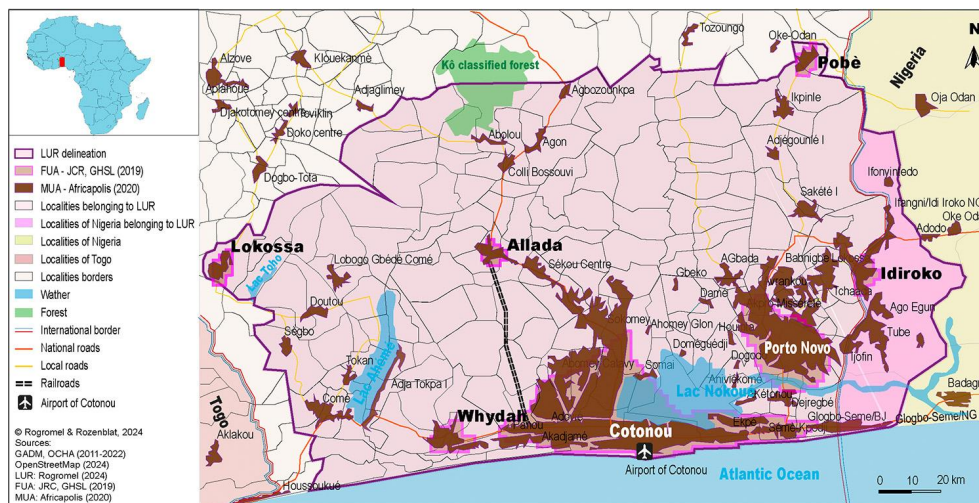
6.4 Political capitals close to economic capitals: Porto-Novo and Cotonou in Benin

- 81 Two cases in Africa present political capitals in the proximity of the national economic center: Porto-Novo in Benin and Pretoria in South Africa. They result from different historical processes, and it is interesting to discuss their integration or not to the LUR of the main economic capitals with the case of Porto-Novo and Cotonou in Benin.
- 82 Cotonou and Porto Novo belong to two different generations of cities: the more ancient one, Porto Novo, is a pre-colonial city dating from the 17th century, while Cotonou is a colonial city dating from the 19th century (Sinou & Oloudé, 1988, Sotindjo, 1996). Porto Novo was a kingdom known successively as: “Hogbonou” by the Adjias, and “Adjatchê” by the Yorubas, then the name Porto Novo (“New-Porto”) was given to it in 1730 by the Portuguese slave trader Eucaristo de Campos (Sinou & Oloudé, 1988). The strategic geographical position of Porto Novo harbor made it a transit crossroads between Nigeria and the rest of Benin. Porto Novo was considered at that time as the main center for the commercialization of palm oil and the export of slaves to America. Therefore, when becoming independent in 1960, the Dahomey republic chose Porto Novo as political capital, keeping this function in the new Benin popular republic in 1975 until today. This capital city of Benin is located thirty kilometers from the port city and economic capital, Cotonou.
- 83 Cotonou as the colonial city was developed later by the French colonial administration for strategic reasons. To prevent Lagos from remaining an obligatory stopover for the transport of goods to Europe and to avoid paying taxes to the English administration, the French colonial administration had a wharf built in Cotonou in 1892 (Brasseur-Marion, 1953, Sinou & Oloudé, 1988, Sotindjo, 1996). The growth of maritime trade in Cotonou had a knock-on effect, resulting in an increasingly important human settlement at the expense of Porto Novo. Despite its administrative status and its urban infrastructure, Porto Novo was eclipsed economically and demographically by Cotonou which has a more strategic position regarding international maritime trade (N'Bessa, 1997; Cousin & Mengin, 2011). The situation of Cotonou's maritime economy means

that Porto Novo lost its main market activity in the aftermath of the Benin's independence in 1960 (Janin, 1964). Porto Novo lost its urban economic command functions as well, and almost all its political functions in favor of Cotonou (Sotindjo, 1995, 1996; Dorier-Apprill et al., 2013).

- 84 In terms of infrastructure, Cotonou is a dominant metropolis since it has an international airport (also serving Porto Novo), a university, and a seaport. In addition, it shares certain administrative functions with Porto Novo, since some ministries were relocated to Cotonou (Sotindjo, 1996, Dorier-Apprill et al., 2013). Political capitals are decision-making centers, that it is why Porto Novo is considered a secondary polarizing pole of the LUR.
- 85 To delineate the Cotonou-Porto Novo LUR, we included all MUAs within 60 km (or 1 hour travel time) from the downtown of Cotonou as being better connected by a road network and having an economic dependence on the city of Cotonou (Fig.9).

Figure 9 : Delineating of LUR of Cotonou-Porto Novo (Benin)



- 86 The Cotonou-Porto Novo LUR's center results in five major contiguous urban centers (Porto Novo, Sèmè-Kpodji, Cotonou, Abomey Calavi, and Whydah) in line with the work of Chabi (2013). Around the LUR's center the urban region extends to five others distant FUAs. The two centers were selected as the main poles of this LUR, Cotonou and Porto Novo, respectively because of their economic influence and political-administrative status. These two metropolises are separated by 30 km as the crow flies, and along the road that connects them, there are many intermediate cities. As shown in figure 9, these two metropolises are well connected by road and to their shared airport. The MUA of Cotonou is three times larger than the one of Porto Novo in terms of population (its population is about 1.5 million inhabitants compared to Porto Novo's 572,000 inhabitants [Africapolis, OECD, 2020]).
- 87 The spatial extension of these two poles that make up the LUR is based on natural constraints (Atlantic Ocean, Lake Nokoué, and Kouto Lagoon) and administrative constraints (Togo and Nigeria state borders). According to these constraints, the morphological extension of Porto Novo is oriented towards the north. This sprawl brought it closer to the Idiroko FUA in Nigeria and has enabled exchanges between them through geographical proximity. Cotonou, on the other hand, is oriented to the

Northwest and West, encompassing the university town of Abomey Calavi, and the towns of Pahou, Adovié, Akadjamé,

- 88 In Benin, the ‘communes’ are the smallest administrative units that correspond to the municipalities typically used to delineate LURs (Rozenblat, 2020; Rogov & Rozenblat, 2020). We used them to delineate the LUR of Cotonou-Porto Novo. As a result, the Cotonou-Porto Novo LUR has 199 localities, of which 62 are included in 44 MUAs with a population of 10,000 or more and 7 FUAs (Fig.9 and Tab.6). Given the road networks, all the MUAs and localities that are aggregated in the Cotonou-Porto Novo LUR, are well connected and mainly depend on economic exchanges with the Cotonou pole.

Table 6: Populations in the LUR of Cotonou-Porto Novo according to different concepts

CITY CONCEPT OF DELINEATION	POPULATION OF MUA IN 2015	POPULATION OF FUA IN 2015	SOURCES
MUA – Cotonou	1,527,277		Africapolis, OECD, 2020
MUA – Porto Novo	572,430		Africapolis, OECD, 2020
Other MUAs in the LUR	1,216,411		Africapolis, OECD, 2020
FUA – Cotonou		1,828,526	JRC, GHSL, 2019
FUA – Porto Novo		612,744	JRC, GHSL, 2019
Other FUAs in the LUR		431,698	JRC, GHSL, 2019
Large Urban Region (LUR)	3,316,118	2,872,968	Rogromel & Rozenblat, 2024

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7. Resulting LURs for Africa

- 89 The delineation of LURs from the perspective of the establishment and development of multinational companies that we have carried out presents three major results:
- 90 **Result 1:** We have delineated a total of 304 LURs encompassing 5,522 MUNIs, 1,844 MUAs, and 904 FUAs (Tab.7). Among these LURs, we have distinguished on one hand 252 monocentric LURs, 52 polycentric LURs, and on another hand, 270 national LURs, and 34 cross-border LURs. The table 7 highlines the top 10 countries with the greatest number of LURs.

Table 7: Number of LUR delineated and Top 10 countries according to their number of LURs

COUNTRIES									

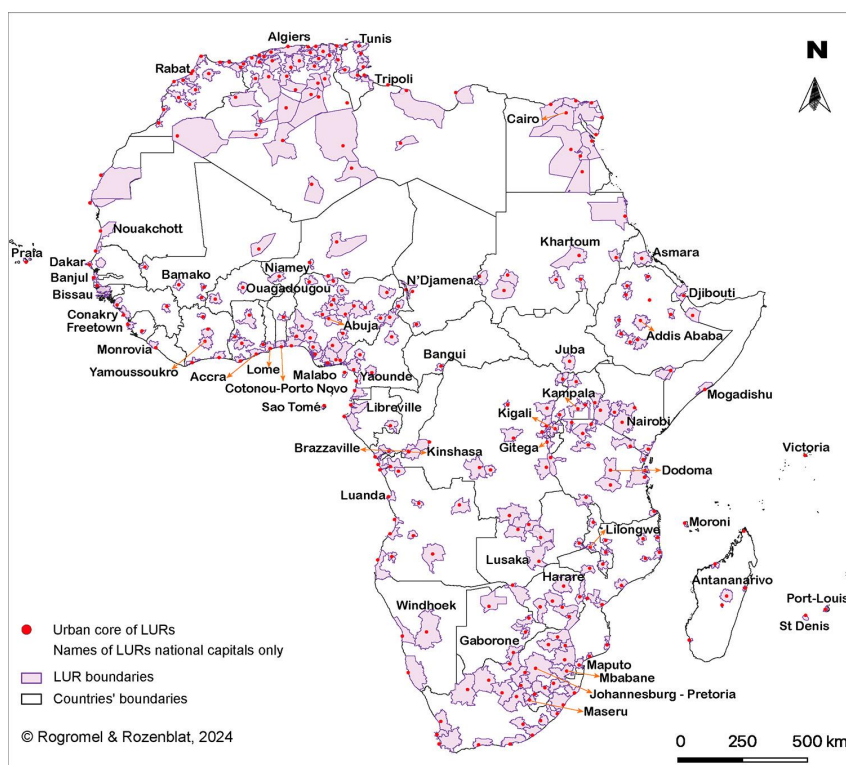
	MONOCENTRIC LURs	POLYCENTRIC LURs	NATIONAL LURs	CROSS-BORDER LURs	MUNIs BELONGING TO LURs	MUAs BELONGING TO LURs	FUAs BELONGING TO LURs	TOTAL LURs
TOTAL	252	52	270	34	5,522	1,844	947	304
Algeria	28	9	37	0	1,034	408	87	37
South Africa	20	7	26	1	168	120	54	27
Nigeria	19	4	23	0	381	205	185	23
Morocco	12	3	15	0	591	97	49	15
D. R. Congo	13	0	8	5	58	39	32	13
Tanzania	12	1	11	2	67	45	23	13
Angola	11	1	11	1	97	31	18	12
Mozambique	10	1	10	0	78	45	23	11
Egypt	7	3	10	0	298	120	75	10
Ethiopia	7	3	10	0	230	86	63	10

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- 91 **Result 2:** We have mapped all the 304 delineated LURs. This spatialization of LURs highlights the marked contrasts in the distribution of urbanization, influenced by economic, geographical, and historical factors. The concentration of LURs along the coasts highlights the importance of the legacy of the development of port cities during the colonization era. LURs are largely concentrated in West Africa in countries such as Nigeria, in North Africa in countries such as Algeria, Egypt, Morocco, etc., and then in Southern Africa (South Africa) and East Africa (Ethiopia and Kenya). Some parts of the continent, notably the Sahara (Mauritania, Mali, Niger, Chad, and Sudan) and Central Africa (e.g. Central African Republic, South Sudan, Congo, ...), show less concentration of LURs, reflecting geographical issues (landlocked and hostile natural conditions) and socio-political (political instability) challenges.
- 92 National capitals, as shown on the map, because of their political and decision-making power, represent the economic and cultural heart of their countries, attracting a large part of the population and economic players (companies). The Figure 10 shows the geographical distribution of the LURs in Africa, with identified urban cores. Some LURs, mainly situated in the North of the Sahara, are much more extended than others. This is due to the importance of interconnected agglomerations, creating vast continuous LURs as it is the case of the Cairo LUR, but also to the scarcity of airports, forcing multinational firms and populations in remote peripheries to depend on the few existing urban centers as in south Algeria, Libya, Mauritania, etc. This figure highlights regional disparities in urbanization, with some highly urbanized parts of the continent

playing an important role in economic exchange networks, and others less urbanized, remaining largely outside the global networks.

Figure 10 : Spatial distribution of the African Large Urban Regions (LUR)



93 **Result 3:** The delineation of LURs has made it possible to locate multinational companies in Africa’s major cities. 98% of multinational firms in Africa are in the delineated LURs. The table 8 lists the top 20 LURs according to their number of multinational firms according to the selected list from BvD ORBIS (2022). Among the countries, South Africa is the most present with 7 LURs: Johannesburg-Pretoria, Cape Town, Durban-Pietermaritzburg, Port-Elisabeth, Mafikeng, Mbombela-Bushbuckridge-Siboshwa, Richard Bay-Hlabisa. This confirms that it is the most globalized African country: the only one belonging to the initial BRICS (now joined in the BRICS + 11 by Egypt and Ethiopia).

Table 8: Top 20 LURs hosting the highest number of firms in 2022

LURS	COUNTRIES	LURS ID	NUMBER OF FIRMS
PRETORIA-JOHANNESBURG	SOUTH AFRICA	JNB	10,410
CAPE TOWN	SOUTH AFRICA	CPT	3,733
PORT-LOUIS	MAURITIUS	MRU	2,397
CAIRO	EGYPT	CAI	2,030
DURBAN-PIETERMARITZBURG	SOUTH AFRICA	DUR	1,489

MONROVIA	LIBERIA	ROB	1,465
CASABLANCA	MOROCCO	CMN	1,049
PORT ELIZABETH	SOUTH AFRICA	PLZ	822
ALGIERS	ALGERIA	ALG	724
GABORONE	BOTSWANA	GBE	611
LAGOS	NIGERIA	LOS	523
MAFIKENG	SOUTH AFRICA	MBD	495
LUANDA	ANGOLA	LAD	416
HARARE	ZIMBABWE	HRE	393
ACCRA	GHANA	ACC	385
MAKURDI	NIGERIA	MDI	368
MBOMBELA-BUSHBUCKRIDGE-SIBOSHWI	SOUTH AFRICA	MQP	355
ABIDJAN	COTE D'IVOIRE	ABJ	337
ALEXANDRIA	EGYPT	HBE	333
RICHARD BAY-HLABISA	SOUTH AFRICA	RCB	324

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8. The usefulness of LURs' delineations or cases of reuse

94 According to these results, we suggest that the delineations of Large Urban Regions (LURs) and Functional Urban Areas (FUAs) offer numerous possibilities of application in several areas:

- **Academic research:** Researchers can use these LURs' delineation for comparative studies and urban dynamics in Africa with other regions of the world using harmonized delineation criteria, contributing to a better understanding of global urbanization processes. This LUR delineation enriches the scientific literature with precise, replicable, and comparable delineations of African urban regions with the other ones of the World.
- **Market economic studies:** For a good market analysis, multinational firms can use these delineations to identify potential markets and economic growth areas for their investments. It would facilitate informed investment decisions based on geospatial and demographic analyses. The size of populations could be used by multinational firms with high demand for labor and to target their consumer markets.
- **Urban planning and regional development:** policymakers and other land use planning stakeholders can use these delineations to plan urban expansion and allocate resources for

urban development. It would enable planning of road infrastructure considering major transport corridors. The LURs' delineations can also help identify areas with high strategic potential for economic activities in large urban centers and peripheral areas, such as special economic zones, industrial zones, shopping centers, etc.

- **Public policies and governance:** Policymakers can draw on these delineations to develop inclusive and sustainable urban policies, considering the specific needs of urban populations. This would contribute to the establishment of urban public policies that are more incentive and attractive for multinational firms

Conclusion

- 95 This paper addressed the heterogeneity of definitions of African cities that is a limitation of comparative studies of urban facts on the continent. We argued that only the adaptation of homogeneous concepts could make African cities comparable to other cities in the world. This is why we examined and discussed general city concepts to select those appropriate for integrating African cities into global exchange networks. Using the existing delineations of Africapolis (2020) morphological urban areas (MUAs) and GSHL (2019) functional urban areas (FUAs), we added further criteria to reconstitute Large Urban Regions (LURs) based on local administrative units (MUNIs), airport's location, local roads transport networks and the political functions of certain urban localities.
- 96 Applying the concept of Large Urban Regions (LURs), this research delineated 304 LURs in Africa, covering 5,522 local administrative units (MUNIs). By describing in detail its elaboration, the method is reproducible and adaptable to other urban contexts, making it a valuable tool for urban development policies. The functional delineation of Large Urban Regions is essential for a thorough understanding and effective comparison of African cities. It enables us to compare African cities, their development dynamics, and their role in global networks.
- 97 These delineations revealed that 98% of the multinational firms listed in a sample of the BvD ORBIS - UNIL CITADYNE database (2010-2022) are located in these regions (LURs), underlining the importance of these LURs in global trade and economic networks. The results show that delineating these regions not only enables African cities to be compared with each other and with other cities around the world, but also to be integrated into global urban network analyses. This approach enables a more accurate assessment of the local development and global integration capacities of African cities. This study paves the way for more targeted and effective urban development strategies to attract multinational firms. Africa's current urban transition represents a challenge for urban governance, but also an opportunity for development around its major urban regions. Thus, the functional delineation of large urban regions (LURs) in Africa is a valuable added value to compare cities and their networks in future studies that will assess the development capacities of all large African urban regions within these global networks.

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ABSTRACTS

An important issue for Africa is evaluating cities' capacities to leverage global networks effectively to foster local development. However, this evaluation is complicated by the absence of a unified framework and criteria, making it difficult to compare African cities to both each other and with cities around the world. The first step, therefore, is to establish a basis for comparing African cities. In this paper, we address the challenges of defining urban boundaries for cities across Africa's 54 countries. We outline our methodology and present the results of adapting the

concept of Large Urban Regions (LURs) (Rozenblat, 2020), which encompass regional urbanized areas surrounding the main African cities. In total, we delineated 304 African Large Urban Regions, covering 5,522 Local Administrative Units (LAU). This delineation of LURs enables African urban areas to be comparable with others worldwide and paves the way for evaluating their integration into global urban networks, especially through multinational firms, of which over 98% in our sample are located within these designated LURs.

Un défi majeur pour l'Afrique est d'évaluer la capacité de ses villes à tirer parti des réseaux mondiaux pour favoriser le développement local. Cependant, cette évaluation est compliquée par l'absence d'un cadre et de critères unifiés, ce qui rend difficile la comparaison des villes africaines entre elles et avec les autres villes dans le monde. Par conséquent, la première étape consiste à rendre les villes africaines comparables. Dans cet article, nous présentons les enjeux de ces délimitations pour les 54 pays africains. Nous expliquons la méthodologie et présentons les résultats de l'adaptation du concept des Grandes Régions Urbaines (LUR) (Rozenblat, 2020) qui englobent les territoires régionaux urbanisés autour des principales villes africaines. Au total, nous avons délimité 304 grandes régions urbaines africaines composées de 5,522 unités locales administratives – LAU. La délimitation des LURs rend les zones urbaines d'Afrique comparables à d'autres zones urbaines dans le monde, ce qui permettra d'évaluer dans les prochaines étapes leur intégration dans les réseaux urbains mondiaux par les entreprises multinationales qui, selon notre échantillon, sont situées à plus de 98 % dans ces LURs délimitées.

Un importante desafío para África corresponde a evaluar la capacidad de sus ciudades para integrarse a las redes mundiales con el fin de fomentar el desarrollo local. Sin embargo, esta evaluación resulta compleja por la falta de un marco y criterios unificados, dificultando la comparación de las ciudades africanas entre sí y con otras del mundo. Por lo anterior, el primer paso consiste en hacer que las ciudades africanas sean comparables. En este artículo presentamos los desafíos de estas delimitaciones para los 54 países africanos. Explicamos la metodología y presentamos los resultados de la adaptación del concepto de Grandes Regiones Urbanas (LURs en inglés) (Rozenblat, 2020), que engloba los territorios regionales urbanizados en torno a las principales ciudades africanas. En total, delimitamos 304 GRU africanas compuestas por 5.522 unidades administrativas locales (LAU en inglés). La delimitación de las LURs posibilita que las zonas urbanas de África sean comparables con otras del mundo, lo que a su vez permitirá, en un futuro, evaluar su integración en las redes urbanas mundiales por parte de las empresas multinacionales, cuyo 98%, según nuestra muestra, se encuentran localizadas en estas LURs delimitadas.

INDEX

Palabras claves: África, urbanización, aglomeración urbana, comparación, sistema de ciudades

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