URBAN GROWTH

Processes in Bogotá's metropolitan/regional area

From overflowing to efficient and sustainable planning of articulated peri-urban growth

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Urban growth processes in Bogotá's metropolitan/regional area: From overflowing to efficient and sustainable planning of articulated peri-urban growth.

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ABSTRACT

The concept of urban growth has been studied in the Global North as a way to understand the constant and excessively accelerated urbanization that cities presented mainly in the 19th and 20th century. There are many ways to consider and analyze this phenomenon, since the constant evolution of urban settlements and the adaptation to technological and social trends have resulted in the mixing of multiple social, economic, environmental, physical, and political factors that have allowed to observe and to understand the influence that urban growth has according to the context in which it is presented. Although it is true that it is possible to determine fixed elements and characteristics independent of the context, it should be emphasized that urban growth processes have occurred in shorter periods of time in Latin America, resulting in unique developments and consequences for the region. The complexity of the growth of cities in Latin America makes of this region a unique case study for this thesis, which aims to use literature and data collection to evaluate the development of urban growth and its physical, socio-economic, and environmental impacts. The thesis consists of three parts. The first, is a literature review urban growth from different points of view and historical models, understanding its development in the Latin American context, the effects of urban regeneration on accelerated urbanization, the concept of productive city and informal settlements as a physical consequence of these urban processes. The second part aims to make a field observation in Bogotá: adopting a quantitative approach, municipal and regional documents, and spatial data are analyzed, in addition to reference to historical literature, and to the temporal evolution of the metropolitan/regional area of Bogotá and its current condition. Finally, a proposal of a planning model is presented, which, under the lens of an understanding of previous examples in other parts of the world and the current condition of the study area, is adapted to the context to allow for an efficient territorial organization, sustainable and articulated economic activities, urban growth, and population flows over the next 30 years.

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INTRODUCTION

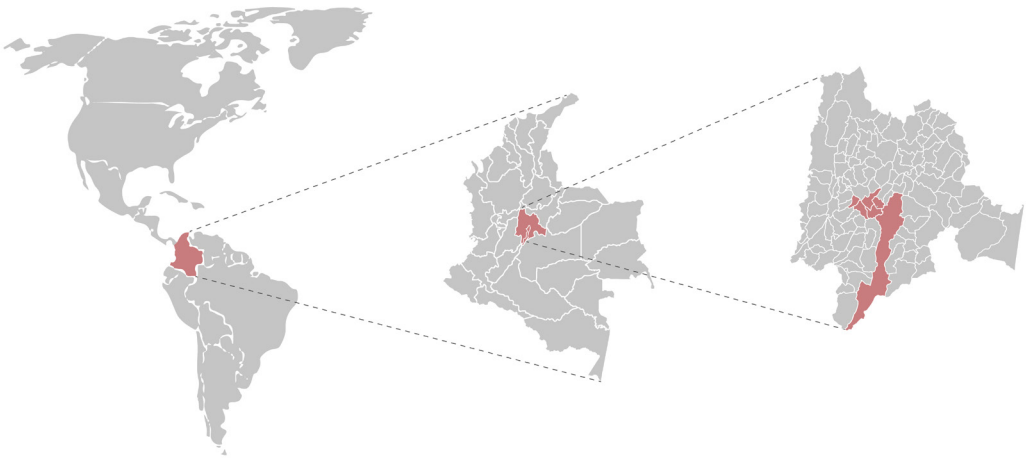
Urban growth, as articulated by Peter Hall (2002), encapsulates the physical expansion of the built environment alongside the simultaneous increase in population, illustrating the symbiotic relationship between spatial augmentation (expansion) and demographic influx (growth). This definition aligns with the evolution of urban growth models aimed to explain and predict spatial organization and growth patterns developed primarily for American cities throughout the 20th century. Models like the concentric zone model proposed by Ernest Burgess, the multiple nuclei model by Chauncy Harris and Edward Ullman, and the sector zone model by Homer Hoyt sought to explain and provided insights into radial expansion, decentralization, and sectorial developments within urban areas, revealing the interaction between socio-economic factors and land-use patterns. They delineated zones of residential, commercial, and industrial activities, illuminating the spatial structuring of cities in response to economic forces and population dynamics. Moreover, while primarily focused on American cities, these models offered foundational frameworks for understanding global urban growth, emphasizing complex interdependencies between urban form, economic activities, and demographic shifts within metropolitan regions. This growth of population in urban centers, while indicative of progress, often puts immense pressure on existing infrastructure, leading to challenges such as overcrowding, strained transportation networks, and inadequate housing.

In Latin America, urban growth emerged from diverse causes, including rural-to-urban migration and economic aspirations. However, the region's urbanization trajectory diverged from Western models, marked by unique socio-spatial patterns characterized by pronounced inequalities and prevalent informal settlements commonly known as "barrios" or "favelas", settlements often lacked adequate infrastructure and basic services. Gilbert (1987) delineates these patterns, highlighting the presence of well-developed commercial and high-income residential areas juxtaposed against zones with inadequate services and spontaneous, low-income housing developments. This spatial fragmentation underscores the challenges of uneven growth, limited access to essential services, and the prevalence of socio-spatial disparities in the region.

Efforts through planning interventions as urban regeneration or the concept of the productive city, while gaining recognition in global urban planning discourse, face obstacles in effective implementation in Latin America.

Socio-economic disparities, resource limitations, and fragmented governance structures impede these initiatives. Financial interventions aiming to contain urban growth and regulate expansion encounter challenges in equitable distribution and effective implementation, often overlooking the complete integration of informal settlements into urban planning frameworks Hall's emphasis on urban planning and governance in managing the impacts of urban growth resonates significantly with these models, emphasizing strategic interventions to address evolving urban landscapes' challenges.

The consequences of urban growth in Latin America encompass spatial segregation, inadequate infrastructure, socio-economic disparities, and environmental challenges. Addressing these requires comprehensive planning strategies fostering inclusive, sustainable, and resilient cities. Understanding the multiple aspects of urban growth in Latin America is crucial for formulating effective policies prioritizing equitable development, infrastructure improvement, and environmental sustainability across the region. That is the reason why one of the focal points of this study is the southwestern threshold of Bogotá's metropolitan area, representing a concentrated representation of the complex interactions among urban growth, economic activities, and informal settlements. The research question guiding this exploration regards the type of planning model that could generate efficient, sustainable, and articulated territorial development to organize, control, and regulate the urban growth, economic activities, and flows of the southwestern threshold of Bogotá's metropolitan/regional area?" By understanding the complexities of urban growth, regeneration, and planning models within Latin America, this thesis aims to propose strategies and models that promote sustainable, inclusive, and efficient urban development adapted to the specific context of Bogotá's metropolitan area, Colombia (map 1).



Map 1 *Geographical location of the study area*

METHODOLOGY

The thesis is organized across three chapters, seeking to deepen the complexities of urban growth concepts while identifying the underlying causes and impacts of rapid urbanization, emphasizing the urban development in major cities of the global north, identifying its evolution and results since the 19th century. This conceptual trajectory served as the basis for understanding urban growth models in American cities and subsequently providing a blueprint for urban development frameworks in Latin American cities. This historical contextualization facilitates a comprehensive positioning of the phenomenon within the regional context. Moreover, the thesis explores a variety of propositions for global urban growth control policies and projects. It delves into multifaceted concepts such as urban regeneration and the paradigm of productive cities. These conceptual explorations have catalyzed the emergence of diverse alternatives aimed toward advancing urban development within pre-existing urbanized areas. These proposed alternatives present innovative solutions finely adapted to the distinctive realities prevalent in Latin America (informal settlements), and shaped by divergent elements resulting from a historically accelerated developmental trajectory.

In this approach, a distinct area characterized by specific attributes conducive to accelerated urban growth is selected. This area, comprising segments of Bogotá's savannah, includes the municipalities of Facatativá, Bojacá, Madrid, Funza, Mosquera, as well as the capital city of Colombia, Bogotá. An exhaustive analysis spanning socioeconomic, physical, environmental, and regulatory dimensions is conducted. The aim is to comprehend the historical trajectory of rapid urbanization contextualized within this area, clarifying its influence on social and environmental frameworks. This comprehensive analysis operates across various scales, aiming to understand the interplay and connections among these dimensions, having a particular emphasis on delineating disparities between municipalities featuring ample rural and natural areas and the fully urbanized city of Bogotá. This involves understanding the distinct and intricate dynamics inherent in smaller-scale urban settlements and their interdependencies due to physical proximity to a large scale megacity.

The synthesis of these elements, along with the theoretical frameworks, forms the basis for proposing a solution: a sustainable development model, which aims to structure and control urban growth, territorial organization, activities and flows for the next 30 years. It adapts historically tested solutions to the Latin American context of Bogotá, respecting its intrinsic elements, generating projects and policies that relate to the reality of the population and promoting an improvement of the urban and environmental context. These initiatives aim to accentuate the region's values and its pivotal role in accomplishing contemporary territorial objectives.

1.

URBAN GROWTH PHENOMENA

Source: https://issuu.com/henrystephens/docs/gradportfolio_2014/56?ff=

1.1. Urban growth

1.1.1. Framing the concept

The phenomenon of urban growth, which can also and partially be associated with accelerated urbanization has shown different stages and features throughout history and the various contexts in which it has been presented, leading numerous scholars from different disciplines to study it for its complexity and multifaceted character. When saying that urban growth refers to the increase in population, land area, and economic activity in urban areas, it is often characterized by the expansion of built-up areas, increasing densities of population and economic activity, and changes in land use patterns (Li et al. 2021). It is possible to find a multiplicity of related factors that influence and allow evidence that urban growth has been a major driver of human history, shaping social, economic, and political development throughout the world (Assadourian, 2013).

Taking these factors into account, multiple definitions based on different perspectives and approaches have been generated to understand the complex and dynamic phenomenon of urban growth. While there is no single agreed definition, scholars from different disciplines have provided valuable insights into the social, economic, and environmental dimensions of urban growth, enriching the understanding and capacity to manage the challenges and opportunities associated with urbanization. The sociologist and planner Lewis Mumford defined urban growth as "the process of enlarging the scale of the human habitat, from village to city, and from city to metropolis" (Mumford, 1961, p. 19). Understanding urban growth as a natural and necessary process that reflected the evolution of human civilization.

Mumford explained necessary historical processes, from the origins of urban settlements, as well as their transformation processes to the medieval settlement as the "ideal model". Period of urbanization (Medieval) in which cities such as Venice, Florence, and Paris continued to develop, becoming centers of art, culture, and intellectual life, bringing with it, the emergence of new forms of urban planning, such as the walled city and the university town, which helped to shape the physical and social landscapes of many European cities (Abel, 2017). However, this perspective of the city and its growth that he exposes in his book "the cities in history" despite presenting very clear ideas of urban evolution and development of cities, from an anthropocentric vision and urban life, always omits the existence (or mention in a subordinate way) one of the vital elements for urban conformation, the nature. Mumford sees the emerging modern city as the result of the triumph of machininism or machinery, understanding the industrial revolution as an inflection point.

Evidencing its triumph in megacities based on the combination of extensive car travel and extensive suburbanization in which individuals are placed above citizens (Tojo, 2012).

On the other hand, simultaneously one of the most important urban theorists of the 20th century such as Jane Jacobs defined urban growth in her book "The Death and Life of Great American Cities" as "the process of economic and social change that leads to the concentration of population and activities in urban areas" (1967, p. 2). She highlighted the importance of urban diversity and complexity in promoting economic and social vitality. Not only, an approach that hierarchizes and prioritizes socioeconomic elements that provide a perspective that explains the development of cities and their urban growth phenomenon, but that defends the big city, alerts the tensions that the development of the cities generates in the quality of urban life and opposes the impersonal urbanism. Based on community relations (apology to the street), the appropriation of people (parks and squares) and the diversification of urban functions that promote and structure the correct interaction of urban life (Rodriguez et al. 2022).

These definitions took into account only the first 4 American major epochs of urban growth, as illustrated by Borchert (1967) in its urban evolution model:

> "Sail-Wagon, 1790-1830 saw cities expanding near ports and significant water passages crucial for transportation. The Steamboat-Iron Horse era, from 1830 to 1870, marked the influence of steam engine technology, fostering the emergence of steamboats and the establishment of regional railroad networks; Railroad-Heavy Industry, 1870-1920 dominated by the development of long-haul railroads and a national railroad network; and Auto-Amenity, 1920-1960 growth in the gasoline combustion engine." (p. 307)

These concepts had prospects of the development of cities, which together with city models (which will be explained later) allowed other scholars subsequently to consider emerging elements as a result of accelerated technological advances and the trend towards the emergence of a new major epoch of urban growth marked mainly by information, High-Technology Epoch 1970-present an expansion in service and information sectors of the economy. Such is the case of Manuel Castells that defined urban growth as "the process of transforming space into place, through the construction of the built environment, the development of social networks, and the creation of cultural meanings" (1983, p. 34). Privileging the role of urban identity and culture in shaping social and political movements in urban

areas. At first emphasizing the importance of social movements in the transformations of the urban landscape and the intervention of the state in social struggles, then focusing on the role of new technologies to restructure the economy. From there the idea of how the concept of globalization of information has reformed our cities beyond the perceptible physical sphere, but from the fundamental changes that have pushed large socio-economic setbacks in much of the population, as Castells said (1995) at the G7 meeting:

> For this reason, it is both the society of technological and medical feats and the marginalization of broad sectors of the population, irrelevant to the new system, [...] therefore we cannot develop its creative dimension and escape its potentially devastating effects without collectively facing who we are and what we want. What the Group of Seven should perhaps consider is how to rebalance our technological super-development and social underdevelopment.

While Castells' perspective adds a new factor, not previously considered, such as information technology, it is also true that all approaches bring clear signs of the reasons and effects of this phenomenon today. Although it is important to know the causes and consequences to understand a little more the complexity of urban growth in the development of cities, before it should be considered one of the main, if not the main element of transformation and mobilization historically, the economy. Even more when the vast majority of the global economy revolves around a capitalist sphere of production and consumption reinforced by rapid and instantaneous globalization through connection and information systems.

Having said that, the economist Edward Glaeser most recently defined urban growth as "the process by which cities become richer, denser and more productive over time" (2010, p. 3). Emphasizing the role of agglomeration economies and the indirect effects of knowledge in promoting economic growth and innovation in urban areas. Glaeser defends the importance of cities to reach the social and technological point in which humanity is currently standing, arguing that cities facilitate social, cultural, and technological innovation, through collaboration, exchange of ideas, as well as competition. It is here where the creative city model (proposed by Richard Florida) appears as a means of attracting human capital. Moreover, in his book "Triumph of the city" exposes that the advance of cities promotes the socioeconomic development of a country, so the growth of cities should be encouraged. The data show that cities that double their population increase their per capita income by 15% (Bettencourt and West, 2010). However, he refers to environmentally friendly and healthy growth for its inhabitants,

where urbanization is the most sustainable solution to environmental and social problems, through a compact city model that reduces its energy consumption, increasing the health of its inhabitants and improving the socio-economic interactions of the most qualified population (ibid).

1.1.2. Causes and consequences.

Having defined and framed urban growth (or accelerated urbanization) according to the perspectives of various disciplines, it is possible to understand "why" of the appearance of this phenomenon and its possible consequences. In Europe, current shape of urbanization resulted from the continuous increase in population growth (natural and by rural-urban migration) in cities that took place in the 19th century, driven by constant public improvements in transport, health, and well-being infrastructure, as well as the freedoms the city offered for trade, industrialization, the emergence of new structures in the construction industry and an evident improvement in the quality of life (Borsdorf, 2002). This growing phenomenon of migration or rural-urban exodus as Hidalgo and Borsdorf (2009) argue, occurs because the rural population long for a life in the city: freedom, education, work, communication, and the promise of enjoyment of free time.

As previously mentioned, the freedoms offered by cities and government policies have a great influence on economic growth, by attracting businesses and industries that provide jobs and wealth, increasing investment in infrastructure and planning (Kabisch and Haase, 2011). In the last 150 years the causes of urban growth have been the same, considered as the main triggers of urbanization and land consumption: technological development, economic growth, increased demand for housing (individual ownership, land, and housing), reduced transport cost or ideal in improving quality of life (Borsdorf, 2002). Although, all these elements always seem to have as main objective the flow and attraction of population, research carried out by Dagmar. H, Nadja. K and Annegret. H (2013), showed that land consumption in cities continues to occur even as the population and the number of households declines. This allows to observe the influence that planning models and urbanization policies generate on urban expansion, with peripheral processes of suburbanization and low-density growth.

These are the reasons why, in different cities worldwide both positive, as negative effects have been increasing making more evident the need to understand and reformulate development plans, from a perspective that covers each of the components and not only economic growth. The constant growth in urbanization processes has gradually increased environmental degradation, not only in the

area where the cities (or agglomerations) are located, but also in their operational landscapes*, bringing with it high levels of pollution, deforestation, as well as the massive destruction of natural habitats fundamental to biodiversity and ecosystems. Although these problems are usually illustrated from an anthropocentric point of view, that is to say the direct effects on the human being and its habitat, concepts such as urban heat island, run-off water, flooding, shortage, become focal points of special attention, but also social problems related to the increase in the concentration of people in urban areas.

Even though, it is true that cities increase the per capita income of their inhabitants with greater population, as already said Edward Glaeser (2011), also shortages of affordable housing, with many people living in overcrowded and unsafe conditions, as well as crime and violence may increase due to factors such as poverty and the concentration of marginalized groups in certain areas as a result of the social stratification in the cities development generating social inequality by the socio spatial distribution of the population with the wealthy living in desirable areas and the poor in less desirable areas. At the same time, congestion in traffic, as travel times increase, significantly reduces the quality of life of the population. The constant change that the city is suffering as its different areas are supplied with amenities and services generate an increase in the lifestyle, this promise of which Hidalgo and Borsdorf (2009) speak becomes a constant increase in urban life, evicting the central areas that become unaffordable for the low-middle income population and inviting informal peripheral developments with fewer opportunities to be created as the real state expands.

1.1.3. Models of urban growth

While understanding the causes and consequences seems to be clearer "why" of this phenomenon, it is also true that it is necessary to understand "how", so that the general panorama has a physical and historical vision of the development of urban centers. There are several models and theories that try to explain how and why cities grow, based on the same factors (social, economic, and environmental) that allowed some scholars to define urban growth, as previously shown with the examples of Mumford, Jacobs, Castells and Glaeser. Although, it is clear that the context of both (concepts and models) seems to give

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** "Operational landscapes refer to the utilization of spaces, environments, and territories situated typically distant from densely populated hubs. They serve to facilitate the daily activities and socioeconomic aspects of city life. These landscapes are vital for fulfilling fundamental socio-metabolic needs related to urban expansion, such as sourcing and distributing food, water, energy, and building materials, as well as handling waste, pollution, and mobilizing labor to facilitate extraction, production, circulation, and management of these resources." (Jonas et al, 2015)*

a focused vision of urban growth, it is important to emphasize the importance of the United States and its accelerated development in the XIX and XX centuries to evaluate expansion patterns, zoning, change of use, stratification, and physical-social organization of its main cities through its constant transformations.

1.1.3.1. Concentric zone model

In 1925 the sociologist Ernest Burgess, proposed that cities grow outward in a series of concentric zones, each with distinct land use patterns and levels of social and economic development, this theory was called the Concentric zone model (Figure 1). To understand it better, Burgess argues that the city is composed of concentric circles with a trend of outward growth, seeking decentralization from zone 1 (commercial zone) to zone 5 (suburban areas). Based on the study of the city of Chicago, migration processes and urban development would occur if the growth were radial, the concentric zone model suggests that as cities grow and change, the different zones expand or contract, depending on economic and social factors (Quinn, 1940). Competition for the urban center led to a successive expansion of land use to the periphery of the city (Urban threshold*) and land use is classified according to its profit-making capacity, so concentric areas are generated with specific and indispensable activities. These areas are divided into:

Zone 1 CBD (Central Business District): It is the smallest area, the heart of the city and the center of economic activity which includes the central business district, commerce as well as the largest concentration of cultural and social activities in the city. In addition, being the area where the values of the land are highest, it is also characterized by being the preferred location for the headquarters of organizations, offices, theaters, and hotels due to its large population flow and transportation hubs such as train stations and airports (McKensie et al, 1967).

Functions:

1. Economic predominance
2. Job offers, trade, services, concentration of information and research to develop knowledge and technology.
3. Urban growth generating conurbation with secondary and tertiary centers with means of transport.

** "Territorial strip that denotes a transition from the predominant urban aspects: occupation density, morphology, urban uses, socio-cultural dynamics, etc., to the natural, or to rural land uses." (Toro, Velasco, Niño, 2005).*

Zone 2 transition area: It is often referred to as the "zone of transition" because it marks the boundary between the CBD and the residential areas that follow. It used to form a suburban area that had many of the commercial activities, but due to the growth the industries invaded the area deteriorating the residential quality, generating industrial rings, and declining neighborhoods with abandoned houses and heterogeneous population among elderly residents and immigrants with multiple social problems. Thanks to this, owners seek long-term profits to sell to expanding companies or short-term through rents. The economically developed population tends to migrate to zone 3 (McKensie et al, 1967).

Zone 3 working-class area: This area is inhabited by the respectable working class that is the workers of the industries and their families as well as the trade that prospered leaving the zone 2.

Zone 4 residential area: zone occupied by privileged and restricted neighborhoods, with the best spaces and living conditions, being home to the middle class, shopping centers.

Zone 5 outermost area: Satellite cities, where the pendulum workers are, those who come and go daily, sleeping area, single-family homes.

1.1.3.2. Sector zone model

The economist Homer Hoyt in 1939, theorized that cities grow outward in a series of sectors, each with distinct land use patterns and levels of social and economic development (Figure 1). He tried to identify homes at risk of foreclosure, so only variables of income levels and payment possibilities linked to them were used (Adam, 2005).

The spatial arrangement by sectors that generate zones is based around the center of the city, given that this is expands and the others mime outwards radially, completing the Burgess model, since limits are interrupted by expanding to the periphery generating irregular forms. The road system is the starting point for the generation of commercial corridors and services, expanding the city from its center, contrasting land use, and rent as the basis for the location and layout of the longitudinal axes from the center to the peripheries, with the intention that the companies are located in the areas of best connection (Hoyt, 1939).

- **Zone 1** central business district, main and articulator of retail business activities and bureaucratic services of private companies

- **Zone 2** light industry and warehouses
- **Zone 3** low-class residence, abandoned areas by high-income sectors, less favorable areas near industrial zones,
- **Zone 4** middle class residence close to upper class
- **Zone 5** high class residences, avoid the proximity of industry, constituting a circular sector surrounded by middle class residential areas without losing connection with the city center. All this related to transport systems that contribute to the growth and communication of areas.

1.1.3.3. Multiple Nuclei model

The geographers Chauncy Harris and Edward Ullman in 1945, with the Multiple Nuclei model (also based on Chicago) suggested that neither of the theories previously mentioned (Concentric zones and the sector model) reflected city structure in the mid-20th century. They proposed that cities grow around multiple centers of economic activity, rather than a single central business district, as they argued in their book "The Nature of cities":

> "CITIES are the central points in the occupancy and usage of the earth by man. Both a product of and an influence on surrounding regions, they develop in definite patterns in response to social and economic needs." (p. 7)

Taking into account this premise and describing the proposed urban space, it is composed of a central commercial district, from which areas with industrial and residential activities are deployed (Figure 1), and arguing that most large cities do not grow around a single central business district, since secondary nuclei are created with different types of activities that respond to the nearby population (Harris and Ullman, 1945), the growth of these is based:

- **Activities requiring specialized facilities:** Grouped as offices and finance, or factories with open spaces and transport, train, or port connections.
- **Similar activities:** Association of specialized districts.
- Activities that resist living together: High-income housing away from industry
- Activities that could benefit from a central location but cannot pay rent, such as food malls.
- **CBD:** central business district, in the most accessible place.

- **Small industry:** along railway axes or highways.
- **Low-class residences:** in less favorable locations, near factories or railway facilities
- **Middle class residential:** between low- and upper-class residences
- **High class residences:** spaces of higher environmental quality
- **Heavy industry:** on the edge of the city
- **Outlying business district:** also, in an accessible area
- **Residential suburb:** good environmental quality
- **Industrial suburban area:** near heavy industry

Land use patterns vary according to the historical development of each city. From these sub-centers urban expansion is created by modifying land uses that respond to the needs of the population, while CBD is not modified (Ahmad, 2021).

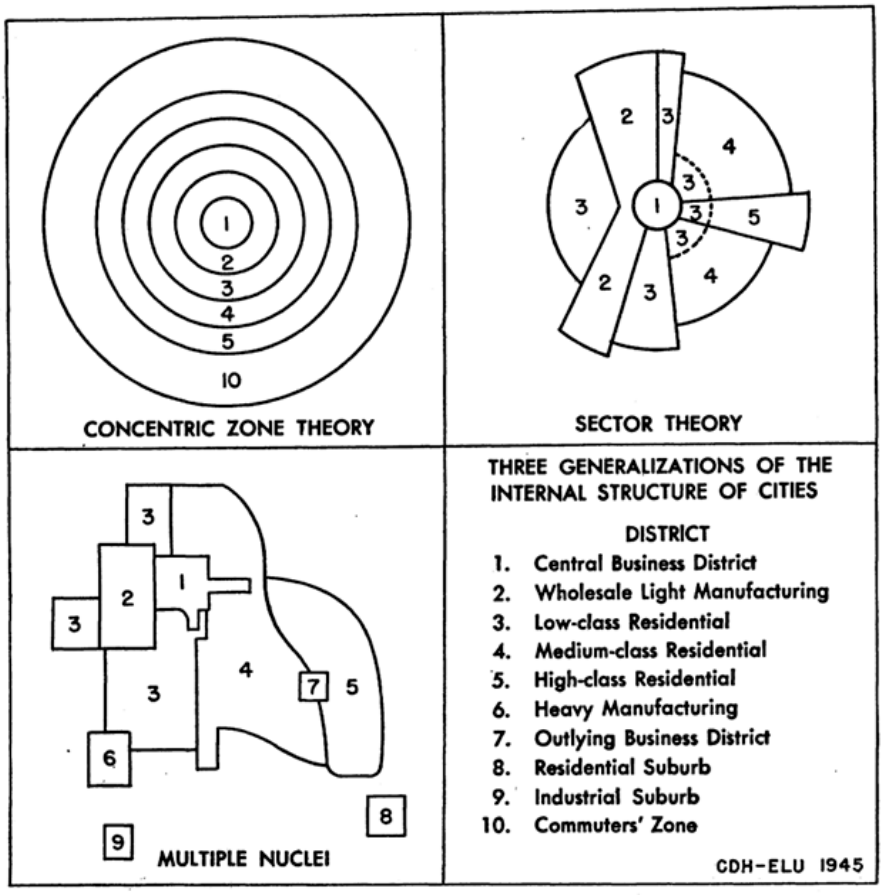

Figure 1 *Generalizations of internal structure of cities. The concentric zone theory. Sector zone theory. Multiple nuclei Model. Source: The Nature of cities, Harris, and Ullman, 1945: https://www.jstor.org/stable/1026055*

1.1.3.4. Latin America Urban Model

On the other hand, understanding the generating factors of the aforementioned theories and their influence in more "new" contexts, it is important to delve into the development of Latin American cities. That have as their starting point a European base, as a result of colonization (Spanish and Portuguese), but that quickly and thanks

to globalization received a strong influence from United States. The Ford-Griffin Model, also known as the Latin American Urban Model, is a theoretical framework that describes the urban growth and development patterns in Latin American cities. The model was first proposed by Ernest Griffin and Larry Ford in 1980. The Latin America Urban Model suggests that Latin American cities have a distinct pattern of urban growth (Allensworth, 1982), characterized by the following features:

- **The city center:** Latin American cities typically have a dense and compact city center, often featuring historic colonial architecture and serving as the economic and cultural heart of the city.
- **The zone of maturity:** This is a ring of older, established neighborhoods that surround the city center. These neighborhoods often have a mix of residential and commercial uses and are characterized by narrow, winding streets and a lack of formal planning.
- **The zone of in situ accretion:** This is a ring of informal settlements that have developed spontaneously on the periphery of the zone of maturity. These settlements often lack basic infrastructure and services and are characterized by a high degree of poverty and social exclusion.
- **The zone of peripheral squatter settlements:** This is a ring of informal settlements that have developed on the outskirts of the city, beyond the zone of in situ accretion. These settlements are often characterized by a lack of basic infrastructure and services, and residents may be at risk of eviction.

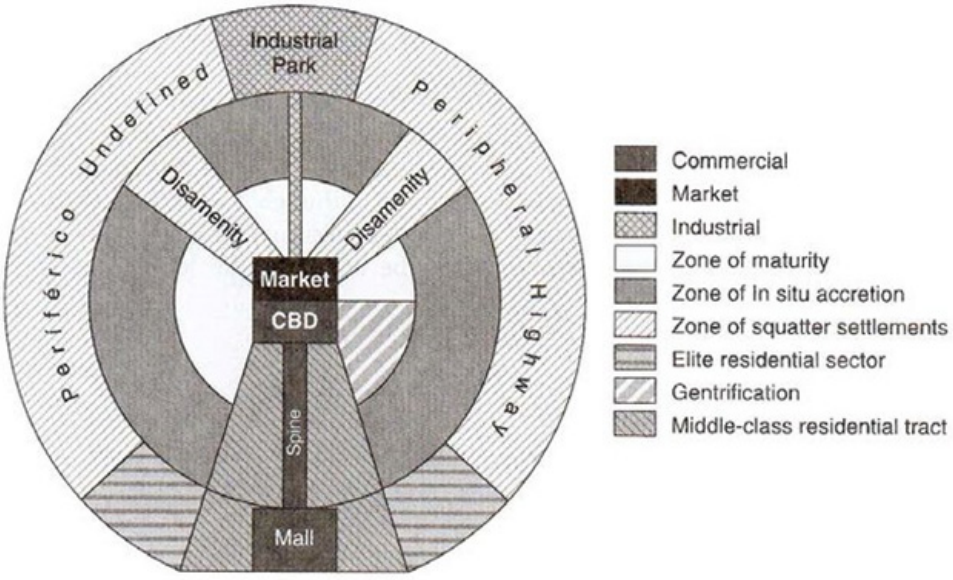

Figure 2 *Ford's model of Latin American cities. Source: Barros (2004, page 21)*

1.1.4. Urban growth in Latin America

However, urban growth or accelerated urbanization in Latin America showed a gigantic increase in its growth rates mainly in the second half of the 20th century, which is why urban studies began to be carried out. Although its largest population increase was during the 60s and 70s due to the rural-urban migration exodus, which predicted a continuous and extensive urbanization accompanied by spatial inequality and social problems, it is also true that growth rates began to decline from the 1980s showing a trend over the next two decades that the urban population would not grow as expected (Barros, 2004). However, this population trend has not had an effect on the accelerated process of urbanization or spatial inequality, which has shown continuous growth in cities even though the number of households tends to decrease. It is therefore clear that the problem today is not urban population growth, but rather its dynamics and socio-spatial patterns of growth in the peripheries. That said, and also considering the importance of Griffin's and Ford's model, it is possible to identify a clear spatial segregation evidenced in the land uses in Latin American cities, as described by Gilbert (1987):

> "There are industrial zones which accommodate modern factories, well developed commercial and rental centers, high-income residential areas, zones of government and private offices, and large swathes of low-income residential development. Some parts of the cities are well regulated and ordered, others lack services and appear to have developed spontaneously." (p.181)

Although colonization and its urban patterns are not the only culprits of the development of cities in Latin America, it should be emphasized that the colonial spatial organization patterns already presented a clear spatial segregation, where elites or people with high incomes are located in areas near the Plaza Mayor* , having access to the services, shops and main centers of power of the city, while the population with lower incomes were located in more remote areas, areas of border or periphery (Gilbert, 1987; Griffin and Ford, 1980). Something that is reflected today and that the current urban growth, mainly in Global North**, has categorized it as a problem (suburbanization of the peripheries of cities) that is interrelated with the decline of core cities and the emergence of edge cities (Batty, Xie & Sun, 1999).

** "The center piece of the Spanish American city was the colonial plaza mayor, a large square flanked by the cathedral or church, government offices, and other public buildings. (Gilbert, 1987)*
*** "Most of the wealthier nations are situated in the Northern Hemisphere, except for Australia and New Zealand. This classification, known as the Brandt Line, delineates the global division between comparatively affluent and less affluent countries based on geography." (Odeh, 2010)*

Although the problem of suburbanization of the peripheries has been studied more over time, partly thanks to the concept of urban sprawl*, and its formulation of the problem in Europe and North America.

At the same time, as previously mentioned, Latin America suffered the fastest urbanization, although initially the countries were predominantly rural, the rural-urban exodus and the natural urban growth made this situation change in only two decades, creating high concentrations of population in cities that quickly exceeded the million inhabitants or became megacities such as Mexico City or Sao Paulo (UNCHS, 1996). This phenomenon can be evidenced in countries such as Brazil which increased from 36% of urban population in 1950 to 82% by 1970, a percentage that remains today. As happened in the 19th century in the big cities of Europe, this accelerated urbanization and urban growth process brought multiple social problems, of which the lack of housing, a high level of unemployment and a lack of government capacity to provide the necessary infrastructure and services for the population stands out. During this period, multiple studies and research were conducted to understand the causes and consequences of this uncontrolled growth, bringing with it a strong presence and importance of socioeconomic studies related to migration, economic activities, the labor market, social movements and the relationship of the poor population and the state with urban development (Valladares & Coelho, 1995).

Although it is true that urbanization has not presented a homogeneous process throughout the countries, it is possible to identify 3 groups of countries according to their demographic trends. First, those with more than 80% of its population in urban areas, those with high urbanization rates, such as the Southern Cone and Venezuela, then the countries between 50 and 80%, which includes those with accelerated industrial and urban development in the second half of the 20th century, such as Mexico, Brazil, Colombia, Ecuador, and Peru. And finally, the ones with less than 50% population in urban areas, these include Paraguay, Costa Rica, El Salvador, Guatemala, and Honduras (UNCHS, 1996).

Similarly, when in the decade of the 1980s these demographic trends changed again and were regulated, they brought with them different patterns of urbanization, mainly focused on the de-concentration of population in the core of metropolitan areas, which seek to avoid the congestions and problems that a metropolis brings but producing processes of de-urbanization in the city centers

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** "Urban sprawl refers to a type of suburban expansion characterized by limited accessibility and insufficient open spaces within the developed suburban areas." (Ewing, 1997)*

and increasing the growth of small and medium-sized municipalities (Figure 3). Just as it happened in Europe, where the power of the city decayed, and its population decides to migrate generating a "belt of wealth" around the agglomerations leaving the congested centers creating the phenomenon of "shrunken cities"* (Hidalgo and Borsdorf 2009). However, although this decompression suggests that the problems caused by the accelerated urbanization will end, the truth is that the levels of growth in the peripheral areas and the secondary municipalities in the metropolitan areas only increase the possibility that processes of conurbation** happen, extending the urban areas at the expense of the rural areas (Escolano & Ortiz, 2005). The emergence of central functions in peripheral areas is increasingly evident, which were previously presented as complementary suburbs, but which are now functional areas with their own centrality. This process known as "peripherization", which is characterized by the expansion of areas on the edge of a city through mainly informal settlements for low-income populations, has been one of the triggers of accelerated, uncontrolled and unplanned urbanization in Latin America.

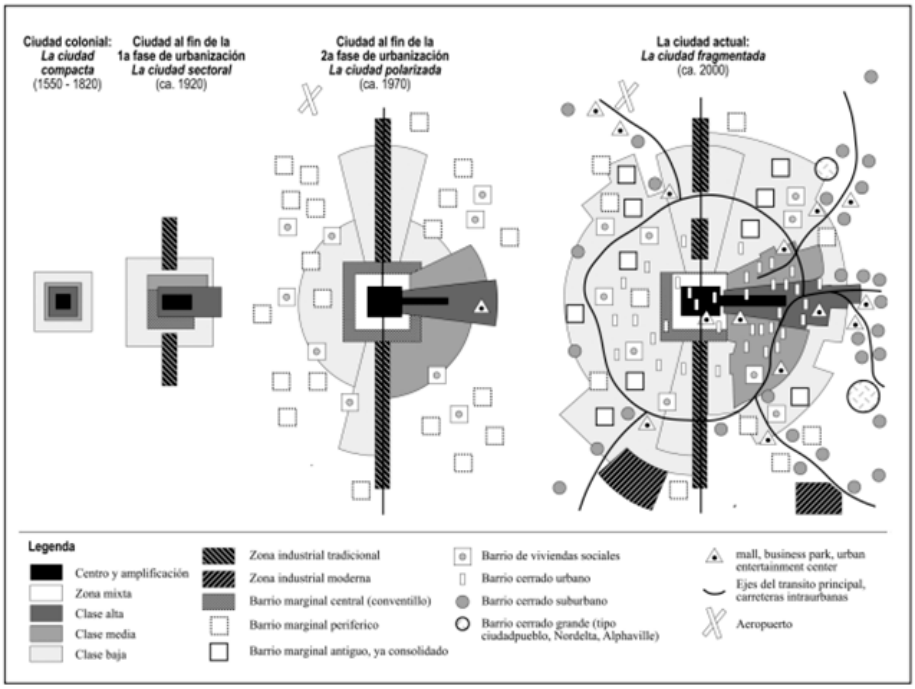

Figure 3 *The structural development model of the Latin American city. Source: Hidalgo and Borsdorf (2009, page 10)*

1.1.5. Urban growth management

Currently, countries have developed different strategies, policies, and programs to manage and regulate urban growth mitigating its short- and long-term impacts.

** "Also known as urban depopulation, it refers to dense cities that have experienced a notable population loss, and as a result buildings or areas in the inner city are abandoned or disused (Ehrenfeucht and Nelson, 2020)*

*** A widespread metropolitan region formed by the merging of multiple towns with the suburban areas surrounding a central city. (Oxford Languages)*

Although population trends have shown a considerable decrease in numbers, as previously mentioned, land consumption and its new designation of urban use remain high in developing countries or emerging economies. Although governments at various levels and scales have tried to regulate the influence of new developments, seeking optimal scenarios for sustainable development, it is not clear how to achieve these objectives, but on the contrary is an overlap of layers and strategies for the city through its land uses, smart growth, or compact city policies to reduce negative impacts in urban areas.

First of all, it must be taken into account that the emergence of urban and regional planning in the 19th and early 20th century resulted from the problems generated by the industrial revolution, making landlords and the government face a problem of accelerated population growth over-saturating (industrial) cities negatively impacting lifestyle, environmental conditions (loss and degradation of agricultural and environmentally sensitive areas) and the economy of the population. During this period of time regional scale planning began to be developed in the major cities of the global north, allowing the appearance of metropolitan areas such as London in 1889, Berlin, 1912 and Chicago 1934 (Blotevogel, 2018, p. 794). While this "phase" of urban growth management was characterized by a local 'bottom-up' and sectoral focus initiatives (transport or recreation), responding to localized urban sprawl problems and without legal and formal inclusion in national planning approaches, some of the supra-local urban development projects and plans that served as the basis for planning today (the Plan of Chicago 1909, the Plan for Greater London 1944, the Copenhagen Finger Plan in 1948) were developed.

The growth of the institutionalization and inclusion of growth management in terms of national policies occurred in the post-war period, which brought economic growth, rising income, environmental problems, and deterioration in the quality of life in the decades of the 60s and 70s. However, this process has never occurred in a linear manner, with a unidirectional driving axis, but instead has developed as a response to different phases and historical periods. Although political influence has contributed to the implementation of management, control and regulation plans and projects, it has always been influenced by the economic factor, for example during the great recession in 2008, the decline on the interest in this issue led to a new distribution of planning responsibilities among national, regional, and local governments, reducing their influence and implementation (Anthony, 2017). The policies of control and peri-urban growth according to the research of Ahani and Dadashpoor (2021) allow to be classified into 2 main categories, which are, "growth containment policies based on planning interventions (UGCPI)" and "urban growth containment policies based on financial interventions (UGCFI)".

The UGCPI are implemented under a design base that seek to impose restrictions on the development and protection of the peripheral areas of the metropolis, the most significant examples of such policies are the urban growth boundary, urban service boundary and the Green Belt.

A project developed in 1947 in London due to urban sprawl in all directions, resulting in the loss of green areas and open spaces on the outskirts of the city, threatening to absorb rural areas and destroy the identity and traditional character of farming communities near London. This led to landscape degradation and fragmentation of the surrounding rural environment, generating concerns about the preservation of cultural identity and the loss of historic rural landscapes. Rapid population growth and lack of adequate urban planning also contributed to the shortage of affordable housing in London (Xiaoping et al 2020). Many people were forced to live in precarious conditions and in densely populated neighbourhoods. Moreover, rapid urban growth and conurbation with other nearby cities generated significant pressure on the city's services and infrastructure, such as transport, water supply and wastewater treatment, which led to congestion problems and lack of basic services in some areas.

This project sought to address these problems by limiting urban expansion and protecting green areas and open spaces around London. The aim was to curb urban sprawl and preserve the rural landscape, providing a more balanced and sustainable However, the implementation of the Green belt not only brought with it the preservation of the landscape and the control of urban growth, by protecting rural landscapes and open areas promoting balanced development, but has also led to a limitation in the supply of housing in London and has contributed to the shortage of affordable housing in the city, a problem that continues to this day and that threatens the integrity of the project in the face of the unavoidable need for infrastructure and housing. Despite this, it has not been limited to London or UK, but examples such as Seoul and Frankfurt have allowed to analyze the pros and cons in each of the contexts:

Frankfurt: The main objective was to provide a natural environment for residents and protect air and water quality. (Xiaoping et al 2020)

Pros:

- **Biodiversity conservation:** The Green Belt is home to a wide variety of flora and fauna, contributing to biodiversity conservation in the region.
- **Recreation and quality of life:** Provides residents with space for outdoor activities such as walking, cycling and enjoying nature.

• **Urban growth control:** Natural barrier between the city and rural areas.

Cons:

• **Development restrictions:** The implementation of the green belt may limit urban development around Frankfurt, which could generate pressures on housing and land use in the city.

• **Conflicts of interest:** There are tensions between the conservation of the green belt and the economic development needs of the region. Balancing the two can be challenging.

Seoul: The priority was to preserve the natural and agricultural areas on the outskirts of the city.

Pros:

• **Environmental protection:** The Seoul Green Belt contributes to the conservation of natural resources and the protection of the ecosystem in the region.

• **Recreational Space:** Provides Seoul residents with a place to enjoy outdoor activities and enjoy nature.

• **Preservation of cultural identity:** By protecting traditional agricultural areas, the green belt helps preserve the region's cultural identity and agricultural practices.

Cons:

• **Development pressures:** As the population and demand for housing increases, there is constant pressure to use the green belt areas for urban development. This can threaten the integrity of the project.

• **Conflicts with land use:** There are challenges to balance the protection of the green belt with the need to develop infrastructure, such as roads or housing, in the surrounding region.

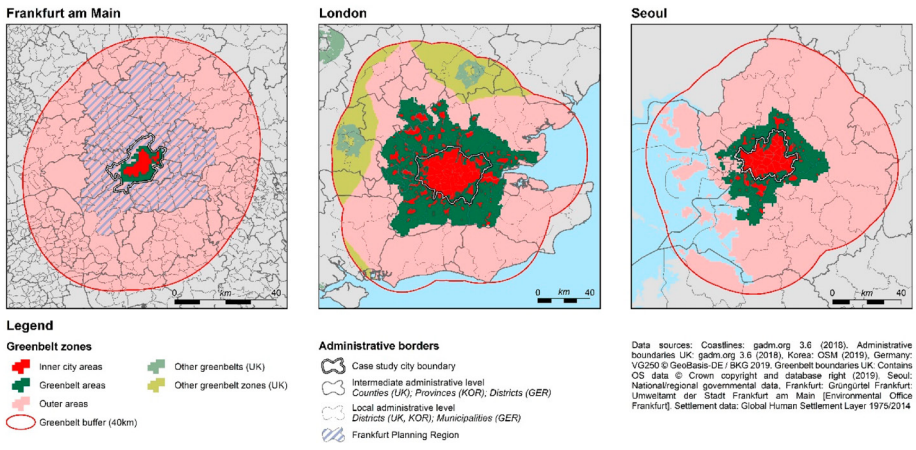

Figure 4 *Analysis zones for Frankfurt am Main (Germany), London (United Kingdom) and Seoul (South Korea). Source: Xiaoping et al (2020, page 6)*

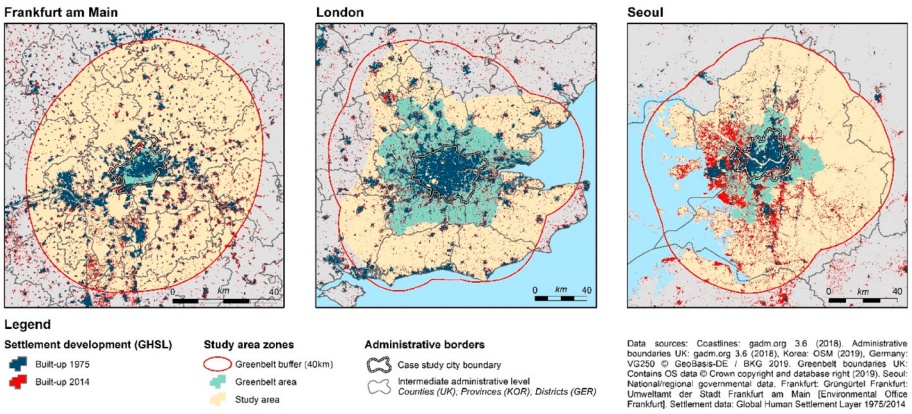

Figure 5 *Settlement development and distribution of built-up growth from 1975 to 2014 for Frankfurt am Main (Germany), London (United Kingdom) and, Seoul (South Korea). Source: Xiaoping et al (2020, page 8)*

City	Zones	Built-up Area [km²]		Population [Millions]		PBA%		LUPp [m²/Person]		DIS [UPU/m²]		WUPp [UPU/m²]	
		1975	2014	1975	2015	1975	2014	1975	2015	1975	2014	1975	2015
Frankfurt am Main	Inner-city	52.9	55.3	0.232	0.297	8.8	14.4	227.5	186.4	48.785	48.851	41.430	37.662
				+27.4%		+4.4%		−18.1%		+0.1%		−9.1%	
	Outer area	740.0	1189.5	3.285	3.806	8.8	14.4	225.3	312.6	44.780	46.235	3.947	7.996
				+15.9%		+60.7%		+38.7%		+3.2%		+102.6%	
London	Inner-city	1336.2	1484.7	7.601	10.264	70.3	78.1	175.8	144.6	48.378	48.531	28.893	23.498
				+35.0%		+11.1%		−17.7%		+0.3%		−18.7%	
	Outer area	893.0	1459.4	4.878	5.864	6.5	10.6	183.1	248.9	45.275	46.493	2.225	4.905
				+20.2%		+63.4%		+36.0%		+2.7%		+120.4%	
Seoul	Inner-city	337.7	423.9	8.1	9.6	8.8	14.4	41.7	44.3	48.426	48.676	0.001	0.003
				+18.3%		+25.5%		+6.1%		+0.5%		+196.7%	
	Outer area	232.0	940.8	3.7	11.1	8.8	14.4	63.2	84.4	44.961	47.381	0.004	0.230
				+203.7%		+305.5%		+33.5%		+5.4%		+5272.6%	

Figure 6 *Result comparative in the inner city and outer area, considering the percentage of built-up area and population gowth. Source: Xiaoping et al (2020, page 9)*

As can be seen in figure 5-6 and described by Xiaoping et al (2020):

> "The overall development of urban sprawl in the regions under study is depicted in… (Figure 6). It illustrated the slight decrease in sprawl values for the Frankfurt and London inner-cities, with all other areas showing respective increases, particularly the outer area of Seoul. Similar development patterns are observed in the outer areas beyond the green belts of all three cities. Built-up area coverage increased heavily from 1975 to 2015 in the surroundings of Frankfurt (+60.7%) and London (+63.4%) and with even much more intensity around Seoul (+305.5%)." (p. 9)

Demonstrating the effectiveness of its implementation as well as highlighting that the Green Belt is one of the policies that allow strict restraint and containment through an urban plan, while Urban growth boundary has been presented as an effective tool to guide peripheral development through land use planning, creating a boundary that separates the urban

environment with zones free of agricultural or natural character by developing recreational areas and environmental protection, preventing unplanned expansions (Kwon, 2015). The urban service boundary likewise creates a boundary that is not based on a control system, but instead orients the market allowing cross-border developments, offering freedoms for new developments, without providing the infrastructure, reducing service costs through this tool.

The UGCFI has been seen as an effective strategy for peri-urban growth control, noting the effect of transferring/purchasing development rights, and selling density. Similarly, taxation is now used as one of the most important policies seeking to prevent urban growth, for example by imposing taxes and sanctions on the effects of development (Dierwechter, 2008). One of the most effective and relevant policies for environmental protection and inhibiting urban growth is the transfer/purchase of development rights (TDR), allowing strengthening the separation between growth and preservation soil. Is conceived as a support mechanism for zoning, improving the pressures of urban growth and expansion and promoting sustainable and ideal development, as explained by Millward (2006) "They are generally considered one of the best solutions to preserve open spaces, natural and agricultural areas by transferring development rights to appropriate development areas".

1.2. Urban renewal, redevelopment and re generation

On the other hand, it can be observed how the plans and strategies of control of urban growth have a special emphasis in the peri-urban activities leaving aside the developments inside, without understanding the responsibility that these have in the direct consequences in the peri urbanization, as well as the opportunity that offer the degraded or abandoned zones to the continuous need of the city to develop. When we talk about urban regeneration it is important to take into account that just as urban growth or accelerated urbanization it does not have a single and definitive concept due to its connection with various disciplines. However, by considering it within the discipline of urban planning or urbanism it is possible to frame the concept within the generation of new policies of an urban character, seeking the realization of urban projects and initiatives in already urbanized areas or spaces of the "existing city" (Rodrigues-Malta, 2001). Urban regeneration is shown from an economic recovery model accompanied by sustainability and integration of environmental, social, and economic factors, which seek to renew, restructure, revitalize, or redevelop areas that have lost vitality and thus have begun to suffer degradation, disuse, or decline processes, to increase the economic interest of investment, mobilization of people and reuse of the existing and disconnected urban fabric.

Although, it is true that the concept seems to have a recent origin because it has been changing and adapting historically to contexts,

the interest for the transformation of the "inherited city" is a topic that mainly since the 19th century has been developing with greater interest in the global north. This concept appears as a result of the need to generate a new city due to the chaos produced by the inability of the inhabitants to govern themselves, bringing with it diseases, slums, crime, prostitution, becoming a danger for urban life and the imaginary of it in the society (Staple, 1970). During the 19th century the main cities of Europe were re-thought, seeking to solve the problems and tensions that industrial capitalism was beginning to show, not only from the peripheral urban growth, but in the effects within urban structures. One of the most notorious effects began to develop in the historic city, producing an increase in density, transforming the uses, and attracting new market flows that caused the demolition of specific areas to respond to these new trends (Wilson, 1987). It is here where the examples of cities such as London or Paris, allow to understand the transformations that functioned as the axis of development for the big urban centers worldwide.

The importance of the "Haussmann Plan in Paris" in the city planning was seen through the implementation of new urban governance policies, engineering projects (such as the sewage system) and the redistribution of health and industry, which allowed to benefit the quality of life of the inhabitant.

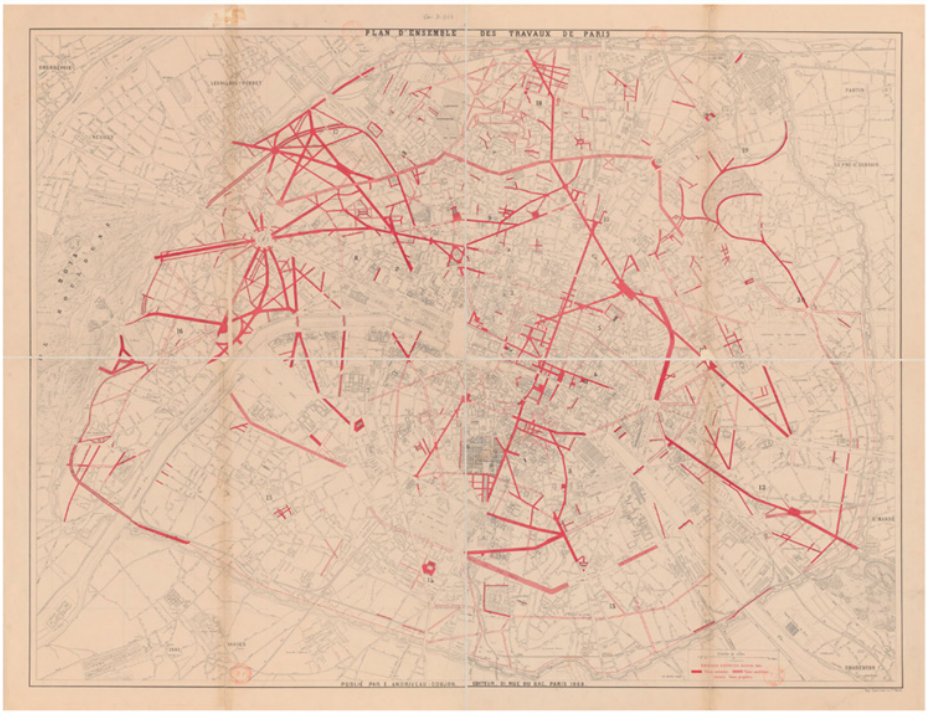

Figure 7 *1858 planning map of Paris illustrating the projects and developments on the streets, divided by: created (filled), modified (hatched) and planning stage (outlined) since 1851. Source: Paccoud (2016, p. 342)*

The projects of greening, road expansion, modes of transport and communication, as well as the architecture typologies not only enhanced the city, but also displaced populations of middle and lower classes from those areas demolished (some of them slums), towards the periphery of the city, creating

social distinction, raising rents, and avoiding class mix. By categorizing areas for development, demolition, and displacement, they produced the information needed to control behavior, modulate freedom, and govern territory and inhabitants. Although at that time the concept used in the plan was renewal, as a result of the involvement and intention of demolition and formulation of a new urban fabric, this word has been adapted, due to the great social implications that these projects have, especially in low-income populations.

In the 20th century the dynamics of urban renewal would begin to have more intense processes in terms of extensive and aggressive programs of dismantling the consolidated city, at the same time as the emergence of urban declarations and policies for heritage conservation of urban environments (Álvares Mora, 1999). The renovations and developments during this century were mainly guided by the different economic periods of capitalist restructuring that the great powers were going through, based on the real estate sector and its strategies against economic stagnations caused by recessions. For this reason, during the first half of the 20th century countries such as the USA and Germany began to implement public aid packages for the rehabilitation and improvement of public space and housing that functioned as temporary measures, while it was possible to recover the market and carry out processes of urban expansion and destruction of consolidated urban areas. This economic opportunity found in the already urbanized areas allowed that both in times of crisis and boom will generate benefits from the transformations and change in the historical fabric. However, the social mobilizations guided by economic stagnation produced a reversal in the processes of urbanization, bringing with it the emergence of new real estate dynamics, which took advantage of the regeneration of degraded environments with low incomes for the extraction of profits taking advantage of the rent gap, this means, there was a benefit from the low value of the land and its future development for residents with greater purchasing power. The distribution of various social groups (artists or creative population) gave way to the "elitization" of specific areas of the city, resulting in the expulsion of the resident or traditional population unable to pay the new high living costs and new amenities. As Castrillo et al (2014) expressed in their research:

> After the middle of the 20th century, the consolidated city was considered a space of economic opportunity, a variable dependent on an accumulation strategy that suppressed the popular ways of life of urban areas converted into city centers. (p. 133)

In the light of these historical events, it is possible to provide a fundamental basis for the direct repercussions that have arisen during the development of cities, evidencing a real estate and economic preference in urban policies over the social groups residing in the inherited city, generating the destruction of built and social tissues, which have been considered as replaceable elements. Although it is true that in many instances consolidation and improvement processes have been chosen, instead of demolition and restructuring, these are usually accompanied by population substitution processes, with the intention of attracting greater purchasing power and high-income population. During the decade of the 70s in Europe the concern for the effects caused by the incessant searches for economic investments, evidenced an excessive destruction of the built historical heritage, accompanied by a mass expulsion of residents and loss of original uses, resulting in the need for measures to control and regulate interventions. For this reason, the Amsterdam declaration was born in 1975, explained by Castrillo et al (2014) as:

> Urban rehabilitation was the right way to preserve the heritage and advocated the extension of the patrimonial consideration to «neighborhoods of cities and towns that have historical or cultural interest» the general treatment of the city as a whole and the need to include the principles of «social balance» and the priority of maintaining the inhabitants in the planning process. (p. 134)

However, having a short-term effect, accompanied by an economic crisis resulted in the resurgence of interest in promoting private investment, for the conservation of the built heritage and attracting tourism, leaving again the resident population of these areas out of the projects. In later years and with the initiative of the European Union the idea of urban rehabilitation oriented to the competition of cities and sustainability would begin to be implemented, improving the degraded areas of cities mainly in the periphery areas considered "tough neighborhoods". These regeneration projects (economic and social sustainable) had as their main idea the generation of social integration, economic development, and environmental improvement, through the social mix, the generation of employment, the participation and interaction of the metropolitan scale in the adoption of tools and mechanisms that produce benefits and investments of private capital but preserving the social tissues and promoting the improvement in the climate response of buildings.

1.2.1. Urban re-generation in Latin-America

However, the use of urban regeneration processes as previously explained, mainly in countries and contexts of global north, have not had the same impact in terms of implementation in Latin America. The character implied by the substitution and re-adaptation processes driven by the mobilization of large industries to peripheral areas in Europe and North America in the mid-20th century, produced the need to reuse and re-functionalize the large areas abandoned and disconnected with the rest of the city. However, these physical-spatial changes, of economic dynamization, driven by new economic activities and people with greater purchasing power, have not occurred in the Latin American region on the same scale as in other contexts (Europe and North America), even more so given the urban land potential available in cities (Paquette, 2020). The most widely used concept focuses on large urban projects, which tend to host a large number of projects such as new transport systems, road infrastructure and economic development initiatives, that impact directly on the city but that do not enter into the concept of urban regeneration project. For this reason, when talking about the projects related to the existing urban fabric can be evidenced a great deficit of elaboration.

Although, it is possible to see few projects that would show a growing trend in large-scale urban reconversion operations, the truth is that examples such as Puerto Madero in Buenos Aires or Nuevo Polanco neighborhood in Mexico, only illustrate the same problem that has been sought over time in the large countries of Europe, the control of private interests over the urban production process and the social fabric of the areas concerned (Aguayo, 2016). Even though the interventions have received international support by presenting models of functional and economic diversity, accompanied by a compact and higher density city model, avoiding the expansion of the city, it also shows a rapid increase in population, as well as excessive gentrification. The influence of private investors in the Latin American context has had to be progressively controlled, as in the case of Mexico, in which the dynamics of Nuevo Polanco were promoted only by private actors, without having a master plan developed by the local government to guide and structure the project on an urban scale, fulfilling public interest objectives.

On the other hand, the emergence and development of urban regeneration projects have been limited by the scarcity of detonating factors that have been identified around the world and that have been countered by the dynamics of the

context, that is, a low demand for globalized companies interested in concentrating on spaces with adequate functioning and visibility at global and regional level, as well as consumption patterns of high-income social groups (housing, work, recreation) in these specific agglomeration areas, especially in recovered central urban areas, which present a condition of rejection by this population group (Betancur, 2014). When we talk about revitalization or regeneration in the inner city, the vast majority are linked to historical heritage centers or central areas of economic, tourist or cultural interest. These areas tend to undergo processes of revitalization in the case of historical centers and re-densification in the central areas of interest, promoted by local government and private investment as the main economic promoter. However, the actions reflected present an approach oriented to the recovery of public spaces such as squares, pedestrianization of streets, as well as the adoption of security measures, but without making modifications in the built fabric, which improve the overall image of the place (relocation of street vendors) seeking to improve tourist attractiveness rather than the benefit of residents (González Couret, 2015; Navarrete, 2017).

One of the main problems in the region is the housing deficit in the central areas, mainly due to depopulation in the second half of the 20th century, resulting in cities like Santiago de Chile losing half the inhabitants in these areas. For this reason, local governments began to implement redevelopment and repopulation programs, with the intention of increasing the number of inhabitants in major cities for the first decade of the 21st century. Public-private partnerships sought to reorient housing construction to these areas, increasing subsidies, granting licenses, accelerating urban processes, and tightening peripheral urbanization policies. However, most programs only caused intense real estate development (Delgadillo, 2016), due to its lack of planning and orientation with the rest of the city. As a result, the increases in land and property prices once again led to a population turnover that increased the rejection of the processes of redemption and regeneration by middle and middle-high class populations which were evidencing a decline in the quality of services and amenities, due to the external effects on the rest of the city by the population eviction.

Although urban regeneration as mentioned above has not developed within Latin American cities on the expected scale, expertise in slum upgrading programs in peripheral areas is shown as a solution for informal settlements, with the intention of regenerating and not eradicating them, understanding the complex urban situation developed within them and accepting them as part of urban growth processes. These programs, which have been developed in multiple

stages, are aimed primarily at connecting the population with the rest of the city through road infrastructure and the provision of basic services, but with social economic and physical integration as their starting point since 1990, as well as community participation, allowing the benefits of spatial reorganization and environmental sanitation of the informal settlement to be harnessed (Orozco Martínez, 2015). One of the most successful examples is found in the city of Medellín, Colombia, through the concept of "social urbanism"*. The projects were based on neighborhood consolidation, through public interventions, such as parks, streets and community equipment that will connect the neighborhoods with each other, so that they could organize the territories with the highest rates of segregation, criminality, poverty, or marginality (Duque, 2015). As Paquette (2020) explains in the research on the Latin American panorama, the differences of these programs and initiatives and their similes around the world are based on:

> The private actor is not at all the main protagonists; on the contrary, the projects are carried out by the authorities and although they are multi-actors, it is because they closely associate civil society organizations and communities. On the other hand, the second major difference is that these projects for the integral improvement of informal or formal neighborhoods are designed to improve the living conditions and urban insertion of the inhabitants present in the place, and not to attract future external residents. (p. 56)

The importance of these projects in the region invites the adoption and understanding of urban regeneration programs in previously urbanized areas, being social, physical, and economic interventions through the reconstruction of selected polygons on themselves (Montoya, 2014). These experiences bring to the objectives of the context a new perspective for the achievement of urban sustainability that can be replicated within urban areas, with an alternative approach of socio-economic development and not only real estate growth.

** Intervention model of the territory comprising simultaneously physical transformation, social intervention, institutional management, and community participation. This model is implemented to promote territorial equity, giving priority to the action of the State in the peripheral areas of the city with lower indicators of human development and quality of life (Mayor's Office of Medellín, 2008).*

1.3. Productive city

Before continuing and understanding these urban and social configurations commonly referred to as informal settlements, it is important to recognize that while Latin American cities struggle to revitalize their urban spaces, especially informal settlements as previously stated, a fundamental premise emerges as a guiding force on the horizon of urban planning: the creation of a "productive city". Regeneration has sought to demonstrate the resilience of cities, an effort to renew infrastructure, revitalize abandoned spaces and reactivate depressed areas. However, to take a step towards complete transformation beyond the successful results achieved in the global north, it is essential to delve into the concept of a "productive city". This notion goes beyond mere physical restoration; it implies a paradigm shift towards the integration of economic activity into the very fabric of the city, which serves as a catalyst for deeper and lasting changes. From creating environments that foster economic diversity to promoting sustainability and innovation, this concept represents a roadmap to vibrant and thriving urban communities.

Recognizing the historical contributions made by influential authors and their works regarding the idea of a "productive city" holds significant importance. Various experts in urban planning and sociology, previously mentioned in their discussions on urban growth, have significantly influenced our understanding of how cities can transform into thriving and productive entities. For instance, Jane Jacobs, in her book "The Death and Life of Great American Cities" (1967), underscored the importance of diverse economic activities intricately woven into the urban fabric. Her observations laid the foundation for comprehending how a city's economic variety drives its vitality and productivity. Similarly, Richard Florida's concepts, notably presented in "The Rise of the Creative Class" (2002), illuminate the crucial role of creativity and innovation within urban environments. Florida's ideas about attracting and nurturing creative talent within cities align deeply with the notion of a productive city, emphasizing the pivotal role of innovation in fostering economic expansion (Florida et al, 2011).

In the same way Edward Glaeser, through his book "Triumph of the City," provided a comprehensive examination of how cities serve as engines of productivity and development. His insights into the economic prowess and innovative potential of urban areas complement the vision of a productive city as a hub of economic activity and growth. Moreover, Manuel Castells, in various works exploring the

relationship between cities and information technology, offers valuable insights into how cities harness technological advancements to drive productivity and innovation. These historical perspectives from influential authors offer rich insights into the multifaceted nature of the productive city. Although it is true that the term productive city was not used directly by any of these authors, it has evolved from different perspectives in the field of urban planning, urban sociology, economics and other related disciplines. Contributing significantly to the idea of a city that is not only limited to being a residential center, but also integrates economic activities, promotes diversity, innovation and sustainability to boost urban development, becoming relevant as the changing complexities and dynamics of urban environments are recognized and their crucial role in economic development.

In recent years, the concept of a productive city has gained substantial traction within urban studies and policymaking circles (Jacobs, 1961; Florida, 2002). As technology continues to evolve at an unprecedented pace, cities have adapted to leverage these advancements, transforming themselves into dynamic hubs of innovation and economic growth (Castells, 1996; Caragliu & Nijkamp, 2008). The integration of information technology within urban frameworks has reshaped the traditional notions of productivity (Glaeser, 2011). The advent of smart city initiatives, characterized by interconnected infrastructure and data-driven governance, has redefined how cities function (Batty, 2013; Albino, Berardi & Dangelico, 2015). These initiatives optimize resource allocation, enhance public services, and foster an environment conducive to entrepreneurial endeavors (Caragliu & Nijkamp, 2008; Townsend, 2013).

Moreover, the productive city concept transcends mere economic prosperity. It encapsulates a holistic approach that prioritizes sustainability, social inclusivity, and cultural vibrancy (Sassen, 1991; Minton, 2009). Cities are not just engines of economic activity; they are melting pots of diversity, creativity, and opportunity (Florida, 2002; Glaeser, 2011). The evolution of the productive city concept necessitates a nuanced understanding of urban dynamics (Castells, 1996; Batty, 2013). It underscores the interplay between technology, governance, and societal needs. Furthermore, it underscores the importance of fostering collaborative ecosystems that encourage innovation and knowledge exchange (Albino, Berardi & Dangelico, 2015; Townsend, 2013).

As cities continue to evolve in response to global challenges and societal shifts, the concept of the productive city serves as a guiding principle (Jacobs, 1961;

Sassen, 1991). It advocates for a balanced approach that harmonizes economic vitality with social equity and environmental sustainability (Glaeser, 2011; Minton, 2009). In doing so, cities can pave the way for inclusive growth, where prosperity is accessible to all residents while preserving the essence of urban life.

Furthermore, exploring the notion of the productive city extends to encompass various facets, including the revival of urban agriculture. Bohn (2016) heralds a significant moment for urban agriculture within the framework of the productive city. The resurgence of urban farming not only contributes to local food production but also promotes environmental sustainability and community engagement. It represents a paradigm shift where cities reevaluate the utilization of their spaces to integrate agriculture into the urban fabric, fostering resilience and self-sufficiency (Bohn, 2016). The inclusion of urban agriculture aligns with the multifaceted approach to the productive city, emphasizing sustainability and community participation (Bohn, 2016). As cities seek holistic solutions to complex challenges, urban farming emerges as a means to address food insecurity, promote healthier lifestyles, and reduce ecological footprints. Transitioning from agricultural revitalization within urban landscapes, the discourse on the productive city also intersects with informal settlements. Informal settlements, often marginalized and overlooked, form an integral part of the urban fabric (that will be explained later). These areas present complex socio-economic dynamics, challenging the conventional understanding of productivity within cities.

As we delve into the dynamics of informal settlements, it becomes evident that their existence reflects not only the limitations of urban planning but also the resilience and resourcefulness of their inhabitants. These areas are microcosms of productivity in their own right, where communities adapt and thrive despite limited resources and inadequate infrastructure. The dialogue surrounding the productive city must acknowledge the role and potential of informal settlements in shaping urban productivity. It calls for inclusive strategies that integrate these settlements into the broader urban framework, empowering residents and leveraging their strengths to foster more equitable and productive urban environments. Thus, as we navigate the discourse on the productive city, encompassing facets like urban agriculture and informal settlements, it becomes apparent that a comprehensive understanding is crucial to holistically address the complexities of urban spaces. Embracing diversity, fostering resilience, and integrating marginalized communities into the fabric of urban productivity remain essential in shaping cities that are truly inclusive and productive for all.

1.4. Informal settlements

Informal settlements, as we saw previously, constitute a very important agenda of urban planning in developing countries, in this case in Latin America, being part of urban growth and territorial development processes of the last decades in the region. To better understand the set of processes that occur within these areas, it is important to define first the causes of their emergence and their development over the years thanks to new policies of regulation and consolidation. To have a clearer idea, the definition of informal settlement cannot be given only by the profile of the population living in it, although it is usually associated with residents with low levels of education and income, the reality is that due to the development of the Latin American cites many of them are considered as middle-class. However, it is possible to give an idea based on the physical characteristics exposed by Fernandes (2011) as identification criteria:

> The several criteria used to identify existing developments as informal settlements (...). Such physical criteria may include precarious urban infrastructure, public services, and collective equipment; inadequate construction; environmental degradation; absence of public spaces and of leisure, community, and cultural facilities; and predominance of poor residents. (p.11)

In addition, informal settlement refers to an environment built through processes of illegal subdivision and/or occupation of land, irregular patterns of development and scarcity in the provision of basic services (implementation outside the parameters and efforts of local planning), due to the unequal distribution of wealth and economic growth, accompanied by practices of exclusion historically in these contexts (Srinivas, 1994: p. 1). On the other hand, UN-Habitat in its definition highlights that a dwelling to be considered under a condition of marginalization (mostly informal) must at least meet one of the following requirements: "lack of tenure, lack of access to safe water, lack of access to improved sanitation non-durable housing and overcrowding." (Holfmann, Taubenbock & Werthmann, 2015).

All these conditions given in each of the definitions are presented as the direct and indirect result of those political and socioeconomic factors that cause informal development. Although it is true that factors such as poverty or low income are presented as one of the main reasons, playing an important role due to the unequal distribution of wealth and job opportunities, there are other factors that were previously mentioned in the Haussmann plan in Paris that today have a direct influence on the socio-spatial distribution

of the population. Thus, the results of the formal market and problems in urban management, through the uneven spatial distribution of infrastructure, are presented as an obstacle in the provision of affordable housing within the city. The constant increase in the price of land and the high costs of formal markets have not been able to respond to the constant increase in population (mainly due to the rural-urban exodus) in the second half of the 20th century, which found as a solution the peripheries and neglected central areas as spaces of informal production of housing and marginal settlements (Abramo 2009; Smolka and Larangeira 2008). The shortage of social housing, caused by the lack of precise housing projects or projects with low quality of life provision as a result of political manipulation and exclusion in local planning, have led to the provision of illegal land titles at low cost by landowners or private actors who benefit from the present necessity and future provision of services by local governments at the regularization processes of these settlements (Larangeira 2002).

The production of this informal housing market based on the necessity of the population and the inability of local governments to provide infrastructure and services to the emerging low and middle-low-income population as mentioned above, brings with it spontaneous processes of self-construction and self-provision of services. Through the subdivision of plots of land, basic construction and illegal designation of titles or land sale, the future intervention and development of basic services by public entities is used, valuing the land, and obtaining benefits from ex-post regularization processes through the legal planning and governance strategies of local governments in the final phase of urban development (Baross, 1998; Blanc et al, 2022). This anticipated valorization varies according to the average time it will take the public entities to provide basic urban infrastructure and services (in the last decades it has gone from 20 to 4 years). And that demand (population) continues to find advantages in the informal housing market over the formal supply (flexibility, space, and income), as can be seen in Figure 8.

While the development of this type of urbanization continues to take place, representing a high percentage of Latin American urban development, as shown by the examples of Peru and Bolivia with more than 80% of land occupied by this model (Espinosa & Fort, 2020; Blanc et al, 2022), the constant planning and territorial governance strategies have not allowed the extension of these areas to cease. However, local governments have worked on plans for ex-post regularization (previously mentioned) and consolidation of these settlements, usually due to social and economic problems that would produce the relocation

of a large number of inhabitants to other areas of the city, making these urban, physical, and legal housing consolidation programs seek to provide adequate and safe housing for residents in informal and self-construction developments. This resulting socio-spatial configuration creates small cities within the city, resulting in disconnected structures in terms of services, but providing a large flow of people and needs informally addressed. This informal market is very important, not only because of its large percentage in the urban development of cities in Latin America, but also because of its flexible and resilient processes in fields such as architecture, urbanism and the provision of services, which will be addressed in more detail in the analysis of the case study in the savannah of Bogota.

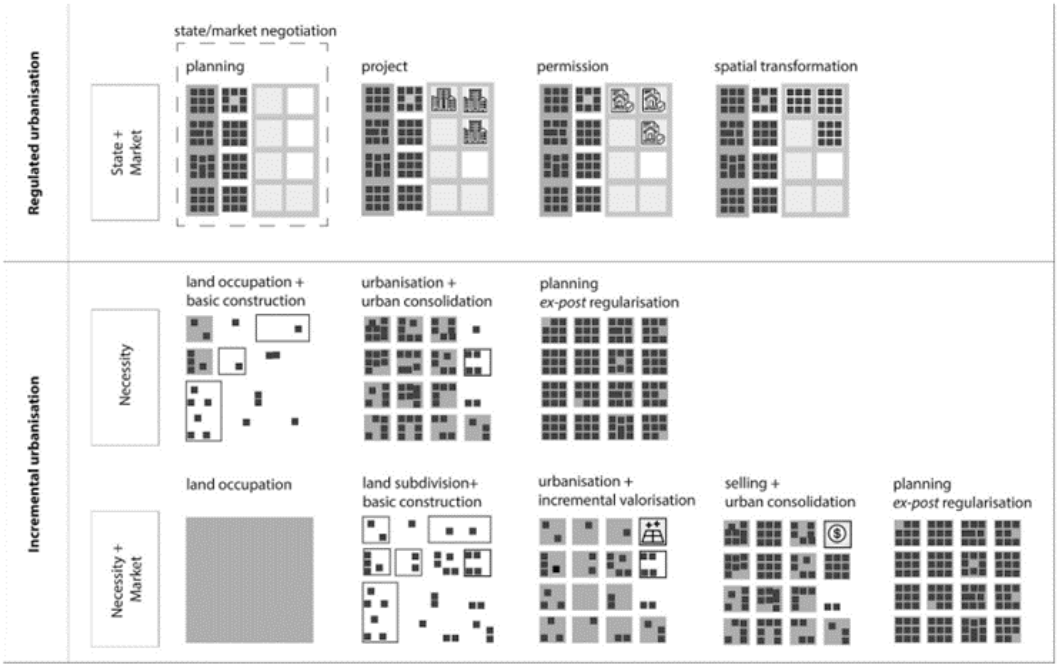

Figure 8 *Steps of formal and informal urbanization processes. Source: F. Blanc et al (2022, p. 714)*

2.

CASE STUDY: Bogotá Metropolitan/regional area

Source:https://www.saatchiart.com/art/Collage-M-I-G-R-A-T-I-O-N/396020/9725499/view

2.1. Analysis of the study area

2.1.1. Introduction to the study area

The historical development of Bogotá, Bogotá's Savanna and its geographical conditions have gradually produced the appearance of informal and marginalized neighborhoods in the interior and the periphery of the urban areas, with the consequences connected to this type of settlements, as shown before in section 1.4, as a result of extension processes of the economic and labor center to the north and west (26th Street) of the city (causing a population turnover, where people with higher incomes leave the central areas reducing their value, being replaced by emerging neighborhoods of informal nature around the historic center), large-scale urban developments (partial plans*) which have increased the price of land, thus increasing the cost of living in the area, pushing the middle and low income population to the periphery (Figure 10-11), as well as the population mobilization of other areas of the country and other countries in the region in search of better living conditions, increasing the demand for affordable housing that cannot be supplied by the public entities, generating relationships and groupings of increasing size and incidence. However, the concentration of these areas occurs mainly at urban thresholds, in areas increasingly distant from the founding and geographical center. As can be seen in Figure 9 in the last decades of the last century, peripheral urban developments (which constitute largely informal settlements) finished configuring the city up to the natural limit presented by the Bogotá's River and its conurbation with municipalities (functional threshold) such as Soacha, Funza, Cota, etc.

These threshold (border) areas present differentiated conditions, based on their geographical location and their proximity to the municipalities surrounding Bogotá. For this reason, the study area, at the same time the most critical border area, is selected considering 4 main features that synthetize the causes of urban growth phenomena and increase the population attraction, mentioned in the section 1.1.2. technological development, economic growth, increased demand for housing (individual ownership, land, and housing), reduced transport cost or ideal in improving quality of life (Borsdorf, 2002). The 4 features are:

1. **Topography:** Areas facilitating urbanization (less topographical obstacles).
2. **Surrounding urban areas:** Proximity and relations with smaller-scale urban areas.

** "The partial plans are the instruments that specifically articulate the objectives of territorial planning with those of land management, specifying the technical, legal, and economic conditions that allow the generation of the necessary supports for new urban uses or for the transformation of previously existing urban spaces, ensuring conditions of habitability and protection of the Main Ecological Structure, in accordance with the provisions and policies of the Land Use Plan." (SDP, 2022)*

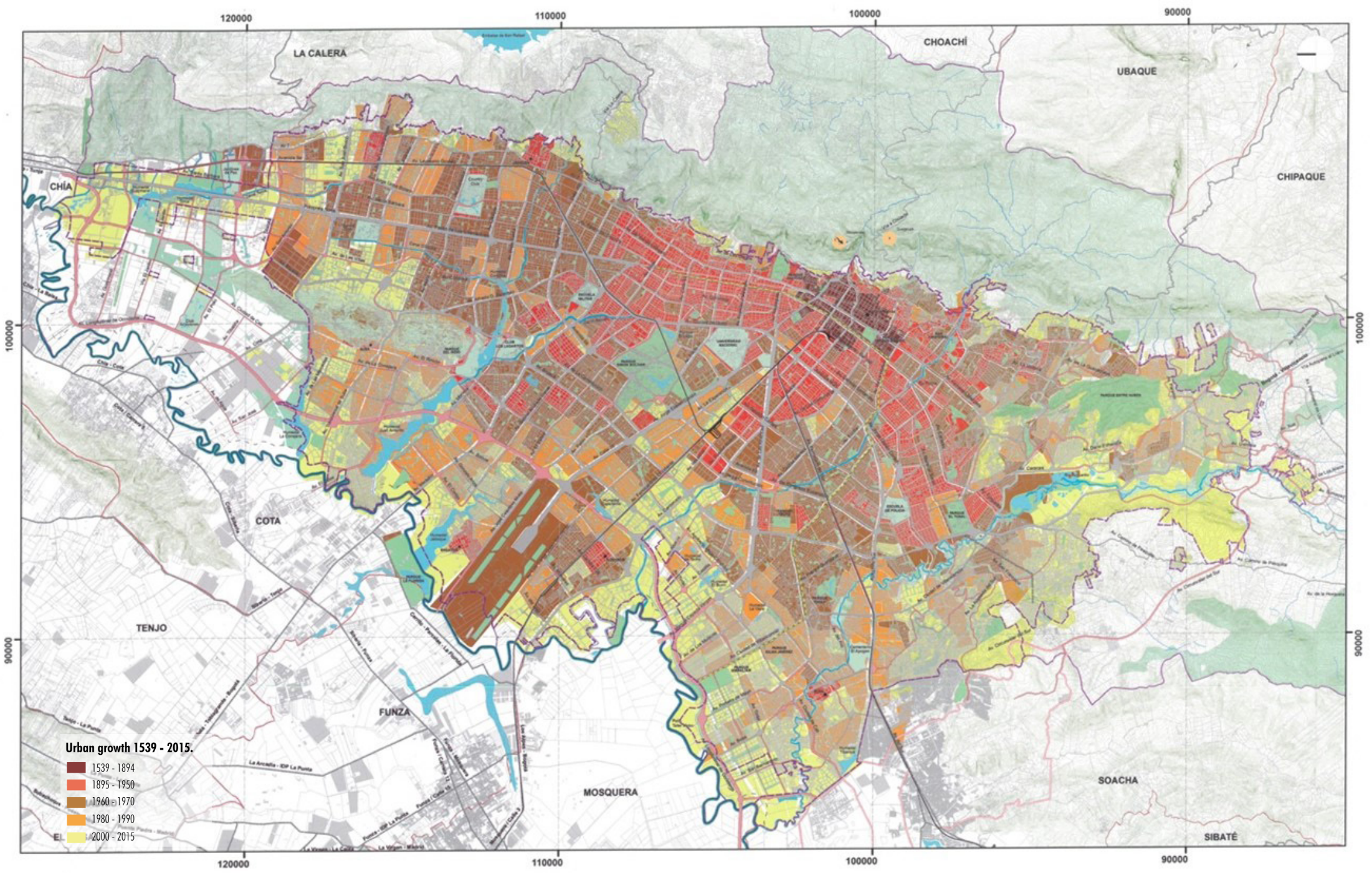

Figure 9 *Urban growth 1539 - 2015. Source: POT (Plan de Ordenamiento Territorial) Enrique Peñalosa 2019*

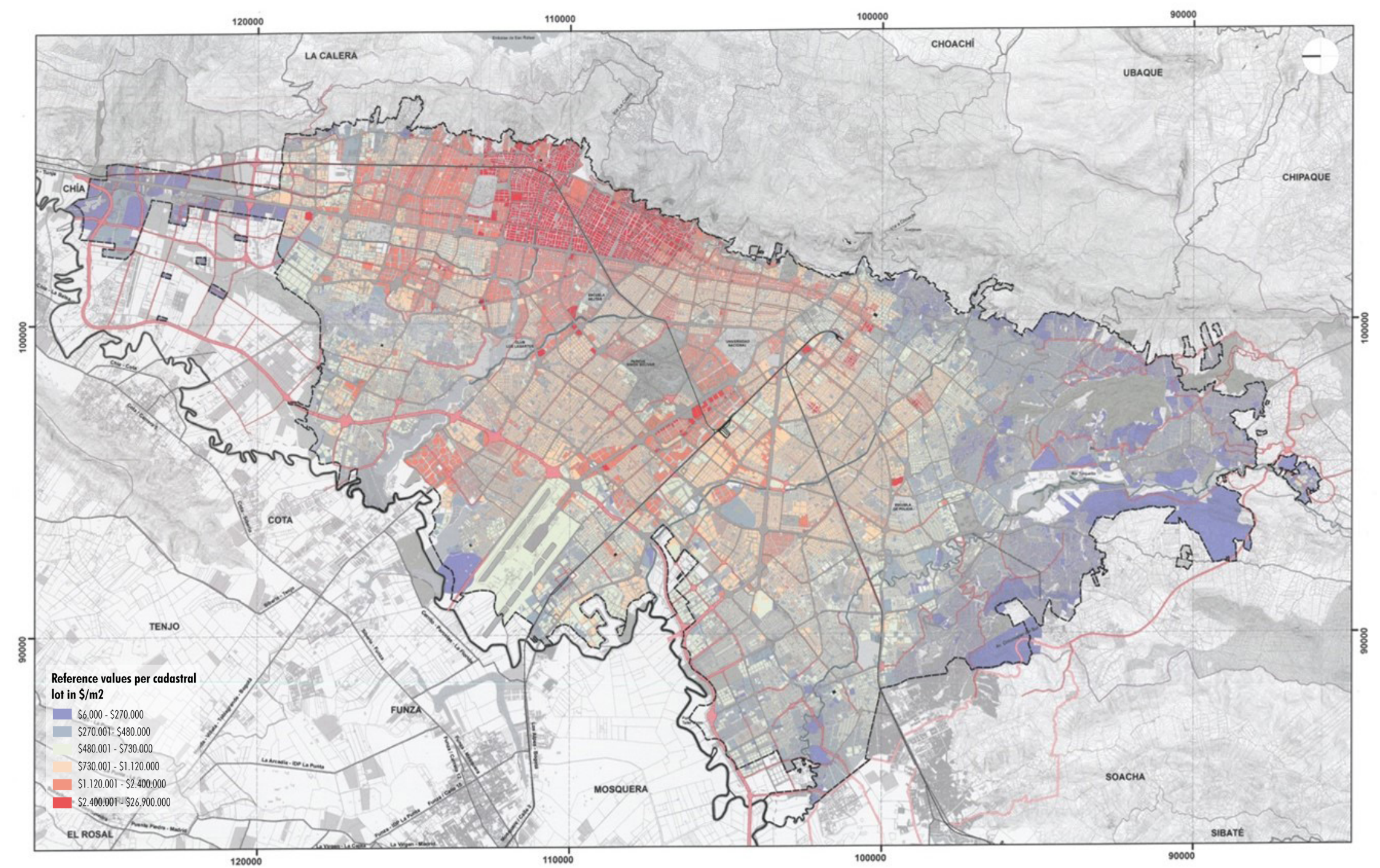

Figure 10 *Cadastral reference value per m2 of land - 2013.Source: POT (Plan de Ordenamiento Territorial) Enrique Peñalosa 2019.*

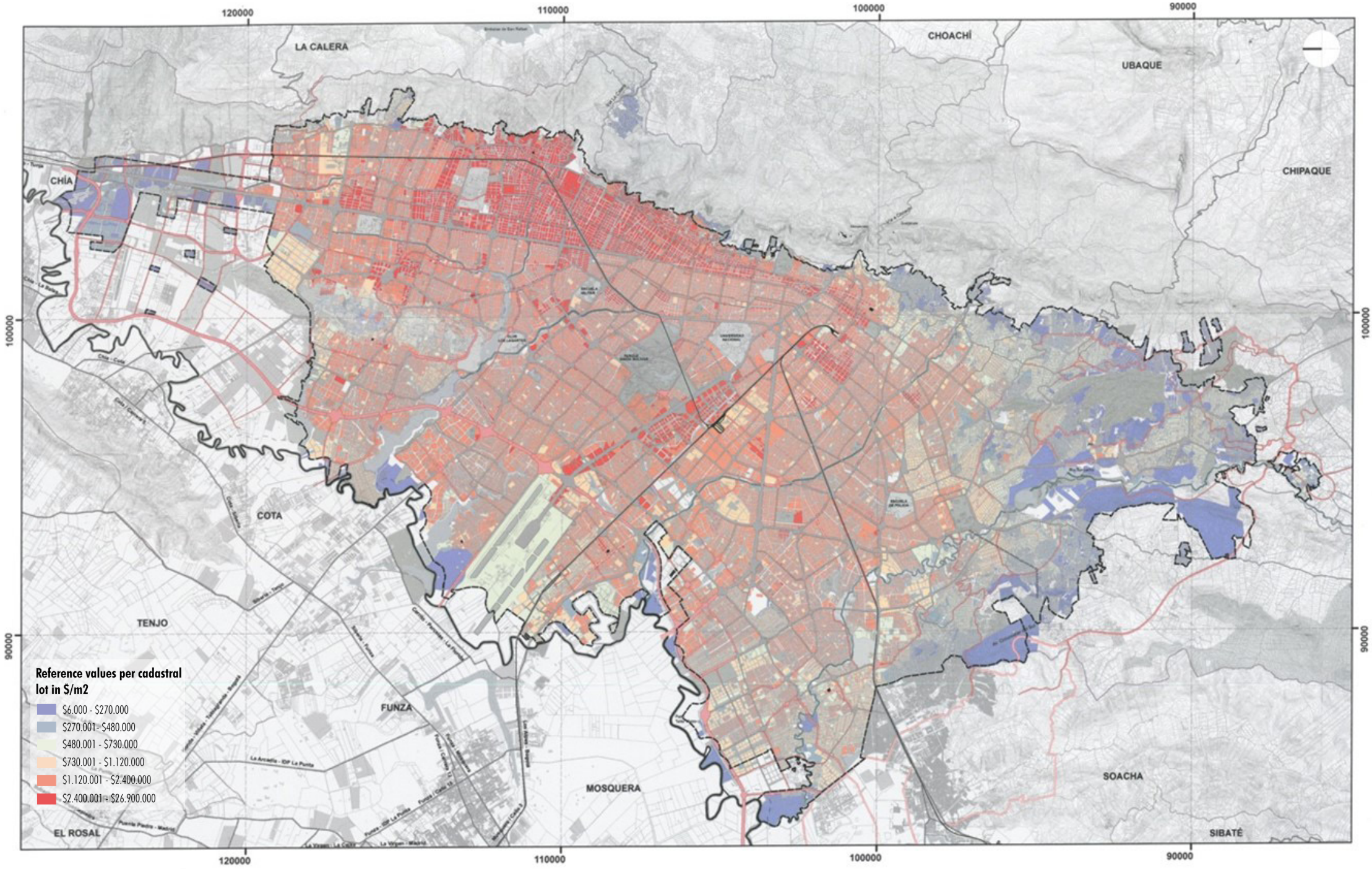

Figure 11 *Cadastral reference value per m2 of land - 2017.Source: POT (Plan de Ordenamiento Territorial) Enrique Peñalosa 2019.*

3. **Mobility and transport:** High flow commercial, labor, and cultural connections.
4. **Landscape conditions:** Natural, architectural conditions, etc.

Taking into account these characteristics, the south-western threshold comprising the urban limits of Bogotá with the municipalities of Funza and Mosquera directly (administrative threshold) and the transitional urban-rural threshold generated by the municipalities of Mosquera, Funza, Bojacá, Madrid, Facatativa and the locality* of Bosa as an overflowing area (functional threshold), was chosen. Being the urban threshold with the highest concentration of population in the surrounding municipalities: Mosquera 166.203 Inh, Funza 115.923 Inh, Bojacá 12.236 Inh, Madrid 140.249 Inh and Facatativá 172.064 Inh, only behind the municipality of Soacha: 831.259 Inh (DANE, 2019) (Figure 12) but with a larger occupied conurbated area, which comprises 14.29 linear km to the municipality of Madrid and 25.82 linear km of dispersed occupied area to the municipality of Facatativá, along the axis of "Avenida centenario or calle 13" inside Bogotá.

On the other hand, the south-western threshold has a privileged geographical location because it is located in the area of the Savanna surrounding Bogotá with less topographical obstacles and slopes (Figure 13), being considered a flat area, with an average slope ranging between 0.8% - 1%, facilitating urbanization and development of infrastructure projects. This brings with it population mobilization, as well as commercial and industrial uses that respond to the demand of Bogotá's savanna, continuing with its historic function of "communicating and providing the resource capital from the port of Honda in 1560" (El Espectador, 2017) and currently being one the main cargo corridors of Bogotá, as can be seen in figure 14. The entry of vehicles daily to Bogotá by the "Calle 13" is 42,131 vehicles, the second largest after the "Autopista Norte" (54,974) (AMB, 2019) the main access and connection at metropolitan and departmental scale towards the west.

An important element to take into account is the agricultural and floriculture vocation presented in the Bogotá's Savanna, a very important economic aspect that will be developed later, since Colombia is ranked number 2 in the export of cut flowers, with almost 17% of world demand (Aldana, 2019), representing almost 80% of the national production and export of flowers, being Bogota the main city in charge of this activity. In addition, added to the tourist and economic attraction generated by being located next to a mega city as Bogotá,

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** "Political, administrative, and territorial municipal division, with clear powers and criteria for financing and applying resources, created by the Municipal Council at the initiative of the respective mayor, in order to meet more effectively the needs of that portion of the territory." (SDP, 2020)*

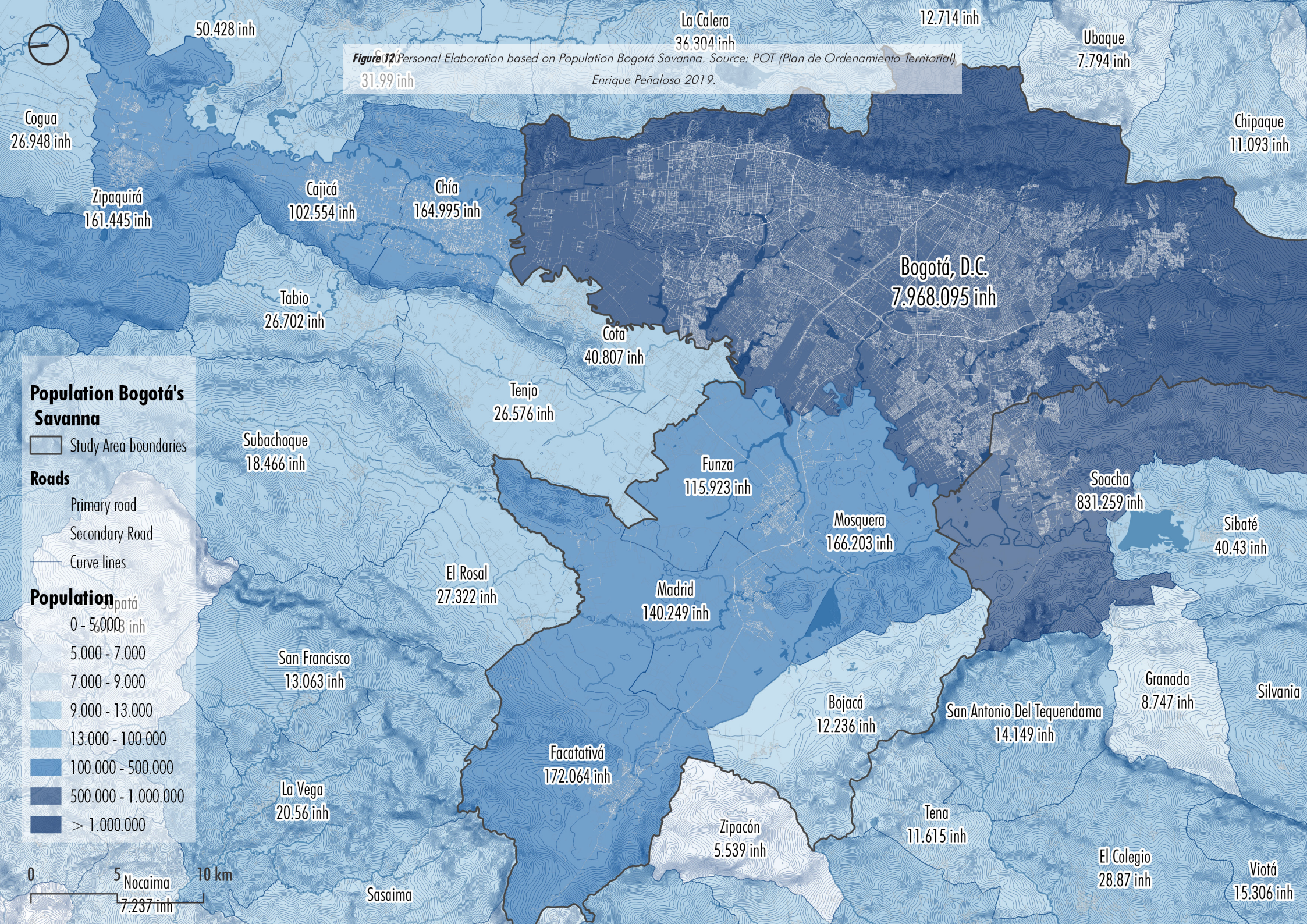


Figure 12 *(Personal Elaboration based on Population Bogotá Savanna. Source: POT (Plan de Ordenamiento Territorial) Enrique Peñalosa 2019.*

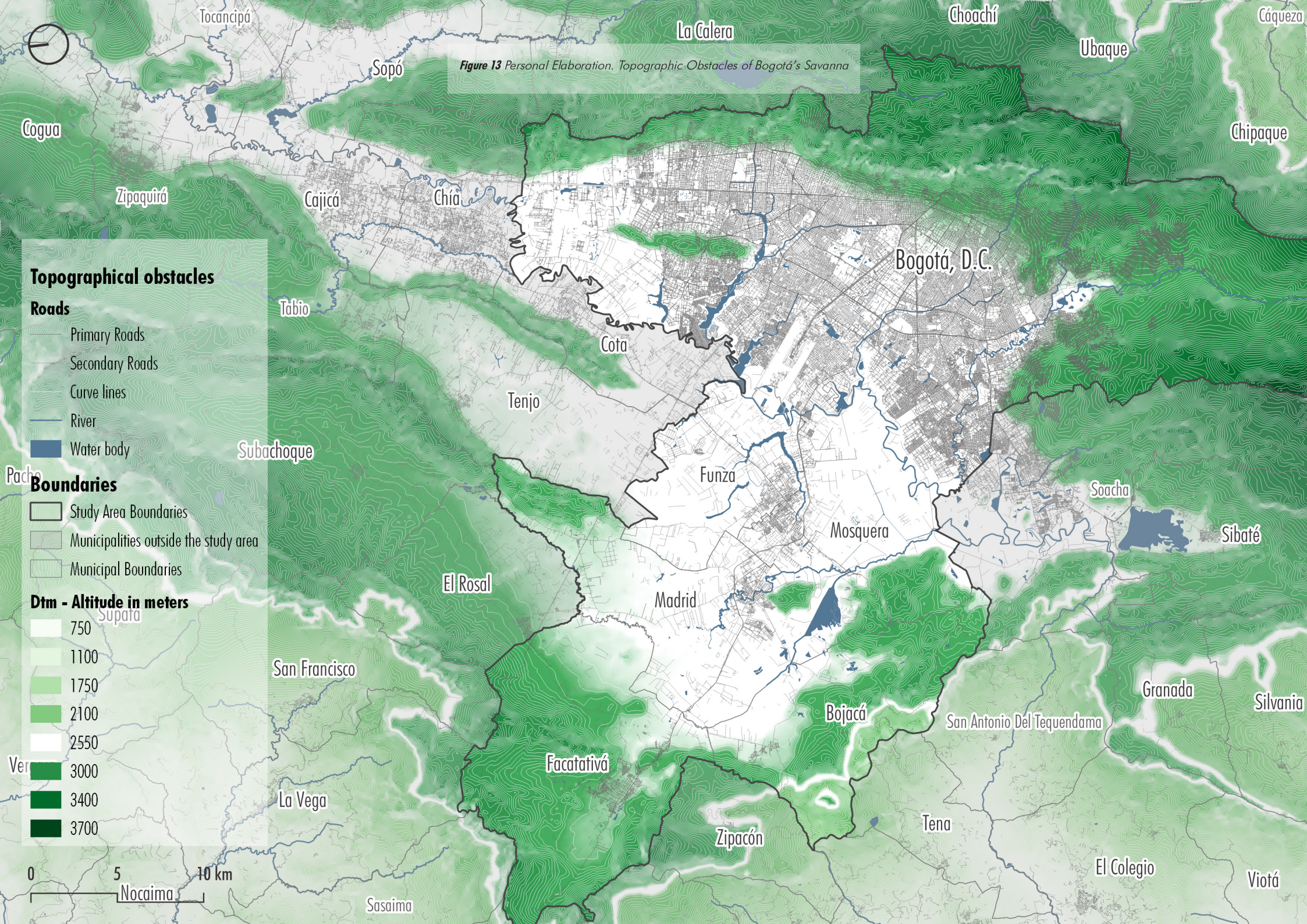


Figure 13 *Personal Elaboration. Topographic Obstacles of Bogotá's Savanna*

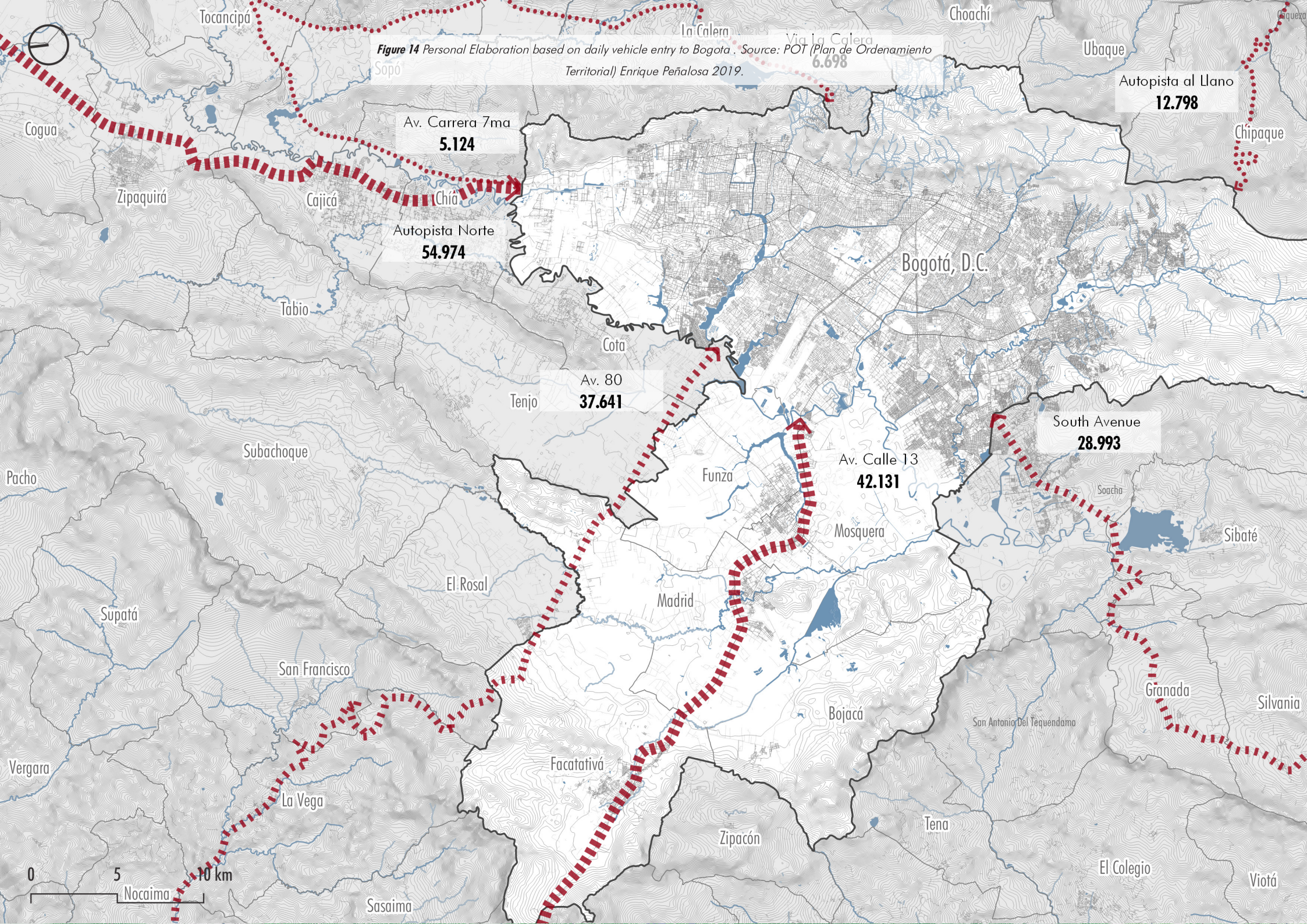


Figure 14 *Personal Elaboration based on daily vehicle entry to Bogota . Source: POT (Plan de Ordenamiento Territorial) Enrique Peñalosa 2019.*

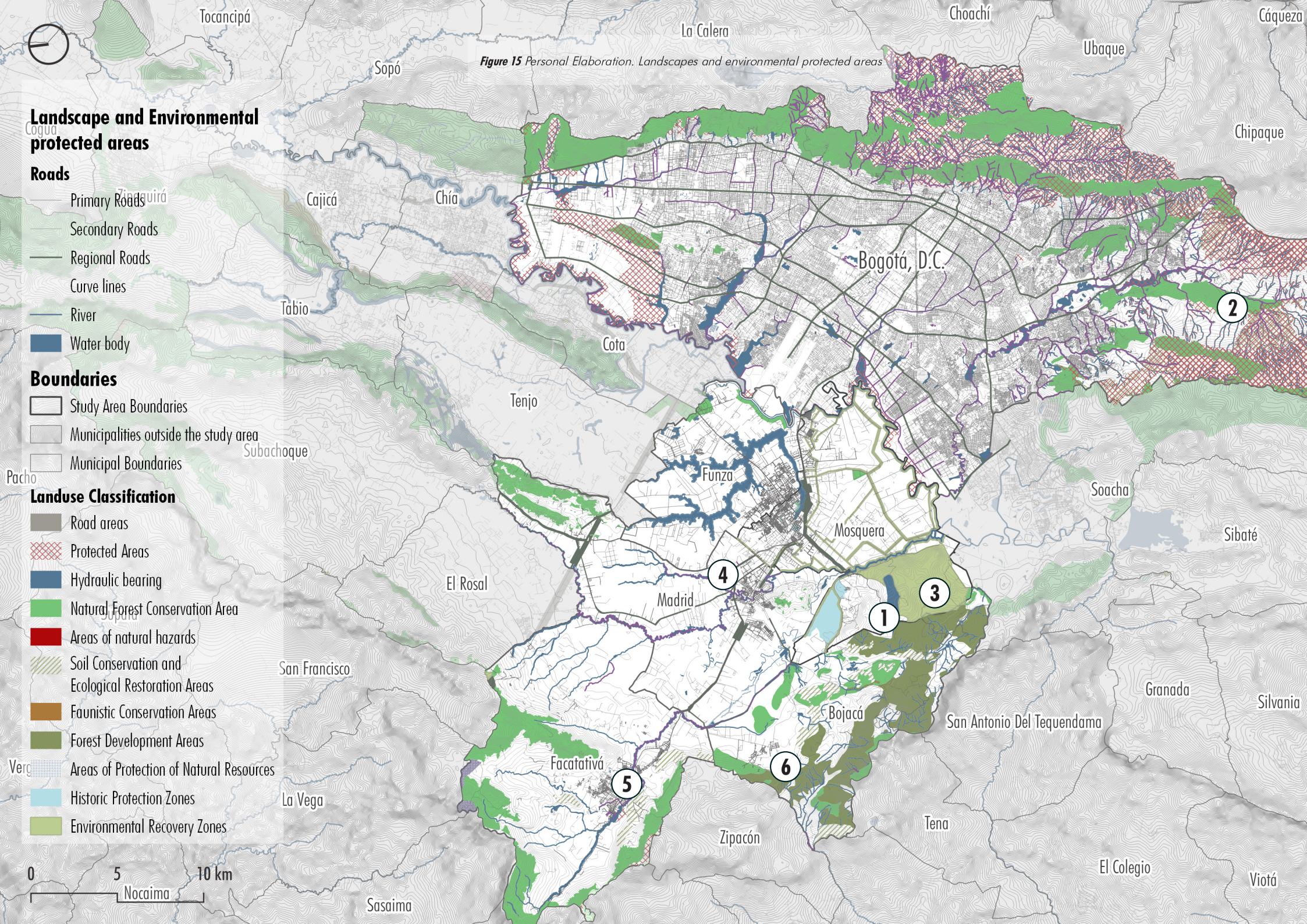
the presence of a large number of protected areas and nature reserves, as well as areas that maintain the colonial architecture style and indigenous settlements, have constantly attracted people from other regions of the country; expanding rapidly the suburban areas, as well as their population, mainly in the municipalities of Mosquera, Funza, Madrid and Facatativá in recent decades. Some of the examples that can be evidenced are:

- Paramo of Sumapaz - Bogotá
- Sabrinsky Desert - Mosquera
- Laguna Pedro palo - Facatativa
- Areas of flower production - Madrid, Funza
- Laguna Herrera - Mosquera
- Piedras del Tunjo Archaeological Park - Facatativa
- Nuestra señora de la salud Church - Bojacá
- House of the Sun Muisca - Facatativa

The strategic location in which the savanna of Bogotá is located and its favorable climatic and soil conditions have generated that agriculture, and urbanization has developed in such a way as to benefit each other from transport connections and constant urban development along the axis, which has gradually produced a growth in the economic importance of this area of the country, which together with its neighboring municipalities represents 44.5% of exports and 31.6% of GNP in Colombia. (RM, n.d.)

All these external elements together with the internal development of infrastructure in the various systems that make up the urban centers in the world (public space, main ecological structure, roads, public transport, services, etc.) have had repercussions that are evident in the urban periphery and cross-border threshold of Bogotá. For example, one of the biggest problems currently occurring in the south-western threshold is population density; the localities of Bosa and Kennedy comprise 70% of the densest UPZ* (Unidades de Planeamiento Zonal) in Bogotá, with a population of approximately 1,204,655 inhabitants distributed in 7 UPZ, of which central Bosa is the most populated with 286,334 inhabitants, only surpassed by El rincón in the locality of Suba with 370,381 inhabitants, Patio bonito is the densest with 202,931 inhabitants in 317 hectares (64,016.08 Inh/Km2). This shows that the population concentration at the border is mainly high and very high, and to a lesser extent medium and low near Bogotá's River.

Figure 15 Personal Elaboration. Landscapes and environmental protected areas



1. Lake de la Herrera
Mosquera

2. Sumapaz paramo
Bogotá

3. Sabrinsky Desert
Mosquera

4. Flowers Greenhouse
Madrid

5. Piedras del Tunjo Archaeological Park
Facatativa

6. Nuestra señora de la salud church
Bojacá

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1. Lake de la Herrera - Source: https://bicionarios.com/reserva-tenasuca/ini-verde/
2. Sumapaz paramo- Source: http://www.colparques.net/SUMAPAZ#aceptar
3. Sabrinsky Desert - Source: https://encolombia.com/educacion-cultura/geografia-colombiana/puertos-en-colombia/
4. Flowers Greenhouse - Source: http://repository.humboldt.org.co/handle/20.500.11761/5813
5. Piedras del Tunjo Archaeological Park - Source: http://www.colparques.net/FACA
6. Nuestra señora de la salud church - Source: www.cundinamarca.gov.co

These localities present a high informal development that is directly related to population density, "Informal growth has greater magnitude in the southern localities of the city (Ciudad Bolivar, Usme, Tunjuelito, Rafael Uribe and San Cristóbal), with a total of 3650 Ha. It is followed by the area of the western edge of the city (Bosa, Kennedy, Engativá, Fontibón and Suba), with a total of 3596 Ha, and then the eastern edge (Usaquén, Chapinero, Santafe and other localities) with 789,18 Ha." (Camargo Sierra, 2013).

The main economic and work centers of Bogotá are concentrated in two main axis which together form a "7" shape that comprises the founding center, the center extended northward and the area of national and international economic flows along 26th Street as mentioned before (Figure 17). In these areas are located the most important economic and workflows of the capital, generating massive urban trips there, restricting the peripheries to secondary, local, and smaller-scale activities. These extensive trips from "sleeping quarters" inside the city and municipalities surrounding (mainly residential) located from 10 km to 25 km of these areas (figure 18), generate that the population inside the neighborhoods and municipalities that comprise the functional threshold of Bogotá present lower indicators of quality of life, making their percentage of time inside the public transport or trips "home-work" and vice versa be greater than those in the areas close to the economic centers.

However, despite the time and distance of the trips, the trend of migration to the surrounding municipalities from Bogotá has been growing exponentially. As previously mentioned, the constant rise in land prices has pushed the low- and middle-income population into the peripheries, but not only have they been affected by developments in the inner city, in the same way, the mono-centric agglomeration of work and economic areas has increased vehicular traffic and traffic jams, added to the lack of efficient mass transport, have encouraged middle- and high-income populations to seek external alternatives to increase their quality of life. In Figure 19 and 20 can be illustrated how since the early 2000s the municipalities of the savanna have received population from Bogotá, mainly Mosquera, Funza, Soacha, Cota, Chia, Cajicá and la Calera due to its immediate proximity, but over the course of 10 years the migration distance doubled the number of municipalities in which 50% of its population is the result of the trend. As a consequence of this phenomenon figures 21 and 22 seek to show the increase of urban and suburban area, as well as greenhouses from 1995 to 2023 towards the west of the city, not only within its administrative area, but also in the municipalities within its functional threshold, highlighting in black and white the areas that most growth and change presented.

** "Upz are planning instruments that establish urban regulation for a set of neighborhoods that have common characteristics in their urban development, as well as in their predominant uses and activities." (CCB, 2015).*

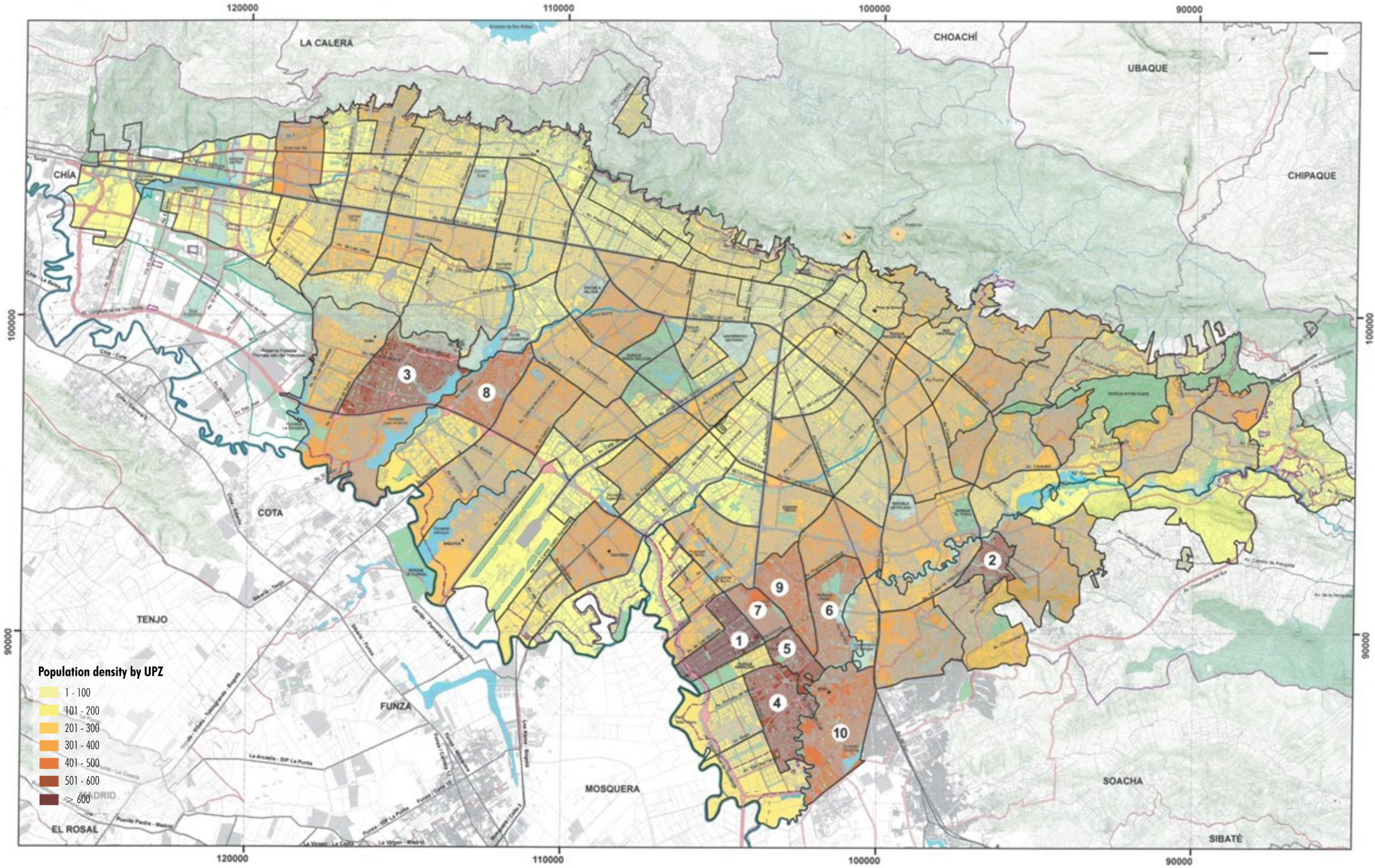

Figure 16 *Population density by UPZ 2017. Source: POT (Plan de Ordenamiento Territorial) Enrique Peñalosa 2019*

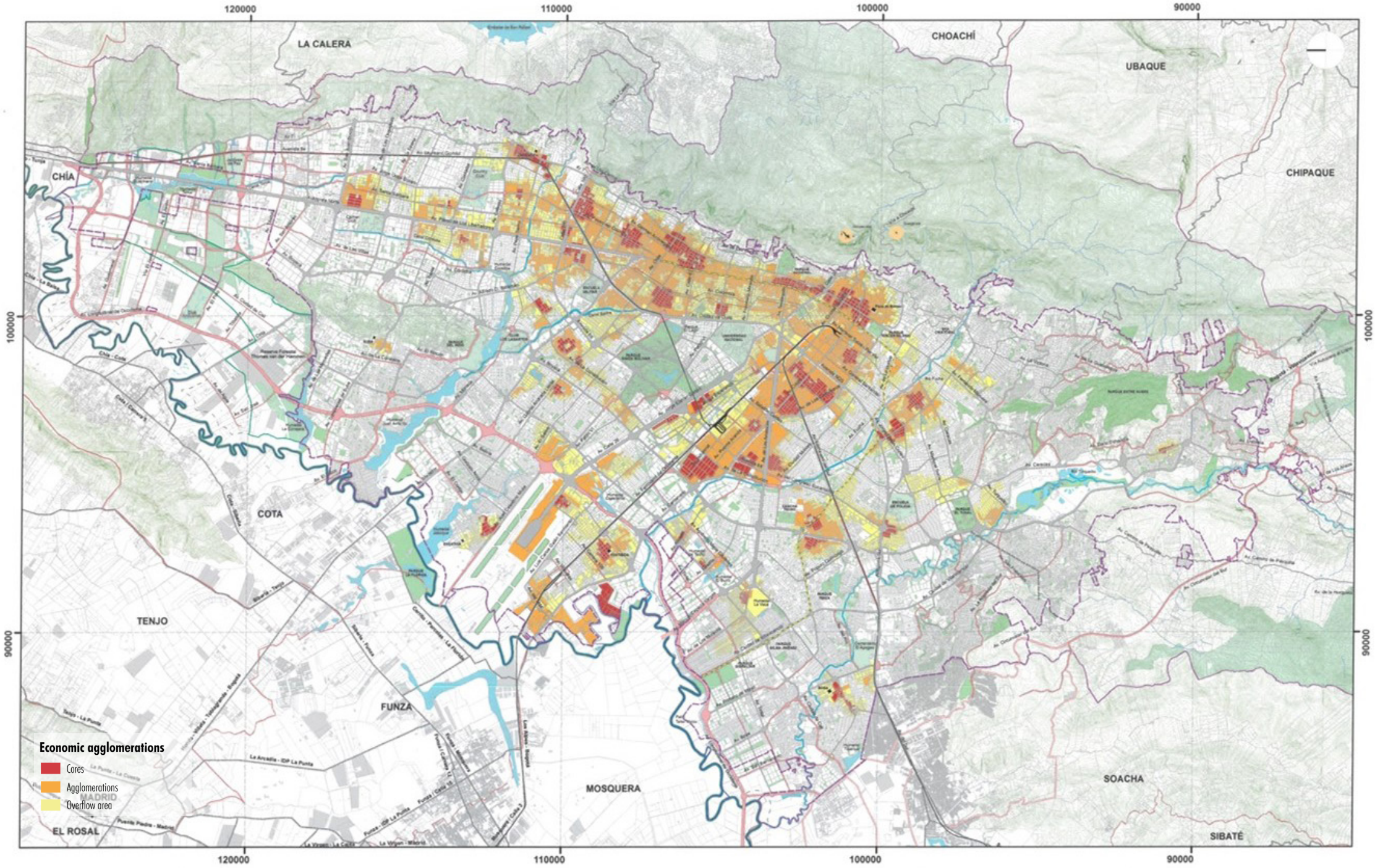

Figure 17 *Economic agglomerations. Source: POT (Plan de Ordenamiento Territorial) Enrique Peñalosa 2019*

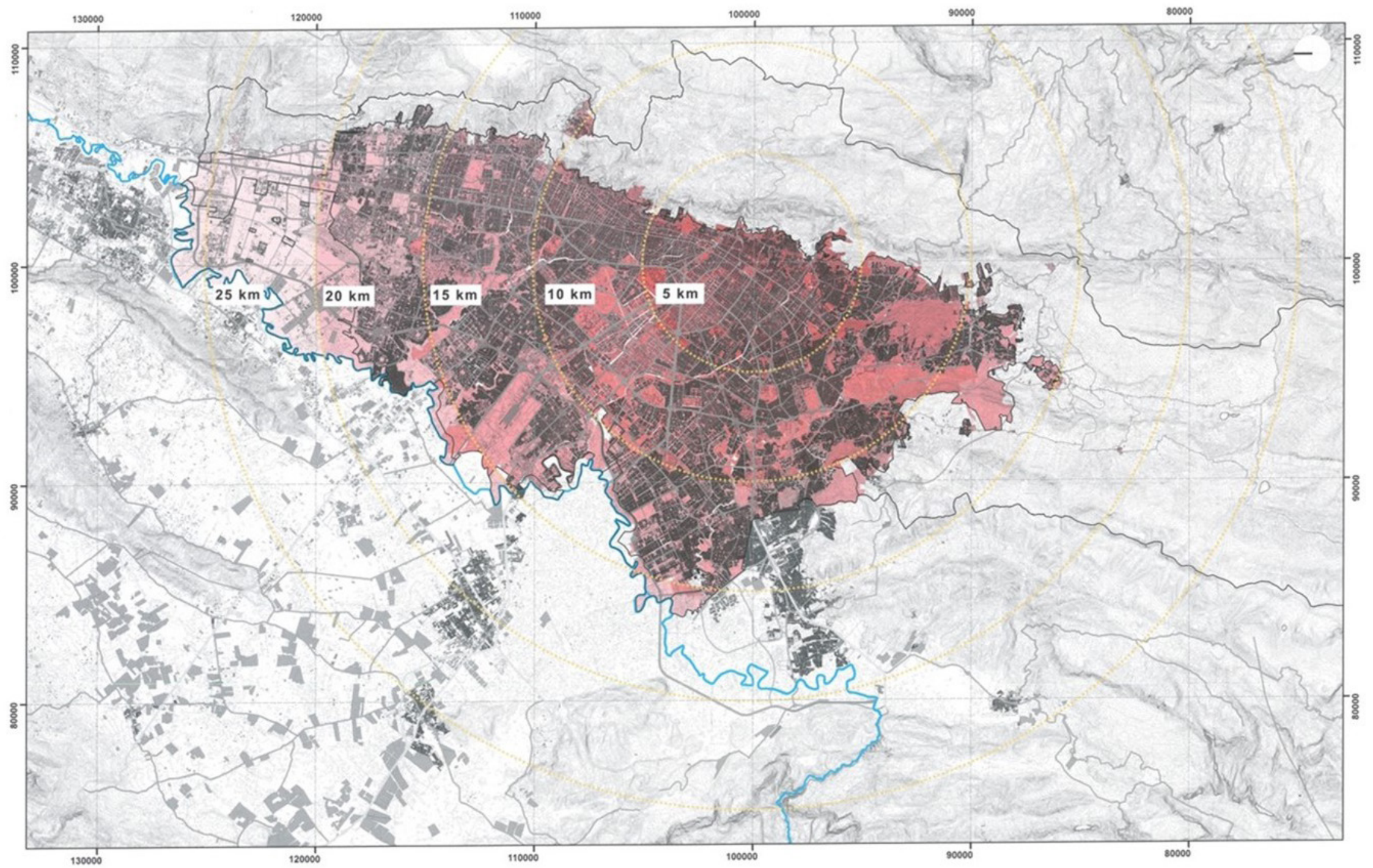

Figure 18 *Distance by cadastral sector to the center of Bogotá. Source: POT (Plan de Ordenamiento Territorial) Enrique Peñalosa 2019.*

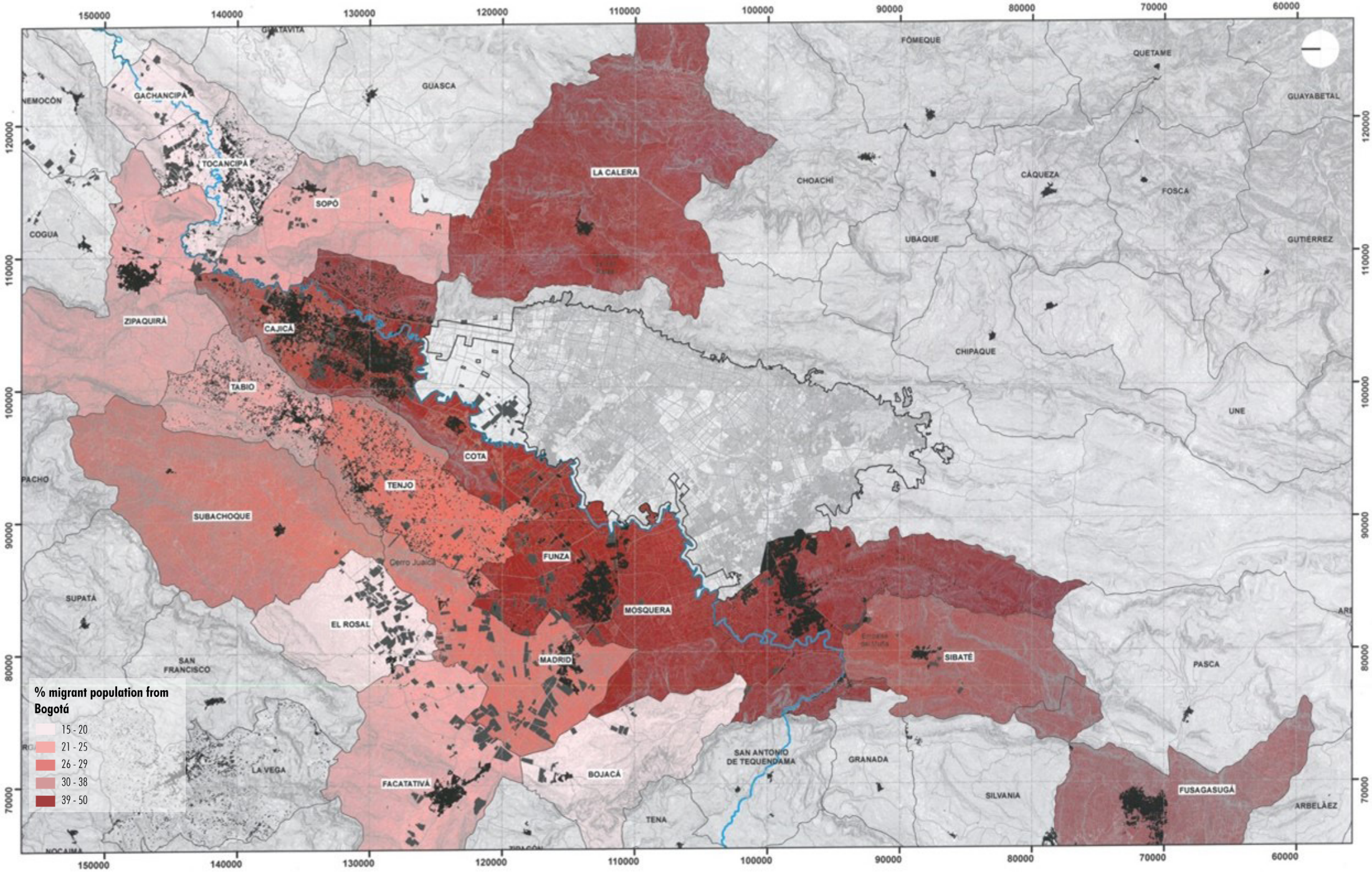

Figure 19 *Cartography of migrant population to savanna municipalities from Bogotá - 2004 .Source: POT (Plan de Ordenamiento Territorial) Enrique Peñalosa 2019.*

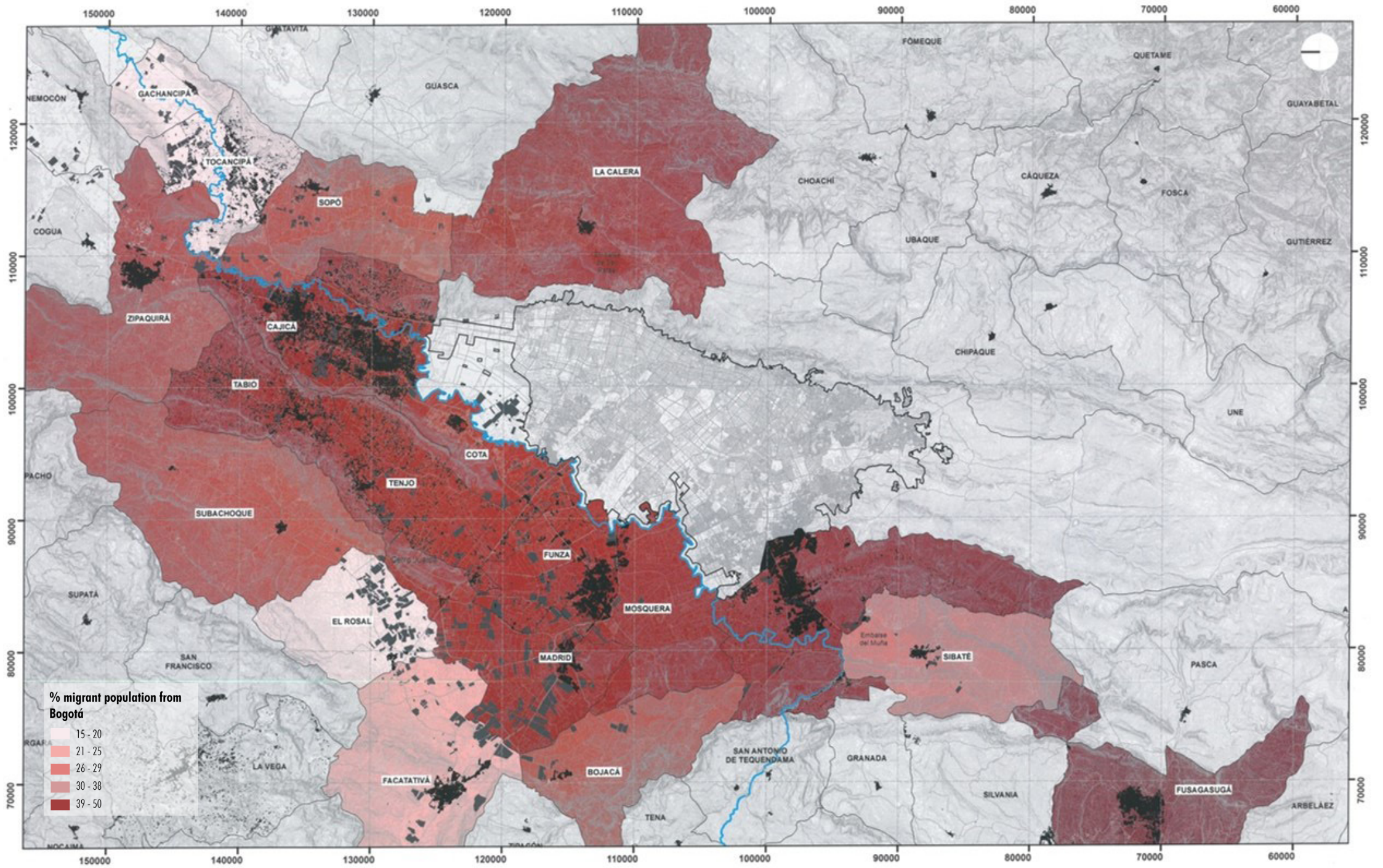

Figure 20 *Cartography of migrant population to savanna municipalities from Bogotá - 2014. Source: POT (Plan de Ordenamiento Territorial) Enrique Peñalosa 2019.*

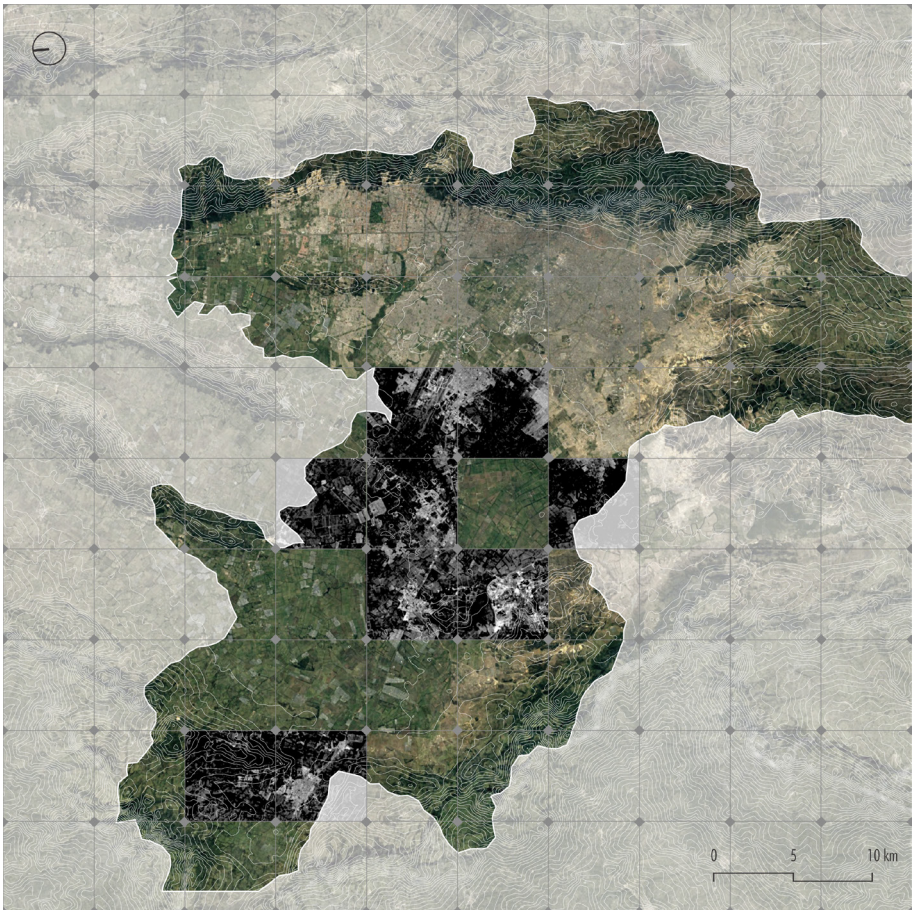

Figure 21 *Personal elaboration. Comparative Urbanized area in Bogotá's Savanna 1995*

Figure 22 *Personal elaboration. Comparative Urbanized area in Bogotá's Savanna 2023*

2.1.2. Normative dimension

From the general basis, previously mentioned, on the study area and its selection, it is important to have a more detailed understanding of the different dimensions that compose it. The complexity of the southwestern threshold is accompanied by the conjunction of a multiplicity of elements that currently clash and oppose each other, avoiding a correct functioning and generating the constant increase in the problems of the area. To begin to understand the multiple dimensions, clarity must be generated regarding the administrative subdivision that Colombia has, it is composed by 32 departments with their respective capital, 141 provinces, which are not officially political-administrative subdivisions, but are used for information gathering and zoning, 6 metropolitan areas, 1 metropolitan region (which will be developed later), 1123 municipalities, indigenous territorial entities and 10 special districts (Villamil, 2010). The special districts under Law 1617 of 2013, aims to:

> "to provide the districts with the powers, tools and resources to authorize them to perform their functions and provide the services under their responsibility, and to promote the integral development of their territory in order to contribute to the improvement of the quality of life of their inhabitants, from the use of their resources and advantages derived from the characteristics, conditions and special circumstances they present." (Law 1617 of 2013, p. 19)

Bogotá is part of the special districts (the Capital District), that is, despite being located in the department of Cundinamarca, the capital of the country has independent and special powers related to its economic and development capacity, housing the headquarters of the central government, administering the national economy and politics, and therefore, the only municipality of direct administration* that only includes the state capital. Therefore, the comparisons between the 5 municipalities and Bogotá in every single dimension despite having a geographical and functional correlation should be performed separately, due to differences in scale and political-administrative powers.

The Planning System in Colombia was created by constitutional mandate and regulated by the Organic Law of the Development Plan, through which the formed the National Planning Council and the Municipal Commissions and Planning departments, have different instruments and programs to meet different

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** This type of administration is also known as an autonomous city or independent city, as it is not integrated into any intermediate-ranking administrative division. (DANE, 2022)*

objectives (see figure 23). On the one hand, it fits mention to the instruments for planning development and territorial ordinance, with which the territorial entities define their guidelines and objectives in relation to their territorial development model. On the other hand, it corresponds to refer programs or mechanisms for the financing of territorial development or those determined for their follow-up and monitoring. (Maldonado – Bolaños, 2015)

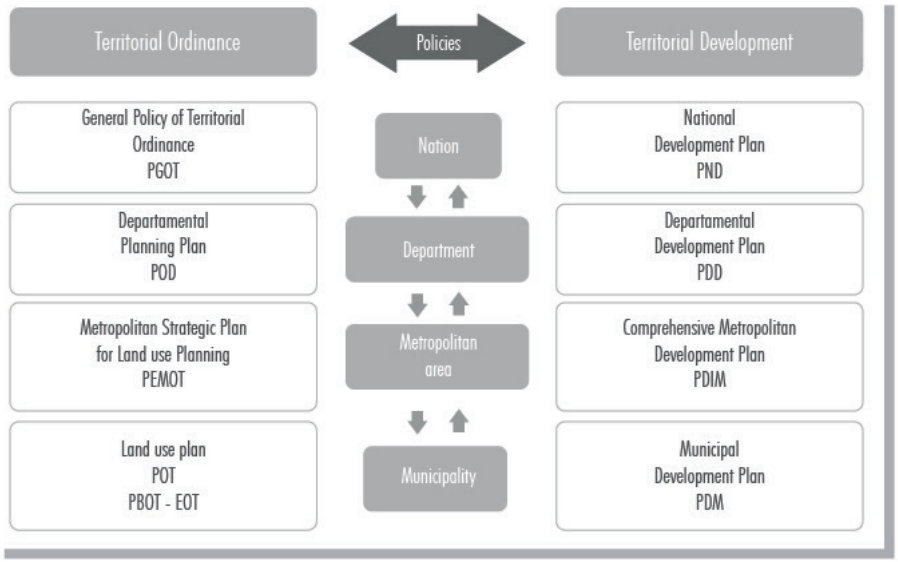


Figure 23 *Personal elaboration based on Maldonado – Bolaños, 2015*

2.1.2.1. Main spatial planning tools at the national level

The General Policy of Territorial Ordinance (PGOT – Política General de Ordenamiento Territorial) aims to guide the physical, socio-spatial and political-administrative organization of the territory with a long-term perspective, to improve the quality of life of all inhabitants, by preserving the natural heritage and cultural for sustainable development, working on the capacities and potentials of the various territories, correcting the territorial socio-economic and physical-ecological imbalances; recognizing territorial, social, and geographic heterogeneity, increasing the capacity for decentralization. The main principles of the policy are (Londoño – Maldonado, 2013):

- It guides the physical organization of the territory in the biophysical, sociocultural, economic, productive, infrastructure and services, administrative and institutional dimensions.
- It has a long-term vision that transcends the periods of government, but that attends to planning cycles linked to the instruments for the development and territorial ordinance (OT – Ordenamiento Territorial) of the territories.
- It guarantees the territorial autonomy and heterogeneity of the regions, and its implementation is of a participatory, multiethnic, multicultural,

and biodiverse approach.

2.1.2.2. Main spatial planning tools at the department level

The Departmental Planning Plan (POD - Plan de Ordenamiento Departamental) is an instrument to harmonize relations between society and the territory, it comprises a set of articulated tools, such as models, guidelines, policies, strategies, plans, programs, and projects of departmental territorial impact with a long-term perspective (16 years). It is the specialized synthesis of the main inter-municipal scale systems (this instrument links the departments and the municipalities), which are interrelated and structured in the departmental territory, such as the system of urban and rural population settlements, the ecological structure, the functional connectivity corridors, infrastructure networks and public services equipment and productive areas. It comprises three components: (DNP, 2020)

- **Technical:** Incorporates conceptual and analytical rigor, planning methods and pertinent information.
- **Political:** It is specified through the governmental exercise of establishing policies to guide the organization of the territories to satisfy human needs and achieve sustainable development.
- **Administrative:** Structure and institutionalize the agreed territorial planning project, the strategies, and institutional organization and the provisions to implement it.

2.1.2.3. Main spatial planning tools at the metropolitan level

The Metropolitan Strategic Plan for Territorial Ordering (PEMOT - Plan Estratégico Metropolitano de Ordenamiento Territorial) is a planning instrument for Territorial Ordering guidelines and harmonization of the POTs of the municipalities of the Metropolitan Areas, endowing these areas with political, administrative, and fiscal power, to fulfill their functions: planning, management, and execution. It aims at harmonizing territorial planning, with special direction towards the consolidation of territorial associative systems, by increasing the capacity for decentralization, planning, management, and administration of the territory, without affecting the autonomy of the municipalities that comprise it. The municipalities have the function of formulating and adopting the PEMOT, which will be the framework to which each of the municipalities that make up the area must adhere, when adopting land use planning plans. (Muñoz et al, 2013)

- Strategy for Integral Water Management.
- Metropolitan System of Highways and urban public transport.
- Metropolitan Services System.
- Strategy for social and priority housing in the metropolitan area.
- Planning of rural and suburban land.
- Equitable distribution of burdens and benefits, generated by territorial and environmental planning.
- General rules that define the objectives and criteria to which the municipalities that are part of the Area must abide.

2.1.5.4. Main spatial planning tools at the local level

The land use plan (POT – Plan de Ordenamiento Territorial) is a technical instrument that the municipalities and districts of the country must use to plan and organize their territory. Its objective is to integrate physical, socioeconomic, and environmental planning with management and financing instruments, seeking to promote sustainable developments, helping governments to guide the regulation, location, and development of human settlements, through the rational use of land, in such a way that the ordering principles are specified in the territory. They should include studies on changes in the demographic structure of the municipality, risk areas (due to floods, fires, landslides, etc.), protection of the supporting environmental structure, socioeconomic behavior of its population, among many others.

The Land Use Plans are valid for 12 years (3 periods of local authorities in Colombia). Once this term has been fulfilled, a document review process must be initiated for the issuance of a new POT, which must comply with a rigorous participation process with the population of the municipality or district (DNP, 2019). Based on the population of each municipality, a different kind of POT is foreseen:

1. **Territorial Planning Plan:** They are prepared and adopted by the authorities of the districts and municipalities with a population of more than 100,000 inhabitants.
2. **Basic Plan of Territorial Planning:** They are elaborated and adopted by the authorities of the municipalities with a population between 30,000 and 100,000 inhabitants.
3. **Territorial Planning Scheme:** They are prepared and adopted by the authorities of municipalities with a population of less than 30,000 inhabitants.

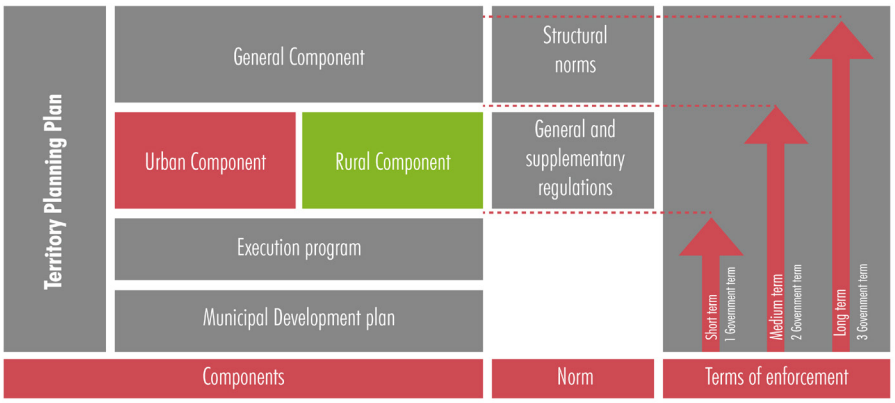


Figure 24 *Personal elaboration based on Ministry of Housing, Cities and Territory, 2015*

This last group has great importance because in the Sabana de Bogotá there has not been a metropolitan area that works together for the sustainable and articulated development of municipalities, but on the contrary have been individual developments that follow the structure of the departmental planning plan, with the exception of Bogotá, as explained above being a capital district responds directly to the national level. This conflict and disconnection in territorial planning has prevented problems from being addressed in a comprehensive manner, with articulated and coherent solutions. Its dependence on the central (national) government has also triggered the delay or failure to carry out necessary projects for the territory (the example of the first line of the Bogotá metro). Only until 2020 was a regional association created to integrate the capital district with the department of Cundinamarca and its municipalities, and on 20 December 2022 finally adopted the rules that would allow the operation of this; its name is Metropolitan Region (RM) Bogota - Cundinamarca. Its objectives are to:

1. Promote territorial autonomy, that is, no municipality will be incorporated into the capital district.

2. The area of the metropolitan region does not have a core or main municipality defining the functioning in equal conditions.

3. Formulation of public policies and plans for sustainable development (conservation, protection and restoration of the main ecological structure).

4. Promote balanced development with a joint vision based on regional impact projects.

5. Recognizing the plurality of territory.

6. Work in the 7 thematic competences: Mobility, economic development, citizen security, food security, public services, management and environment.

This new intermediate level of territorial planning and organization will facilitate the treatment of the social, environmental, economic and physical dynamics that are happening throughout the study area as well as its interconnection

with the rest of the department. While it is important to understand the mechanisms used in Bogotá's savannah, it is also important to clarify certain specific elements within the POT that will allow the bases for decision-making regarding certain areas later. First of all the treatment of informal settlements in which ex-post regularization processes are taken as a starting point as explained in section 1.4. where the subdivision of the land and the sales value of the lots take into account the future intervention of the state and the provision of public services through it. As in other Latin American countries, in Colombia the response to these settlements is faster over time, generating specific urban policies and treatments such as comprehensive improvement as stated by the ministry of housing in national decree 1077 of 2015.

> "Integral Improvement means the treatment whereby in certain areas developed within the urban soil that lack or present deficiencies in public space, public services, roads or equipment, guidelines are established to complete the urbanization processes in order to correct and improve the physical conditions of these areas ensuring their habitability". (p. 189)

With this urban treatment different urban processes are understood, such as the provision of public services, parks, interconnection of the urban pattern, or architectural and structural, as assessment and structural improvements of buildings to comply with the seismic resistance standard, protect the integrity of the inhabitants and improve their living conditions through the spatial redistribution of housing. All these processes as mentioned in section 1.2. do not seek through their improvement to bring external investment that gentrifies the population living in these neighborhoods, but on the contrary to improve the living conditions of these people and give them the possibility to make use of their rights as part of the city, such as access to health, education, recreation, etc. As well as comprehensive improvement, there are also other relevant urban treatment, such as development, which guides and regulates the urbanization of the land or group of undeveloped land. Finally, the treatment of consolidation, which is divided into basic, which are residential sectors with a tendency to develop mainly by self-construction, where it is intended to consolidate allowing the moderate modification or expansion of existing buildings, and moderate, which are sectors of the city where a process of change has been generated in the urban pattern, given the constructive dynamics, which has modified the conditions of the original model, in which the aim is to consolidate the new urban pattern. (Camara de comercio, 2023)

2.1.3. Socioeconomic dimension

Having that explanation as a starting point and with the population information of each of the municipalities provided in the introduction of the study area (Mosquera 166.203 Inh, Funza 115.923 Inh, Bojacá 12.236 Inh, Madrid 140.249 Inh, Facatativá 172.064 Inh and Bogotá D.C. 7.968.095 Inh) it is possible to understand the demographic development that has been presented by comparing the last two population censuses carried out in the country by the DANE (National Administrative Department of Statistics), in this case 2005-2018. As can be seen in figure 23 the study area and the municipalities surrounding Bogota are those with the highest population growth, with more than 20% compared to the first census or between 10 and 20% in the cases of Bogota and Bojacá. It is only possible to observe some exceptions that are mostly in the vicinity of other departments, while those that are more distant from the capital have had a high percentage of population loss due to the rural-urban exodus. These growth numbers are not only accompanied by migrations from different municipalities and areas of the country, but, as previously mentioned, international migration, mainly from Venezuela, has triggered accelerated population growth (DANE, 2021).

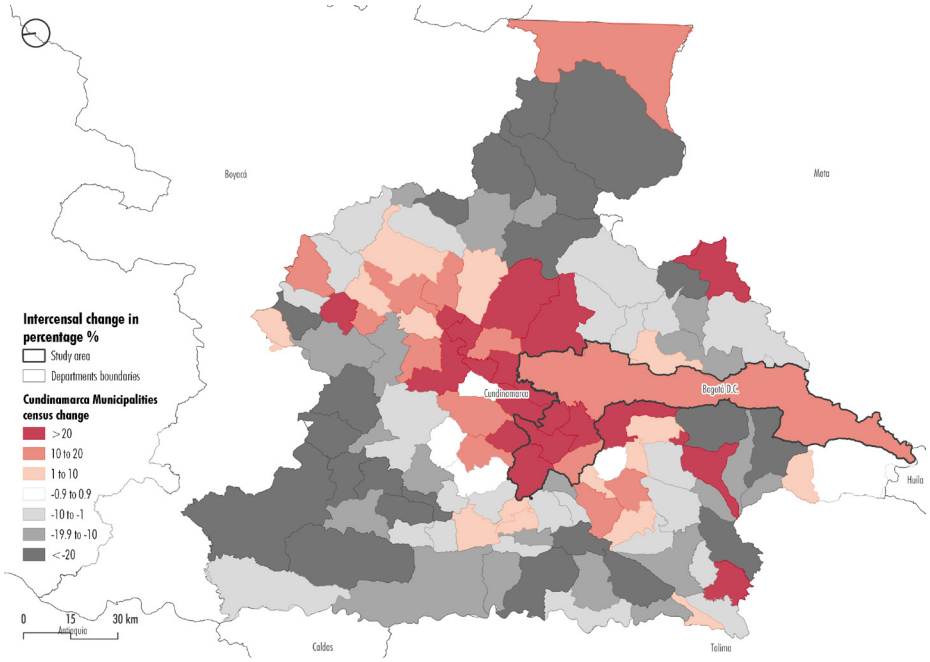


Figure 25 *Personal elaboration based on Intercensal change in percentage % Source: DANE (Departamento Administrativo Nacional de Estadística) 2021*

The Constant population growth and demographic trends have been accompanied by a change in the population pyramid, reducing the base (reducing the birth rate) and witnessing that the majority of the population is between 20 and 30 years old as can be seen in Figure 26. These data support the idea that the population growth of this area is the result mainly of migration and not of a increasing birth rate. The migratory population pressure exerted by Bogotá towards the surrounding municipalities in the last 5 years mainly Soacha (117,531 Inh),

Mosquera (19,445 Inh), Madrid (15,247 Inh), Chía and Cajicá (+/- 12,000 Inh) has contributed to the rapid transformation of the dynamics of these settlements and the direct impact on mobility infrastructure and service provision. Although it is true that the population pyramid presented a significant change, it is also important to emphasize that the number of people per household is also showing a reduction. In 2005, the largest household group, 20,9%, was composed of 4 persons, while in 2018 the main group was 2 persons, comprising 23,5% of households (DANE, 2021). This has had a direct impact on the increase in the consumption of rural land for urban expansion and, also, an increase in the demand for housing in the area.

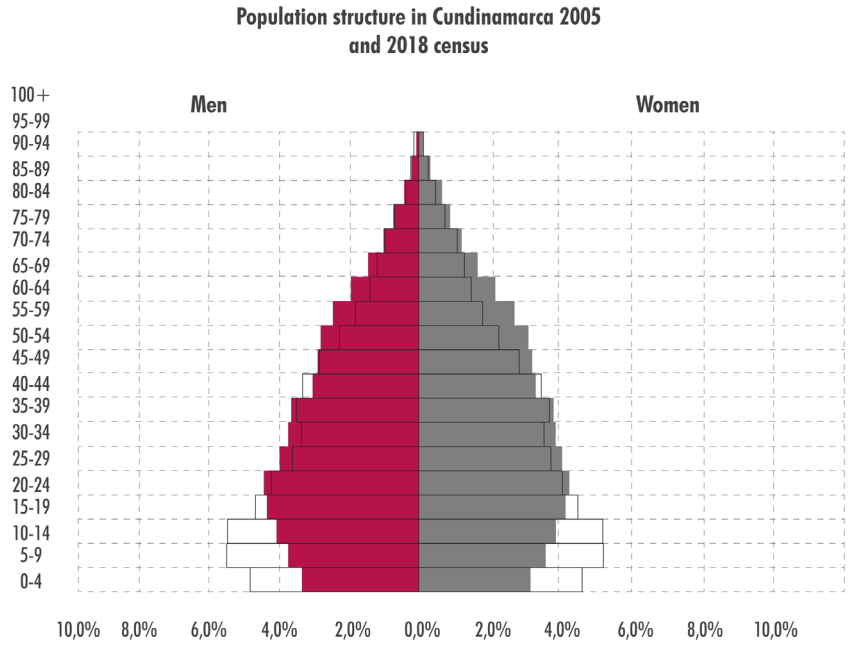


Figure 26 *Personal elaboration based on Population structure in Cundinamarca 2005 and 2018 census. Source: DANE (Departamento Administrativo Nacional de Estadística) 2021*

Cundinamarca currently contains 7% of housing units nationwide (excluding Bogotá), a percentage that seems to be large considering that there are 31 more departments, however, this housing distribution has not made it possible to meet the quantitative and qualitative demand of the population in full, making the areas furthest from the main urban centres more affected, with percentages above 10 or 15%. In the specific case of the study area, the most affected area is Bogota, with 10.5% of households in quantitative housing deficit, that is to say, about 302,000 families living in unfit housing conditions, DANE includes in this category housing with structural and space deficiencies, that is, that they do not have the optimal characteristics to be habitable (DANE, 2021). A higher number compared to the other municipalities that do not exceed 5%, except Facatativá, with a quantitative deficit between 5-10%. Although it is true that the study area has a high level of coverage of public services, the rural areas of these municipalities still have deficiencies in the provision of sewerage, gas and Internet (figure 27), as well as structural guarantees compared with urban areas, in this case 61% of the housing deficit is located in the dispersed rural area. Most of these problems stem

from the state's inability to meet housing needs, resulting in informal settlements or developments (section 1.4). The high cost of living as well as the need for housing have made the architecture of self-construction and illegal neighborhood conformation the predominant configurations in the urban peripheries, an aspect that will be develop later from its physical conformation.

Housing information	Municipality/ Department	Coverage of home services					
		Electricity	Aqueduct	Sewage	Gas	Waste Collection	Internet
Census 2018	Colombia	96,3%	86,4%	76,6%	67,3%	81,6%	43,8%
	Cundinamarca	98,4%	89,7%	76,8%	69,9%	982,2	42,3%
Census 2005	Colombia	93,6%	83,4%	73,1%	40,4%	ND	ND
	Cundinamarca	95,9%	81,0%	65,8%	28,4%	ND	ND

Figure 27 *Personal elaboration based on Coverage of access to public services, CNPV 2018 and CG 2005. Source: DANE (Departamento Administrativo Nacional de Estadística) 2021*

On the other hand, these areas in addition to their constructed physical appearance are developed through formal and informal economic and production relations. As previously mentioned, the western axis comprising Calle 13 or "Avenida Centenario" presents a regional and national relevance due to its agricultural production and floriculture, as well as being the most important western connecting axis for Bogotá. It is here that a differentiation and an approach must be made of the specific economic activities that take place in the area of study that relate directly to Bogotá in a functional way or through cross-border connections. Cundinamarca, and in particular the municipalities that form the western axis, have as their main activity, consisting of 24.8% of their laboral occupation, jobs related to agriculture, livestock, hunting, forestry, fishing, mining and quarrying, as well as electricity, water and gas supply, a percentage that stands out compared to the rest of the country which only presents 2.1% in these activities. However, are also highlighted the commercial activities (17.7%) and the manufacturing industry (11%) of large national and multinational companies such as PepsiCo, Nestlé, Yanbal, among others, as well as construction industries, food production or transport; these industrial activities continue within Bogotá exemplifying the Latin American urban model of Ford-Griffin, as it is possible to see in figure 28.

However, although production activities represent a high percentage of the department's economy, national decisions on free trade agreements (FTAs*) have caused commercial and service activities to be the ones with the greatest growth within micro-businesses and emerging businesses, due to the competition and economic effects that these treaties have brought to the department and the country. To exemplify the situation in the years 2019-2020, the expenditure for imports mainly of technology and medicines doubled the profits in exports of raw materials such as coal and flowers (DANE, 2021). Causing 61.3% of its employed population to engage in commercial activities (26.1%) and services (35.2%).

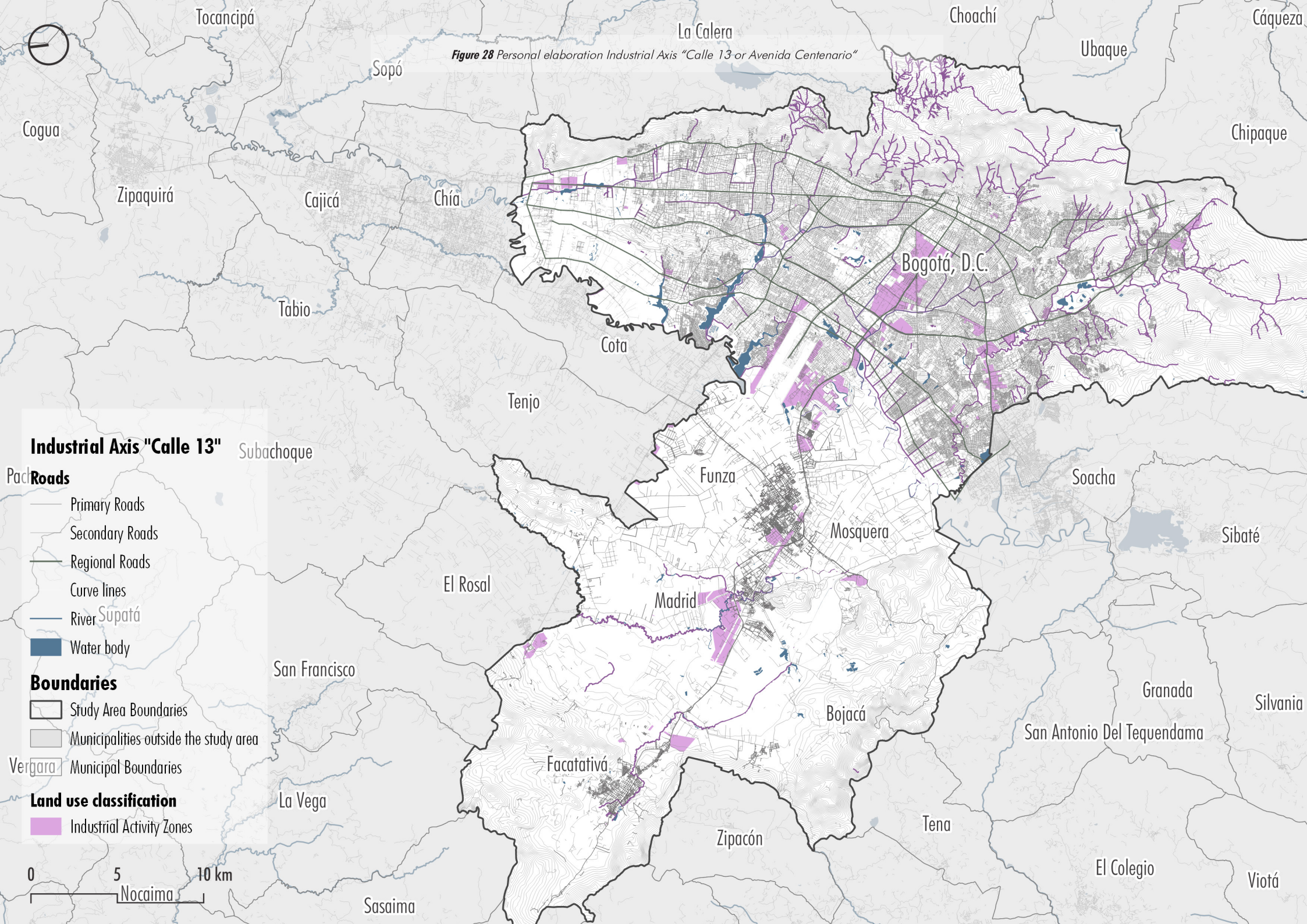


Figure 28 *Personal elaboration Industrial Axis "Calle 13 or Avenida Centenario"*

The implementation of these treaties, accompanied by the low academic training of the population, has led unemployment rates and informal occupations to grow significantly in the last 5 years. By 2020, more than half of the department's employment generation was related to informal activities (excluding Bogotá), the proportion of informal workers was 57.4% in men (M) and 59.6% in women (W), while in Bogotá for the same year its values were 41.9% and 40.1% respectively. In the interior of the city it can be seen evidenced in figure 29 how informal labor concentrations have a greater presence in the south-western edge area (administrative edge of the study area), the historical center and the economic center elongated toward the north, due to its population and economic flow. These numbers are accompanied by unemployment rates of 7.6% in M, 13.2% in W, 11.5% in young men (YM) (14-28 years) and 18.6% in young women (YW), while in Bogotá the unemployment rate was 9% in M, 11.4% in W, 15.1% in YM and 20% in YW, 8% higher than 5 years ago, young workers being the most affected and with the highest percentage of rising unemployment (DANE, 2021).

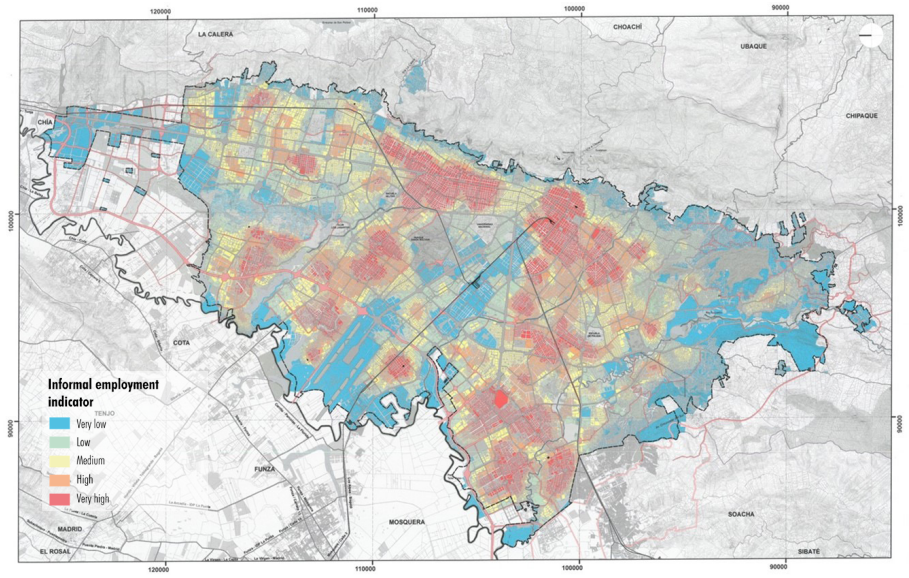
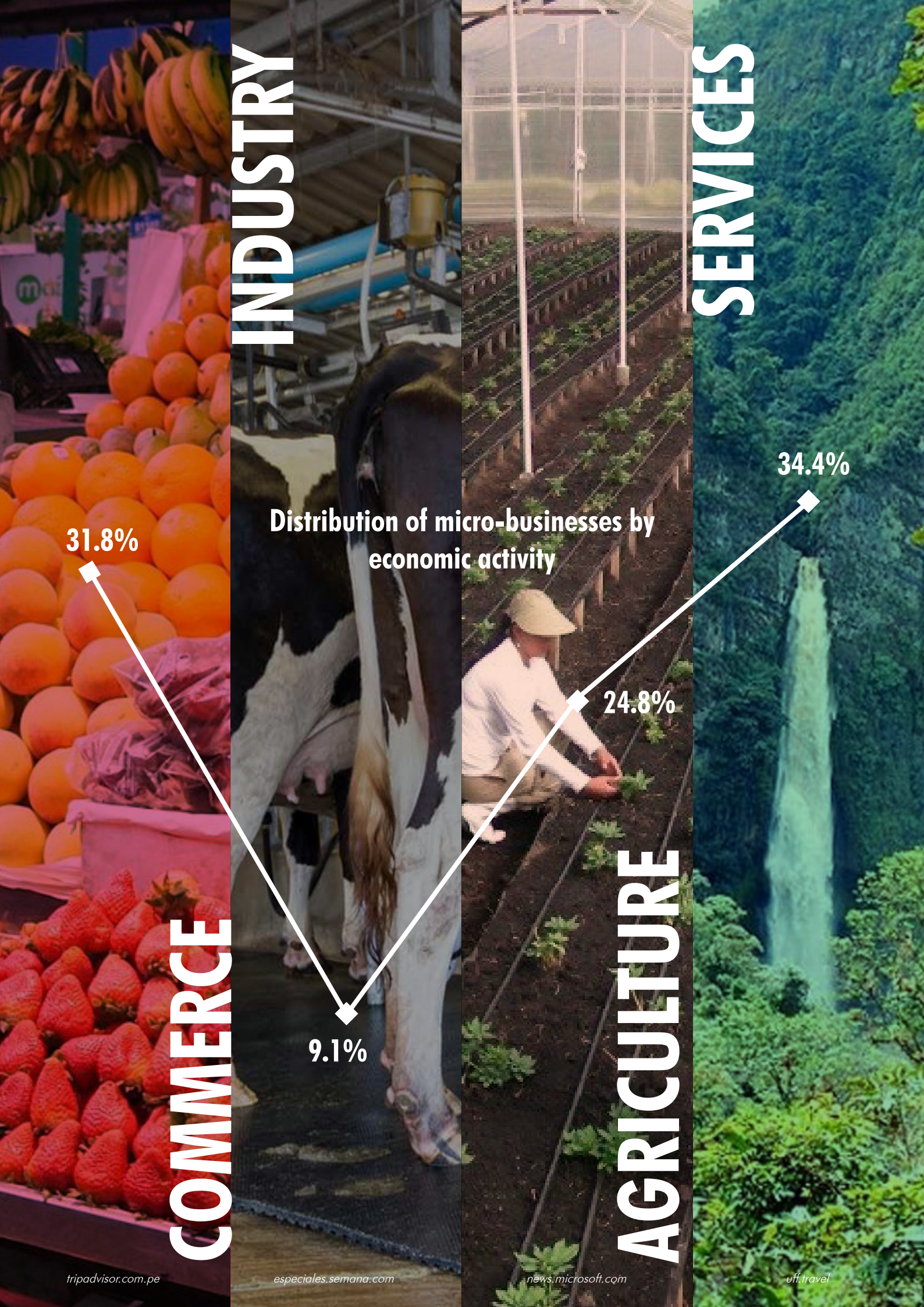


Figure 29 *Informal employment indicator. Source: POT (Plan de Ordenamiento Territorial) Enrique Peñalosa 2019*

The significant increase in these indicators has triggered a gradual growth in the rates of monetary poverty* and multidimensional poverty**, with Bogota and Cundinamarca having the lowest rates in the whole country, with 3.8% and 7.3% by 2022, the same behavior is seen as in previous indicators, where the municipalities in the study area and those immediately near Bogotá have the lowest indicators and have numbers below 5% in terms of unmet basic needs (DANE, 2022). However, although the indicators seem to have a "positive" balance the reality is that this area has been highly affected by the above-mentioned factors, in addition to the increase in inflation.

** "Is an agreement between two or more countries where the countries agree on certain obligations that affect trade in goods and services, and protections for investors and intellectual property rights, among other topics. Reducing or eliminating tariffs on qualified or improving the standards of products" International Trade Administrator U.S.*


COMMERCE
INDUSTRY
AGRICULTURE
SERVICES
Distribution of micro-businesses by economic activity
31.8%
9.1%
24.8%
34.4%
tripadvisor.com.pe
especiales.semana.com
news.microsoft.com
uff.travel

Currently a Colombian needs at least 676 US dollars per month to live in Bogotá, however, the current minimum wage is 292 US dollars, a value that can be reduced when considering the informal nature of most workers. These socio-economic conditions have caused urban and social morphological configurations resulting in the development and growth of settlements in the nearest municipalities, as a response to the search to supply basic needs at low cost, as well as an economic response of location and flows that provide the benefits of living near a megacity without living within it (transport, services, job opportunities, etc.), which is evidenced in the axis of Calle 13 as the main generator of dynamics of the Sabana de Bogotá, being seen and understood as a connection that fulfills the task of supplying immediately some of the needs of the inhabitants of the surrounding municipalities, avoiding the mobilization and the long trips towards the center and north of Bogotá. As previously mentioned, the large economies of the sector consist of agriculture, floriculture, industry and mining, however, the developments of the urban area are mainly influenced by microeconomics and micro-businesses. It is here that the nature of the sector is mainly the provision of services and local trade.

2.1.4. Built environment dimension.

First of all, it is important to clarify that an analysis will be developed starting from the urban areas that comprise the least territorial occupation outside Bogotá, to later analyze specific areas of Bogotá, such as the cross-borderborder areas (previously mentioned in the section 2.1.1), as well as the non-urban areas (rural, protected, natural, etc.) in their physical and environmental dimension, to finally consider locations within the city with specific designation of urban development and consolidation that will contribute to the further development of the proposal and its implementation strategies.

In this way it is determined that the influence generated by Calle 13 on the morphology and building typologies of the sector triggers a transformation of use and scale of immediate buildings, where the residential character disappears and industrial and commercial uses begin to predominate, generating changes in the lots where the simple ones are eliminated (those with a smaller dimensions) and start to appear large combinations of lots that respond to the need and the flows of people in the sector. The typological transformations in the lots cause an increase in the change of use, making the classic residential typologies be replaced due to

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** "Inability to purchase a basic food and non-food basket (housing, clothing, education, health, transportation, etc.) due to low per capita income" (DANE)*

*** "It is a mechanism that allows the National Government to identify poverty levels from five dimensions, which a person in poverty can suffer simultaneously, in addition to monetary poverty (Education; Health; Labor; Housing and public services; conditions of childhood and youth.)" (DNP)*

their size, that is to say, specific incentive buildings are presented taking advantage of the strategic location of the services and main roads to motivate the growth and development of commerce of different scales along the sector, thus having the power to control, manage and organize population and economic concentrations in each municipality (figure 30).

Figure 30 *Personal elaboration Morphological Commercial clusters development in the municipalities of Mosquera and Funza*

This phenomenon exemplified in the municipalities of Mosquera and Funza, two conurbated municipalities, allows us to understand the physical response to the socioeconomic dimension mentioned, extending along the streets repeating its pattern on a smaller scale, to a low-range neighborhood commerce. However, these patterns of relationship that have shaped urban areas in the sector cannot be understood in their entirety without the help of the typologies that compose them. These different typologies can present and generate urban morphologies that structure and/or condition the life of the inhabitants, through their relationships on the first floor, the flow of people that attract, dimensions and function. In this case, large-scale buildings, such as industrial warehouses, service buildings (schools, hospitals or churches), as well as greenhouses on the outskirts, will not be considered, but, on the contrary, buildings that still retain the colonial style, self-built buildings, apartment towers and suburban houses, so that they can also be related to their influence on the different periods of growth of the last decades.

Colonial Style buildings

First of all, the colonial-style buildings along with the Spanish grid formed the urban settlements from a central square, with the powers of the state (in addition to religion) around, and a descending hierarchical organization as the distance to the central square grows. This social, economic and spatial organization of the population allowed buildings with more central locations to have larger dimensions and fewer subdivisions of lots. These are those that are mostly preserved and that are still used for administrative and political uses, except for some buildings that today present a mixture of commercial and residential use. As can be seen in the figure 31 this typology has a low density of buildability, as well as its relationship with the street on the first floor, characterized mainly by a central courtyard that organizes the spaces allowing the access of light and wind to the interior of the building. This spatial distribution allowed flexibility of uses that responded to the character of meeting and flows of the central square or streets, allowing as at present generate commercial areas on the first floor and housing areas on the second. These colonial urban structures extended their fully orthogonal grid in such a way that it was easier to divide and connect them with main roads and other nearby municipalities. Its conformation of facade and low disposition of windows, in addition to the dimensions of its rooms are due to the bearing structure that have the walls, built in Tapia or Bahareque, which gave them a width between 70 centimeters and 1 meter, which did not allow generating large openings for lighting or large distances between walls for spatial distribution. Although this typology has not had a significant influence on the modern development of municipalities, because it was mostly replaced, it is the starting point for urban and architectural subdivisions and organizations of later periods.

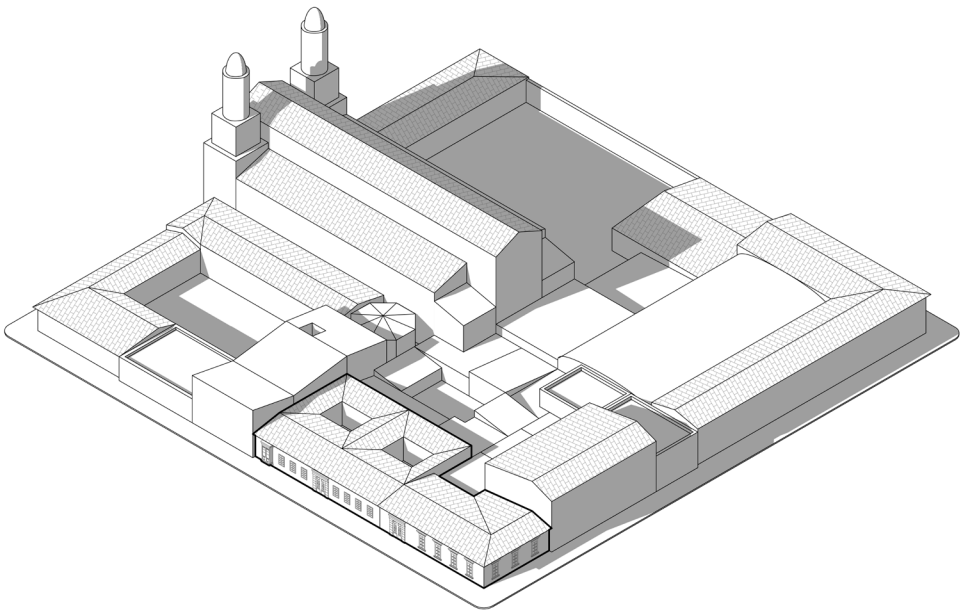


Figure 31 *Personal elaboration. Axonometry of colonial style building remaining in the current blocks distribution*


Tenjo
Funza
Mosquera
El Rosal
Madrid
Bojacá
Facatativá
Tena
Zipacón
0
1,5
3 km
Urban growth 1539 - 2018.
Study area (except Bogotá)
1539 - 1894
1895 - 1970
1980 - 1990
2000 - 2018
Green Houses

Self-built buildings

Formal self-construction buildings begin to appear simultaneously as population growth increases, although, with the subdivisions of lots made by large rural owners began to generate developments in each of the municipalities around their founding centers, this time the building typology is not continued, however, the roads and dimensions of the blocks were maintained, generating a mainly compact urban and morphological conformation, with small scattered groups far from the main urban center. The subdivision of the blocks results in narrow buildings, approximately 6 meters wide by 15 meters deep, this allowed many more buildings and people to be located in the same amount of space compared to the colonial typology. In the same way the height per floor is reduced allowing to increase the amount of these in each of the buildings, in this case, began to appear buildings of 3 floors with growth possibility, this flexibility of growth and modification is the main characteristic of formal and informal self-construction buildings, allowing them to adapt to the spatial and economic needs of the population, providing the opportunity of mixed uses conformation, but also internat subdivision of the space, creating apartments per floor that generate income to the owner at the same time as an economic self-sufficient low-cost housing. This typology is predominant in urban areas, expanding rapidly during the next stages of development and responding to demographic and economic changes that other typologies cannot. This typology is the main urbaniser of cities and municipalities in Colombia, generating a dense morphology that allows greater interaction with public space, due to its flexibility, and a greater sense of belonging to the place that responds to the origin of self-construction of the buildings. At the same time greenhouses in rural areas began to appear, creating large covered areas for mainly flower production.

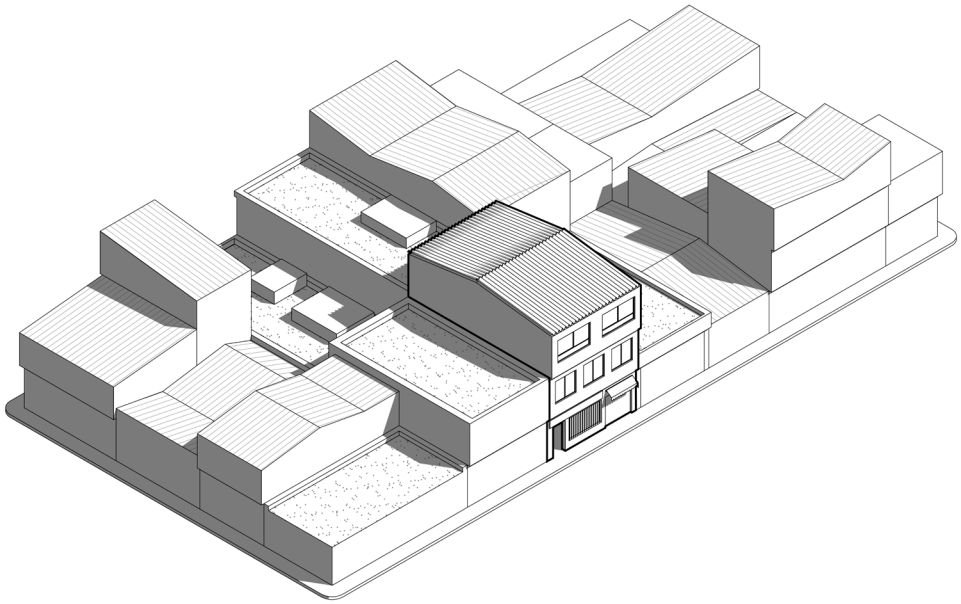


Figure 32 *Personal elaboration. Axonometry of self-built building in the current blocks distribution*


Tenjo
Funza
Mosquera
El Rosal
Madrid
Bojacá
Facatativá
Tena
Zipacón
0
1,5
3 km
Urban growth 1539 - 2018.
Study area (except Bogotá)
1539 - 1894
1895 - 1970
1980 - 1990
2000 - 2018
Green Houses

Apartment towers

When talking about apartment tower it is also important to talk about another concept that comes with it and is the closed complex, that is, a private urbanization with physical limits to the outside, by means of walls or grills. These new building groups in principle of maximum 4 floors brought with them private communal spaces and a null relation to the public space, which seeks to generate a greater sense of security for those who live inside these spaces. As Paula Mendez said in her article Sensing La Séptima. Rethinking Bogotá's public spaces through emotions and the senses (2018) "even if it is not possible to generalize, a tendency is somehow perceptible in which inner spaces constitute the Bogotá of the rich, while outdoor public spaces the Bogotá of the poor." Although during this third period this typology did not have the greatest impact, it is important to say that it brought the concept of density and compact city for a time when the growth of urban areas was being accelerated and uncontrolled. Unlike the buildings of formal and informal self-construction, the towers of apartments do not present flexibility of growth or freedom of modification for economic purposes, this made it dependent on the services and shops that developed around it, increasing the demand for these neighborhood stores that gradually were generating batch of lots to become in large local stores or branches of multinationals. With the passing of the years, especially after the years 2000 this typology began to become the main urbaniser and the main attractor of the big builders, which began to produce closed residential complexes with buildings of 15 to 20 floors in an accelerated and massive manner with the aim of attracting a greater population flow to these municipalities and providing options for the population with higher incomes, In addition to the social interest and priority interest housing offered by the government (apartments). The phenomenon of greenhouses grew simultaneously with urban trends and the interest of large flower companies reducing permeable areas.

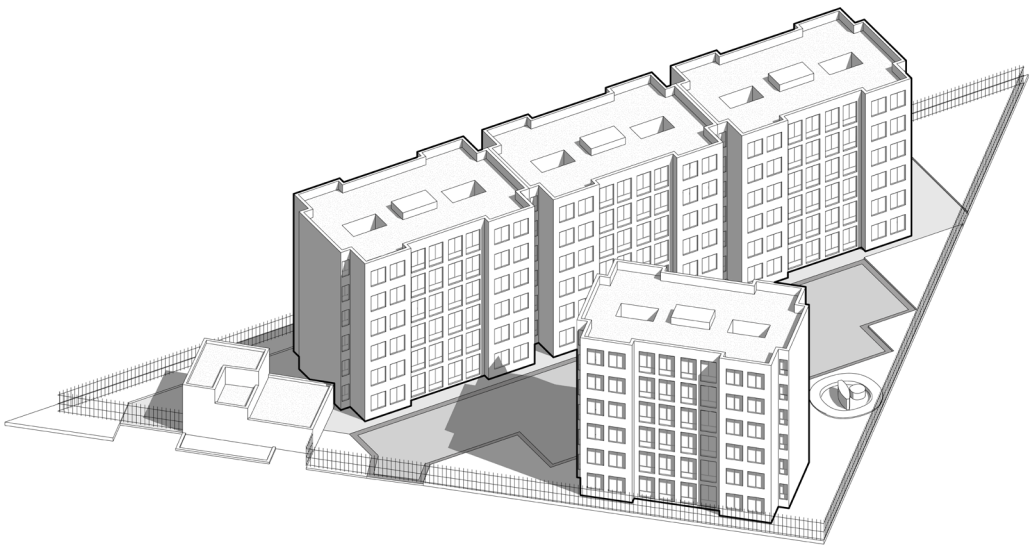
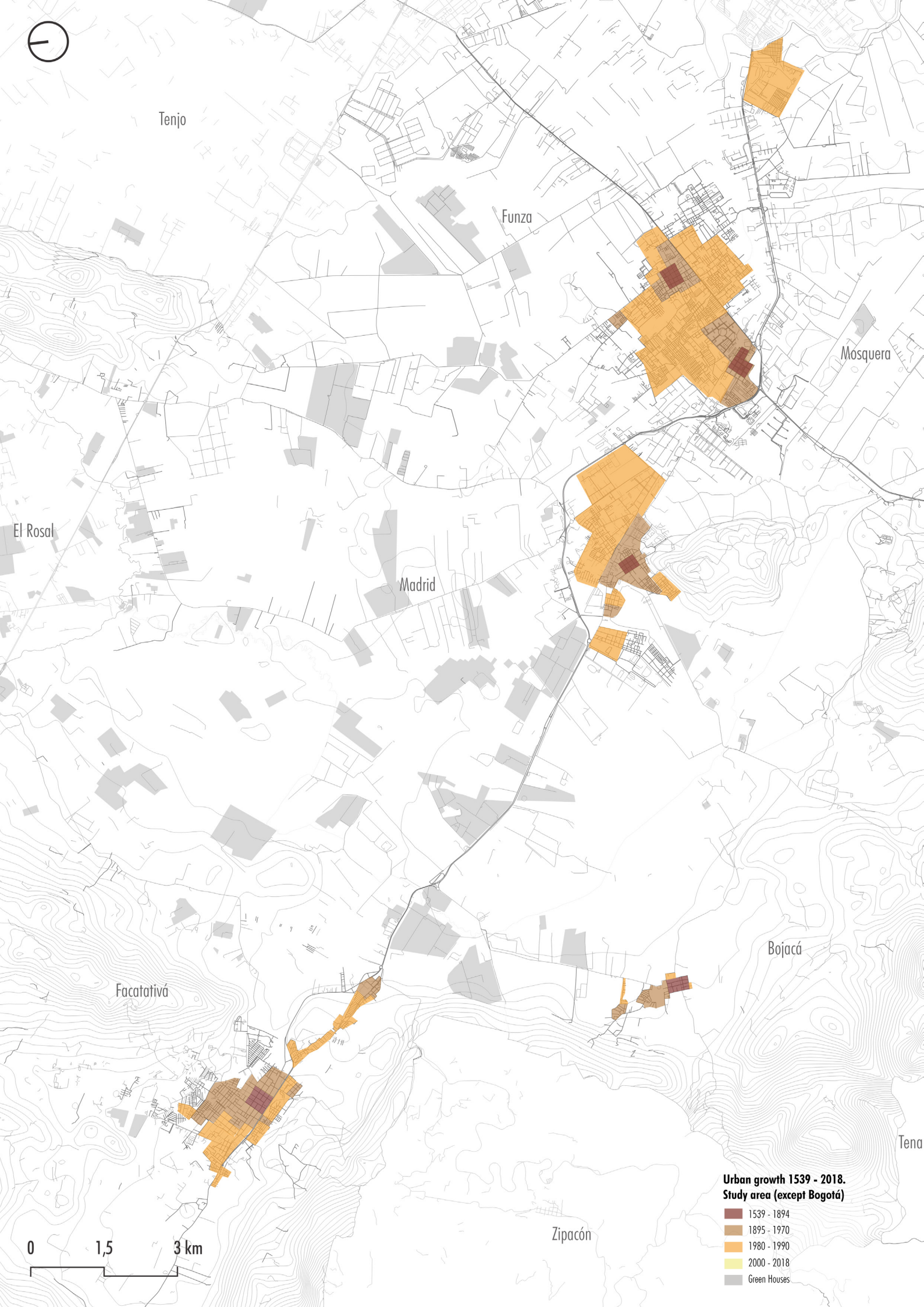


Figure 33 *Personal elaboration. Axonometry of apartment towers and closed residential complex*


Tenjo
Funza
Mosquera
El Rosal
Madrid
Facatativá
Bojacá
Tena
Zipacón
0
1,5
3 km
Urban growth 1539 - 2018.
Study area (except Bogotá)
1539 - 1894
1895 - 1970
1980 - 1990
2000 - 2018
Green Houses

Suburban houses

As previously mentioned in section 2.1.1, not only the low- and middle-income population were forced to move to the surrounding peripheries and municipalities, but also those with high incomes, due to the constant pressures and problems within Bogotá, sought places close to the city, but with the tranquility of an area with less population. It is here that the suburban houses and the expansion of the peripheries begins to be evidenced with a different morphological structure, during this last stage of expansion the apartment towers and suburban residential buildings (mainly in closed complexes) are mainly responsible for the growth of the urban area. This typology seeks to resemble the comforts of a rural area in the vicinity of an urban area, which is why these houses have more green spaces and distance in all directions to other buildings, replicating colonial styles in their design or presenting modern styles with low building index but occupying a large percentage of horizontal area. These closed residential complexes tend to have fixed population and floating population depending on the temporary designation given to each building, but they are regularly located in remote areas of the main urban area, generating scattered clusters connected by roads that are subsequently urbanized increasing the urban footprint of the settlements. As can be seen, these areas do not have a compact structure and their distance has begun to generate conurbations between municipalities making the boundaries between themselves and between urban and rural areas diffuse making it difficult to regulate and control these spatial relations. As can be seen in figure 34, its extensive green areas (or open areas) combined with the concept of closed complex have created clusters of wealth concentration, which have increased the price of the soil around it. In addition, due to their distance from urban centres as mentioned above, they have caused a difficulty in providing services that respond to a floating population and a nonconstant flow of people to these municipalities. The area is currently configured as an area with large dispersed suburban and productive patterns.

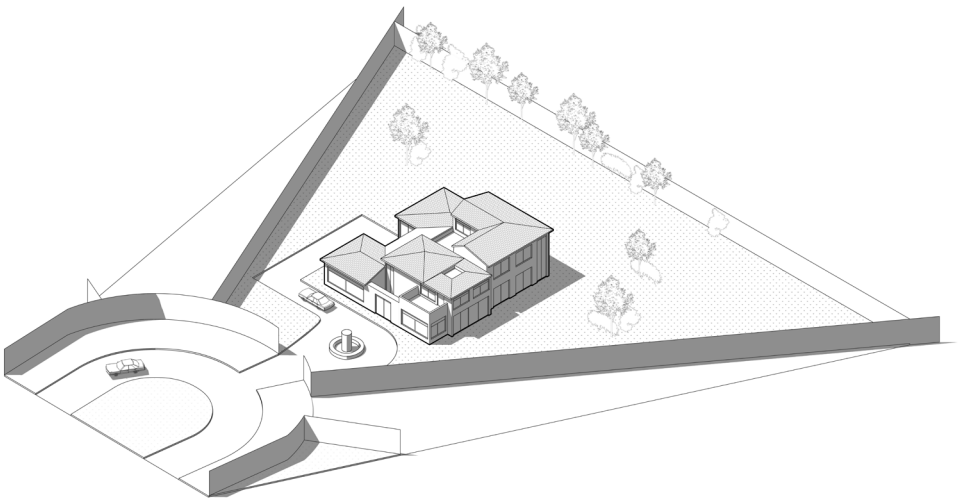
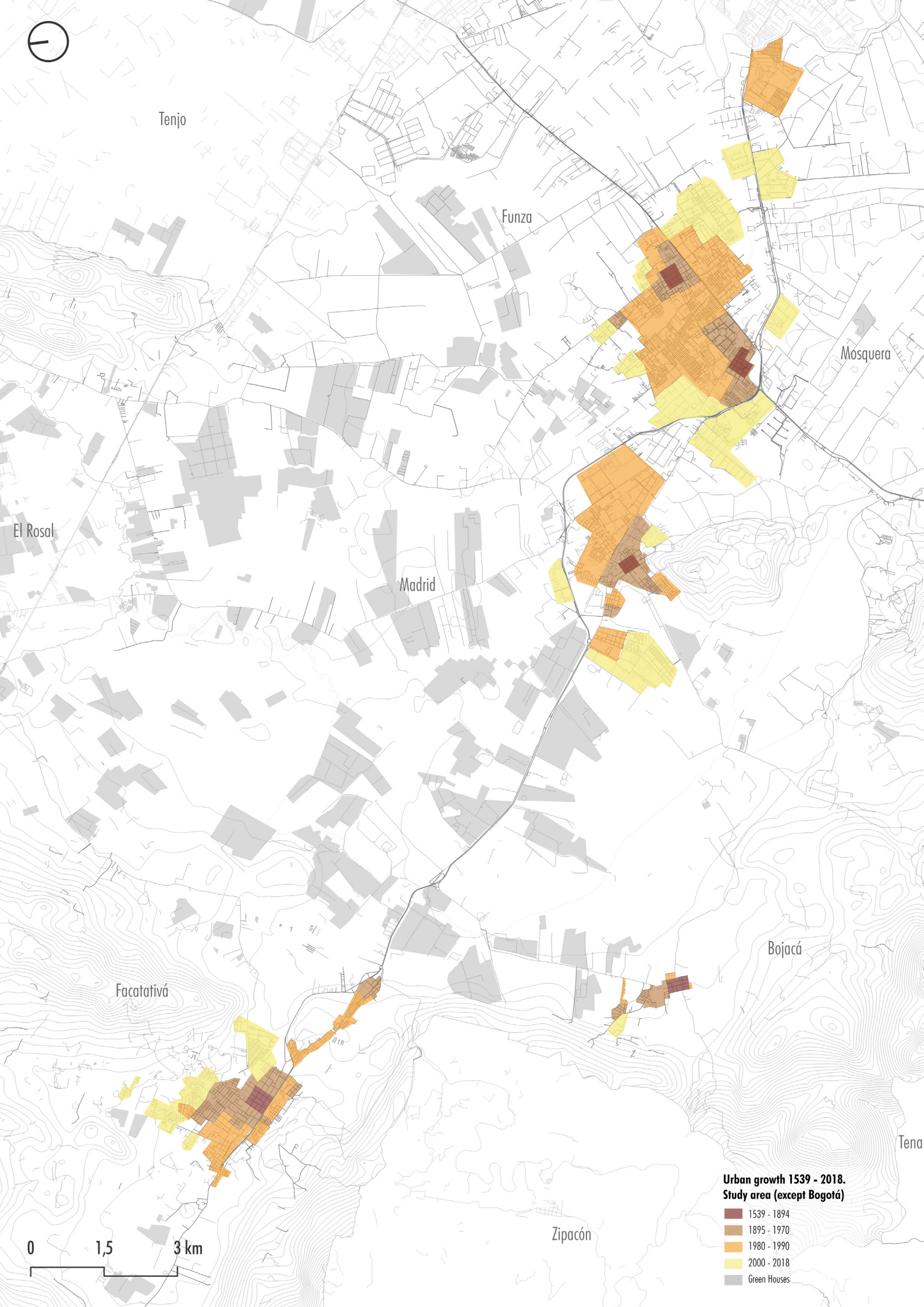


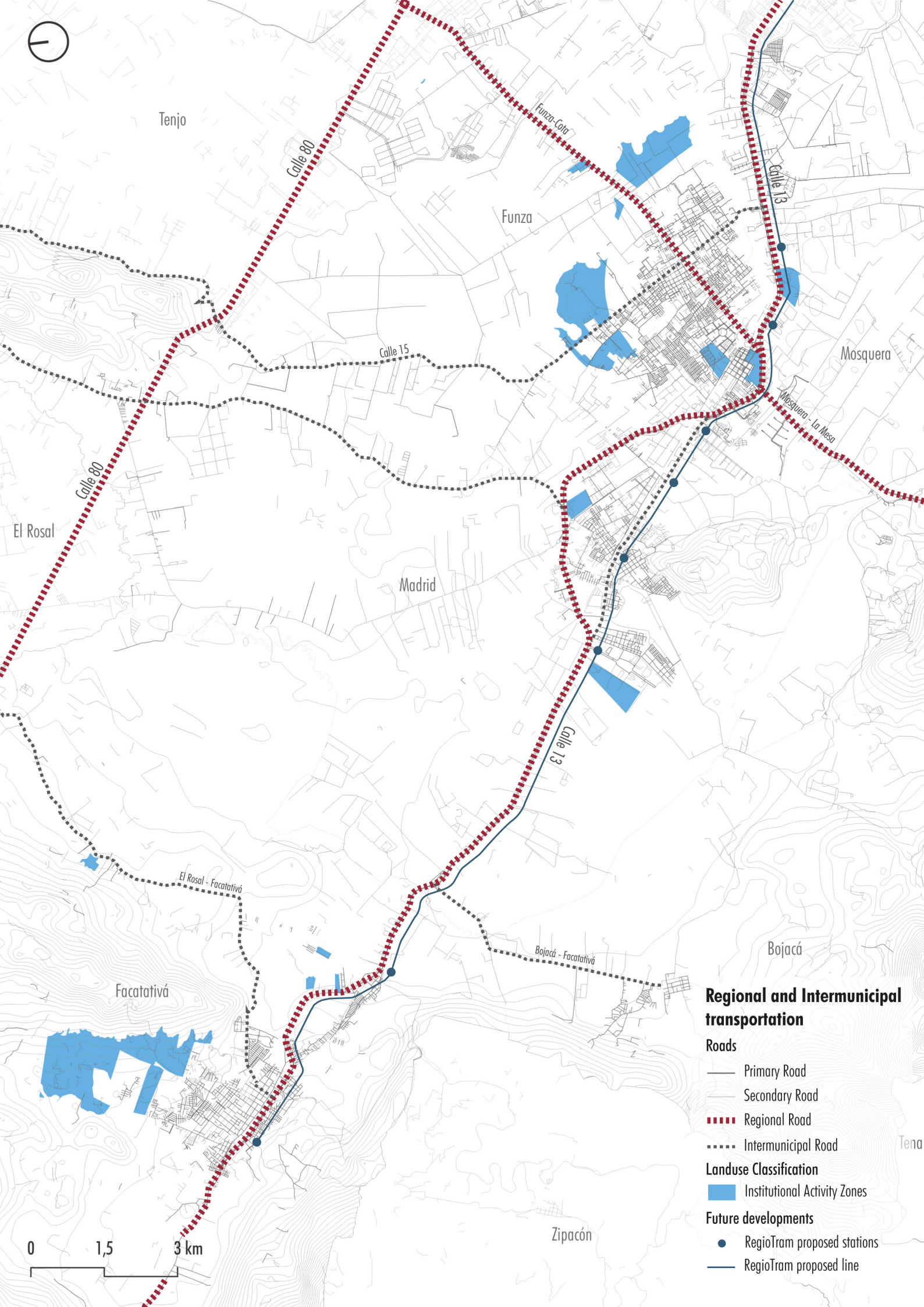
Figure 34 *Personal elaboration. Axonometry of Suburban house in scattered cluster*


Tenjo
Funza
Mosquera
El Rosal
Madrid
Facatativá
Bojacá
Tena
Zipacón
0
1,5
3 km
Urban growth 1539 - 2018.
Study area (except Bogotá)
1539 - 1894
1895 - 1970
1980 - 1990
2000 - 2018
Green Houses

The economic, commercial, transport and connectivity tensions have not only developed these municipalities along Calle 13, but have played a very important role in the relations with municipalities further north of the Bogotá Savannah. The growing emergence of institutional zones, mainly schools and universities with the intention of generating rural headquarters in suburban areas have notoriously extended the footprint of these settlements that do not have sufficient infrastructure and means of transport to respond to the demand and constant population pressures. Currently, the vast majority of inter-municipal roads have a rural condition, that is, unpaved and narrow indrastucture compared to regional roads, this has caused the traffic of the area especially at the entrance of Bogotá to be very high, accompanied by a deficit in the means of transport, increasing the times of the trips. The transversal connections between calle 13 and calle 80, the second most important entrance of Bogota to the west, in addition to being the most important industrial and commercial axis towards the northwest, have caused the mobilization of population towards the municipalities of Cota, Tenjo and El Rosal. This trend of population migration is not accompanied by a response of infrastructure and transport as in the case of the municipalities of the study area. Currently the main means of transport, in addition to the private vehicle, are the intermunicipal buses belonging to private companies that provide the service of different lines that connect just certain municipalities. However, a massive regional transport project is being developed with the intention of starting to operate in 2026, connecting from the municipality of Facatativá to the center of Bogotá by tram along calle 13 in 50 minutes, reducing two and a half hours of trip time and connecting all municipalities along this axis with 8 suburban stations and 9 inside the city. In addition to reducing trip times, the intention of the Regiotram is for the first time to create a joint network of public regional connection in response to individual private projects by municipality with lower level of regulation that have not been able to respond to the needs of the population of the area.

Bogotá administrative threshold

Continuing along the axis of Calle 13 and taking into account the localities that border the aforementioned municipalities, it can be observed that the use of the bus is the main source of communication and connection with the rest of the city, however, this time of a public nature, as can be seen in figure 35, accompanied by two lines of the mass transport system, called TransMilenio, which are insufficient due to the amount of population mobilized to the economic and labor center of Bogotá as mentioned above, collapsing the system, generating delays and having buses that exceed their maximum capacity.


Tenjo
Funza
Mosquera
El Rosal
Madrid
Facatativá
Bojacá
Zipacón
Tena
Calle 80
Calle 80
Calle 15
Calle 13
Calle 13
Funza-Cota
Mosquera - La Mesa
El Rosal - Facatativá
Bojacá - Facatativá
0
1,5
3 km
Regional and Intermunicipal transportation
Roads
Primary Road
Secondary Road
Regional Road
Intermunicipal Road
Landuse Classification
Institutional Activity Zones
Future developments
RegioTram proposed stations
RegioTram proposed line

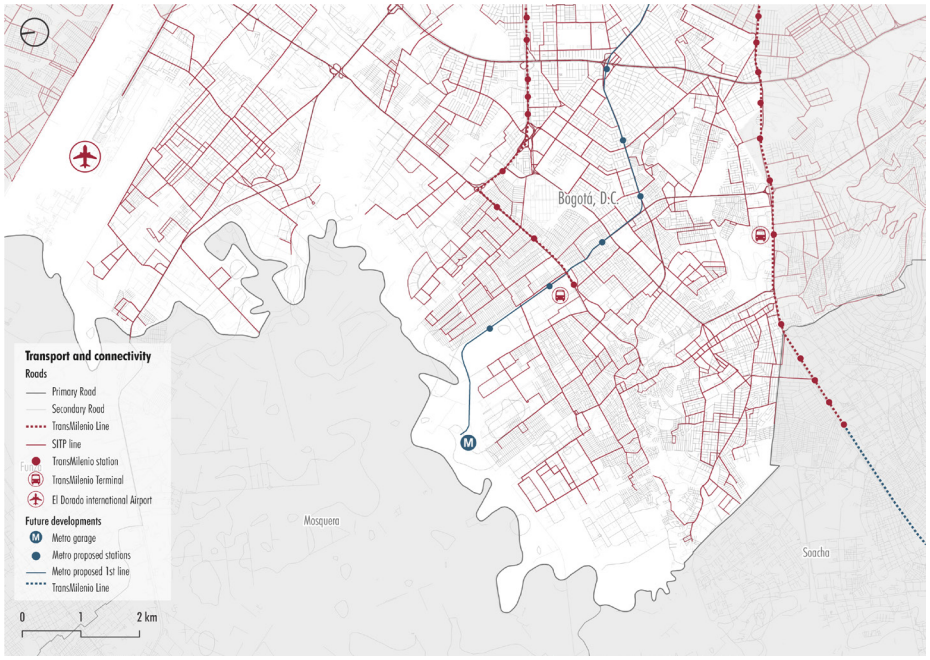


Figure 35 *Personal elaboration Transport and connectivity systems of the south-western administrative urban threshold of Bogotá*

This problem in mobility is partly due to the type of mass transport used in the city since the beginning of the century, in which a BRT* system was chosen reducing the cost of implementation, but sacrificing capacity, efficiency and other needs of a city that by 2000 already had 6.3 million inhabitants (DANE, 2018). This alternative that has been spreading throughout the city, as well as the lack of decision in the national government when choosing the best solution to implement the first metro line in Bogotá, have led that during the 82 years that has lasted the debate of the metro only until the year 2016 could be approved the project that would sign with the Chinese company "China Harbour Engineering Company" in 2019 and due to the covid 19 pandemic would delay all its construction until today, in which different changes demanded by the national government have not allowed to meet the established dates, but which is expected to meet the goal of complete construction by 2028 (Primera Linea de Metro de Bogotá, n.d.).

The importance of understanding the process that has had the approval of this first line lies in the fact that the choice of the south-western area is due to the critical conditions of habitability presented by a settlement on the city threshold of informal origin, as can be seen in figure 36, this area has mainly a residential use, a bedroom area as mentioned in section 2.1.1 and which present an informal or low scale economic development. These functional characteristics are accompanied by a high building occupation density, as can be seen in figure 37, where the unurbanized spaces do not constitute recreational or effective green spaces for

** "is a bus-based mass transit system. The system generally has specialized design, services and infrastructure to improve system quality and mitigate typical causes of bus delay. Often likened to an above-ground subway, BRT (Bus Rapid Transit) strives to merge the efficiency and speed of a light rail or subway network with the adaptability, affordability, and straightforwardness of a bus system." (Wirasinghe et al, 2013)*

the use of people, if not on the contrary, as it is possible to compare in figure 38, they constitute areas in which water bodies are present, in this case the main physical edge of the south-west, Bogotá's River. The river round, the canals, wetlands, as well as the flood zones make up a large portion of the territory directly affecting the population that inhabits the limits closest to these water bodies. Although the regulations determine in these areas the possibility of recreational use and implementation of an ecological park, the reality is that the construction of the wastewater treatment plant (WTP) generates a considerable decrease in the quality of life of the inhabitants, who will be affected by the odours results of this treatment process.

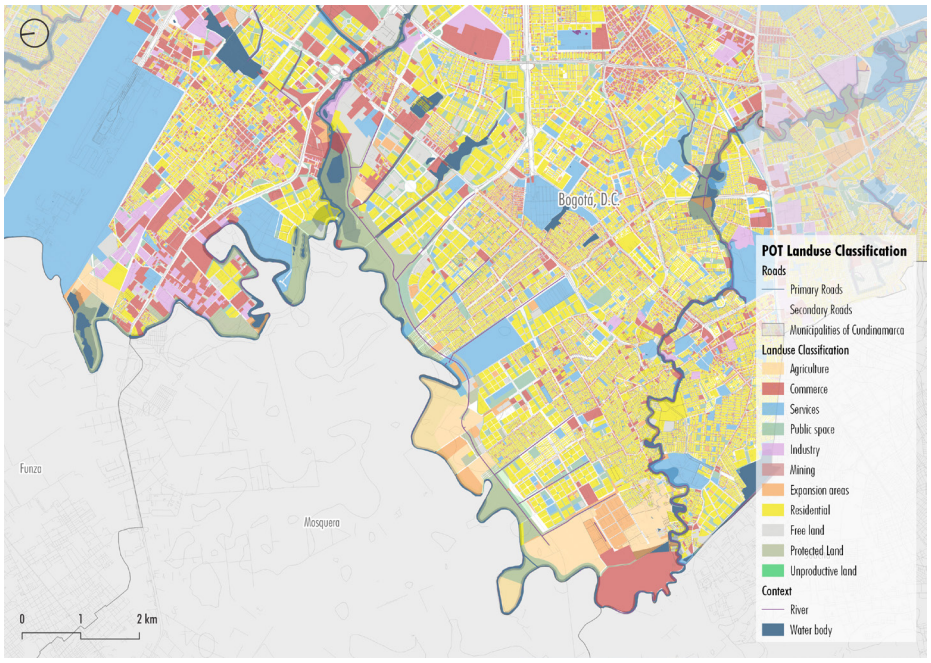


Figure 36 *Personal elaboration POT Landuse classification of the south-western administrative urban threshold of Bogotá*

Figure 37 *Personal elaboration Full and empty morphological urbanization of the south-western administrative urban threshold of Bogotá*

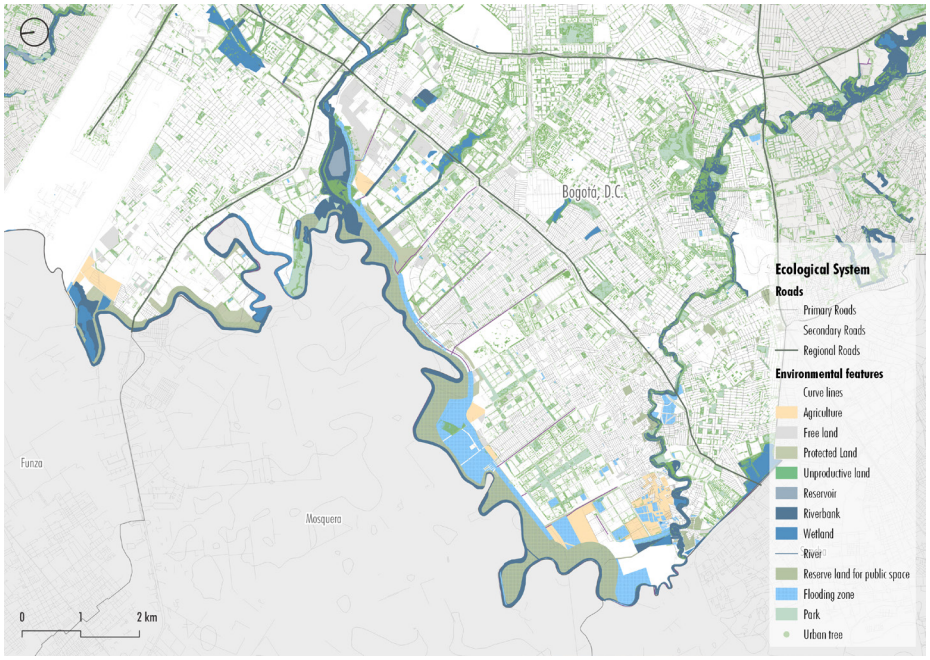


Figure 38 *Personal elaboration Ecological system of the south-western administrative urban threshold of Bogotá*

As in the case of the municipalities of the study area, the main urban configuration in terms of building typology are the self-built buildings, mostly of an informal nature. As previously mentioned its spatial flexibility and distribution is an advantage for those inhabitants who seek to have an extra source of income to survive, subdividing housing for commercial use in first level or development in height to create apartment by level or service provision, in the last phenomenon will focus the subsequent description for the case of Bogotá. The vertical development of these buildings as can be seen in figure 39 allows the creation of an informal real estate market and a family network within the same buildings. Usually, as families grow, the vertical subdivision allows to generate privacy and a new home without the need to invest large amounts of money for a new house, or at the same time leasing processes of residential, service or commercial nature, bringing economical improvement that can later be used to continue with the vertical development or investment in another building repeating the same leasing process. This phenomenon has supported these neighborhoods that resemble a small city, since all its services are supplied informally, such as schools, at a lower cost than could be requested in other areas of the city.

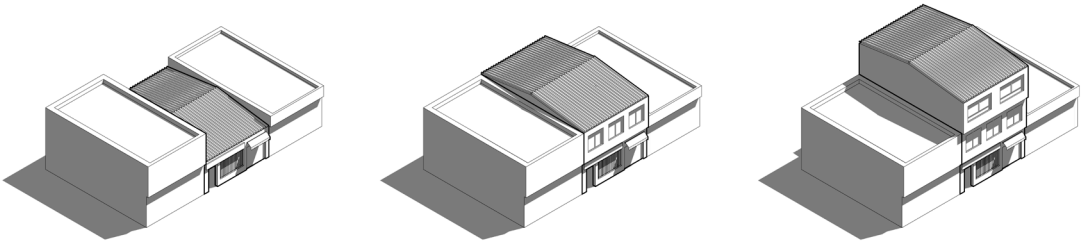


Figure 39 *Personal elaboration. Axonometry of progressive vertical development in self-built building typology*

This elongated and narrow typology brings problems of lighting and ventilation inside every single lot due to its dimensions, but allows to generate conformations of up to 6 floors. The informal real estate economy stabilizes the lack of accessible housing for migrants and people of lower resources, who find in these informal neighborhoods a solution to the housing need, sacrificing the transportation times, security, accessibility to quality primary services, access to parks, green areas and effective public space, due to the need to occupy small land portions with high density urbanization (less than 2 m2 of public space per inhabitant). The current situation of the sector highlights the lack of public services, mainly in the area closest to the river bank, generating a mobilization towards the most central neighborhoods of the city that present a greater amount of services, being the main centers of concentration of health dynamics and public education in the sector. This deficient urban development and conformation in services has generated the opportunity to respond to the demand produced by the population's need to supply its basic needs through its adaptive buildings. The typological modifications that allow to obtain an income by the private character of the service increase the economic flow of the neighborhood, job opportunities and physical evolution of the territory simultaneously to the response of the state in the provision of services and requalification of these settlements, generating a localized pressure in the new flows that appear due to the creation of these buildings, increasing the interest and price in the premises that surround the small scale services.

With the intention of illustrating the physical and urban relationships that are presented throughout the territory images were taken at different points randomly showing building typologies, green areas, riberbank, border areas, as well as an aerial image of an area with planned urban development near the urban threshold and informal neighborhoods.

Image 1 *Image extracted from Google Earth Pro, Santa Fe de Bosa Neighboorhood self-built and infomal urbanization, currently legalized*

Image 2 *Image extracted from Google Earth Pro, Santa Fe de Bosa Neighboorhood River round, administrative Threshold*

Image 3 *Image extracted from Google Earth Pro, Santa Fe de Bosa Neighboorhood residential complex "Caminos del Porvenir III" housing typology*

Image 4 *Image extracted from Google Earth Pro, Patio Bonito Neighboorhood "Carrera 86" self-built and infomal urbanization, currently legalized, building growth due to real estate pressure*

Image 5 *Image extracted from Google Earth Pro, San Bernardino Neighboorhood self-built and infomal urbanization and Tunjuelo River spatial relation*

Image 6 *Image extracted from Google Earth Pro, Tintala Neighboorhood fomal urbanization of residential complexes in proximity to the administrative threshold*

This urban model presents great contrasts and in its essence great difficulties in relating not only with natural elements such as hydrographic sources, but also with planned urban structures. Although it is true that from its origin they seek to follow an orthogonal grid that facilitates future intervention by the state, its narrow streets and lacking planning prevent them from adapting 100% to the social and economic dynamics within an urban environment, affecting the quality of life and health of the inhabitants, that must live with the energy-supplying elements of the light poles at short distances, increasing the danger due to the radiation generated by these. Likewise, the presence of unpaved streets in addition to the dimensions of these hinders the efficient provision of garbage collection service, resulting in contaminated green areas and environmental impacts, with direct consequences for the inhabitants of these localities. On the other hand, as it is possible to show in the images, as the planning and the state has intervened,

the presence of the typology of apartments or residential complexes of greater height have allowed the realization of effective parks and public spaces, as well as the expansion of main roads and the provision of services, however, its continuous growth has prevented it from being given the necessary rights and guarantees of habitability to the majority of its inhabitants.

2.1.5. Environmental dimension.

Non-urban areas Land use Classification

After having analyzed the urban areas within the study area it is important to focus on the non-urban areas that tend to be the main affected by the changing dynamics within urban settlements, not only by the pollution generated, but also due to the constant reduction of the area of these areas. Based on the "Regional Environmental Management Plan" (PGAR) 2012-2023 and the POT (Land Management Plan) of each of the municipalities, the aim is to understand the environmental situation. First, a general overview and description of the situation in the area as a region will be given, then the specific situation of each municipality will be specified according to the land use classification in each single POT and environmental reports. As previously mentioned, the constant population growth suffered by both Bogotá and its surrounding municipalities has caused in rural areas the need to subdivide the land to meet the housing needs that these population trends bring, as well as benefit from the land price of the commercialization of new expansion zones. These large areas of land used for the vast majority of productive (agricultural) purposes have presented inequality in tenure since 1994, when a very low percentage are owners of the majority of the territory, while many families have very small land portions that do not allow them to generate the production necessary for their subsistence, generating high levels of poverty (PGAR, 2012).

As mentioned in section 2.1.2, the agricultural and floricultural production (greenhouses) of this area are the main economic sources of the region, being highly benefited by various water sources that go beyond those located on the surface, but also underground drilling for irrigation, industrial use and human consumption. This process of drilling and extraction of groundwater from the Bogota's Savannah has generated a critical situation due to the negative water levels of these aquifers for the last decades, where the relationship between extraction and recharge are unbalanced, due to the increasing demand for water from the area, especially for Bogotá, and the high vulnerability of the region to the effects of climate change, mainly oriented towards the decrease of precipitation between 10-30% (recharge system of the aquifers in the high zones) and the increases in the

temperature (PGAR, 2012) in the area that contains strategic ecosystems such as the paramos, and areas of high environmental importance that are part of the Regional Ecological Structure, as well as the highest levels of population (not counting Bogotá). This area, due to its height which ranges between 2520 and more than 4000 m.a.s.l (Meters Above Sea Level) in the Paramo of Sumapaz, has a great importance due to the diversity of biomes and living areas that can appear, as well as the disposition of the land for the cultivation of vegetables and products for national and international consumption. This is why, this area has a large percentage of ecological restoration and monitoring zones, however, despite government efforts to protect these areas, the decrease in natural ecosystems had been given with an average annual loss of 2810 ha/year, which is equivalent to 13.76% of the total of those that are protected in the last 13 years (PGAR, 2012), this has produced an ecological fragmentation along the region that hosts patches of forests and ecosystems without interconnection that hinders their protection and restoration. The relationship between fragmented natural ecosystems and the development of population dynamics in urban centres has left these areas unprotected due to growing economic urban or production interests of a formal and informal nature, this to fact that the direct corridors that facilitate the communication of the fauna and the development of the flora must be avoided and instead temporary alternative zones are used to give time to the legal processes exercised for the natural protection of the region.

According to the suitability of the soils the plan defined the percentage of land that can be used for each activity, in this particular case the data will be given based on the department of Cundinamarca and not only the study area. 31.39% is of conservation aptitude; 38.63% in forestry aptitude; 10.75% in livestock aptitude and 19.23% in agricultural aptitude, evidencing that 1/3 can support agricultural and livestock activities based not only on fertility or soil erosion, but given the relationship between population and water demand, certain areas are suitable for conduct these water-intensive activities. However, data from the Cundinamarca Regional Autonomous Corporation (CAR)* for areas outside its jurisdiction, which have only 30% capacity to carry out these activities, show an overuse of approximately 64%. This conflict of land use not only affects areas of lower productive intensity, but also those with conservation ability and potential, which currently of the 70% of land covered, only 12% has these designations, endangering the environmental conditions of the region and the sustainable balance of the unique ecosystems present in this area (PGAR, 2012).

** "It stands as the primary regional environmental authority, collaborating with the Ministry of the Environment to oversee and guarantee the execution of plans and initiatives aimed at safeguarding the environment and renewable resources." (CAR)*

On the other hand, not only urban growth and over-exploitation of land by misuse are the only threats to the strategic natural ecosystems of the study area, the presence of coal mining, construction materials, limestone, emeralds and salt have affected water, air, soil, biodiversity and all ecosystem services* that they provide, thus generating not only environmental consequences in the paramos, forest reserve areas and water bodies, but indirectly in the socio-cultural dynamics of the inhabitants. One of the main problems of this activity and its effects are the lack of regulations and normative regarding the provision of environmental licenses, currently only 50% has this license and its environmental management has not been the expected, putting at risk the life and health of people living in the nearest areas, in addition to insufficient compensation for the environmental impact generated (PGAR, 2012). As stated by the Ministry of Mines and Energy in its management report for 2010-2011.

> "(...) the work carried out for the exploration and exploitation of mining and hydrocarbons causes movements in the surrounding lands generating instability in the surrounding constructions, in such a way that if sufficient distances are not kept there are imminent situations of risk for the inhabitants around them." (p. 90)

These constant affectations have pushed to have a new vision regarding the priorities in this type of conflict, where the general interest must prevail and environmental licenses must be denied when mining titles show overlap, whether partial with protected areas or strategic ecosystems. Biodiversity and its ecosystem provisioning, regulatory, cultural and support services, as a source of quality of life and benefiting from different anthropic activities of a sectoral type cover basic needs of the population such as the supply of food of great relevance for the Capital District and the department of Cundinamarca, are affected in a worrying way for a territory where one in four Colombians live. Similarly, the evolution and development of policies for the protection of river basins and forest areas are often intertwined with previously granted mining titles and licences, which at the same time provoke conflicts by the use of insufficient resources for different uses simultaneously.

After presenting the general conditions suffered by the study area, it is important to understand their organization and classification of land use that allows to reflect the boundaries and relations that currently each of these activities

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** "the direct and indirect contributions of ecosystems to human well-being, and have an impact on our survival and quality of life. There are four types of ecosystem services: provisioning, regulating, cultural and supporting services." (Earth.org, 2023)*

present in the municipalities and why the problems previously mentioned are becoming increasingly evident.

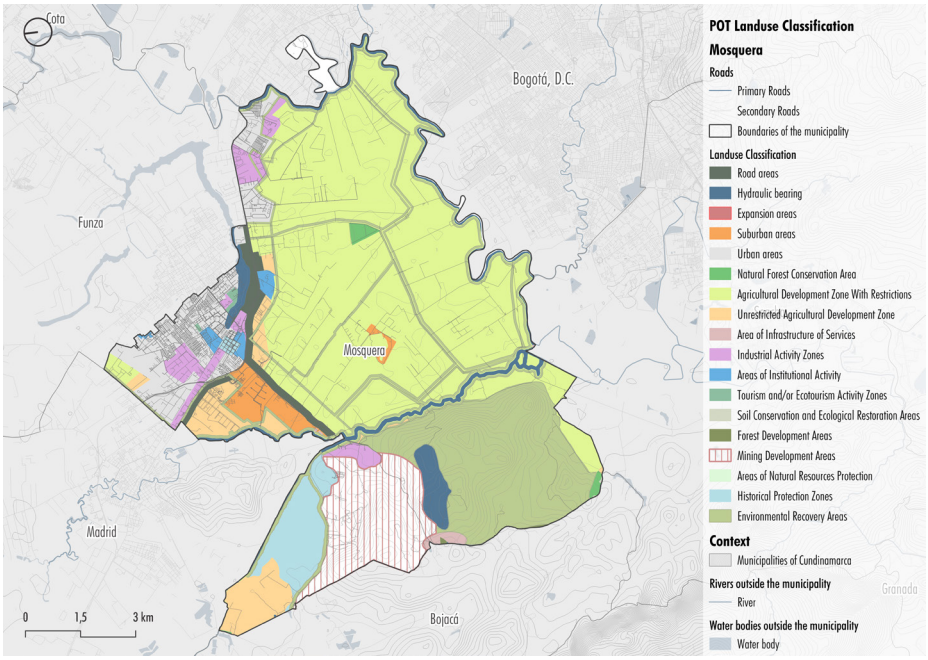


Figure 40 *Personal elaboration POT Landuse Classification Municipality of Mosquera*

The municipality of Mosquera is the area in which the influence and effects of mining can be most evident, as you can see in the southwestern part of the municipality is a large area disposed to mining, mainly of construction materials, between historical protection zones and environmental recovery areas, in addition to the water bodies that have shown a gradual reduction of their reserves. These activities that may be incompatible with each other occur throughout the country with certain area restrictions and environmental compensation, However, as previously mentioned, these restrictions have not generated the expected result for the CAR and the municipal and departmental environmental control entities. This municipality bordering Bogota directly witnessed an extension along Calle 13 that has resulted in the partial conurbation with the city in its urban areas, leaving a worrying area of expansion towards the unrestricted agricultural development zone, which have been used in the limits with the municipality of Madrid as a suburban zone for the creation of rural residential complexes. Likewise, the urban development of Mosquera has taken place around water bodies that due to road infrastructure, industrial areas, urban areas and consumption for irrigation have been polluted or dried almost entirely for urbanization. This municipality has a very interesting behavior due to its complete conurbation with Funza, creating a unique urban footprint that resembles the idea of a single settlement. This kind of joint development along the calle13 axis would suggest that their behavior would be the same, however as can be seen in the figure 41 the municipality of Funza is completely surrounded by a water body that limits the urban area and extends along the unrestricted agricultural development zone, but unlike Mosquera this

municipality has another industrial axis that limits to the north, Calle 80, which generates a double urban pressure of consumption of water resources and occupation of undeveloped land that is reflected in a low index of natural areas of protection.

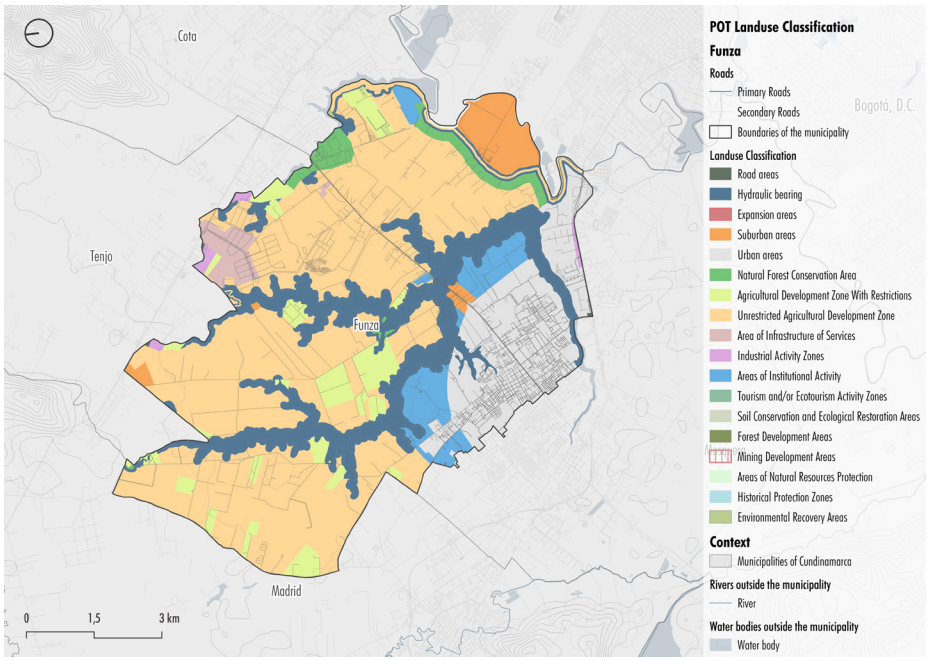


Figure 41 *Personal elaboration POT Landuse Classification Municipality of Funza*

Currently, the borders towards the water bodies are treated as areas of institutional activity, which through the implementation of public services oriented to environmental protection and monitoring or educational entities and rural headquarters seek to restrict the extension of the urban footprint to these areas, avoiding a loss of environmental character of departmental importance. In contrast to this municipality, Bojacá is the one with the highest number of protected and conservation areas, as well as environmental recovery areas close to forest development areas, this has been possible due to its topographic conditions in most of the territory, being the only municipality in the study area in which its variation in height is so significant and its urbanized area is really low, with a population partially greater than 12.000 inhabitants unlike the other municipalities that exceed 100.000. These areas of protection by limiting with Mosquera in the north east share the mining zone and its environmental risks, although the proportion is lower, the location of this activity generates a risk also for all the river basins that come down from the mountains as part of the recharge system of the water bodies of the municipalities. This activity, as well as the lack of restrictions on livestock and agriculture activities in intermediate zones to the environmental protection areas, have created an ecosystem loss due to the illegal extension, in addition to the felling of trees to locate crops or animals, reducing the ecosystem services provided by these areas, the ecosystem connectivity, and the possibility of recovering aquifers of anthropogenic and ecosystem importance.

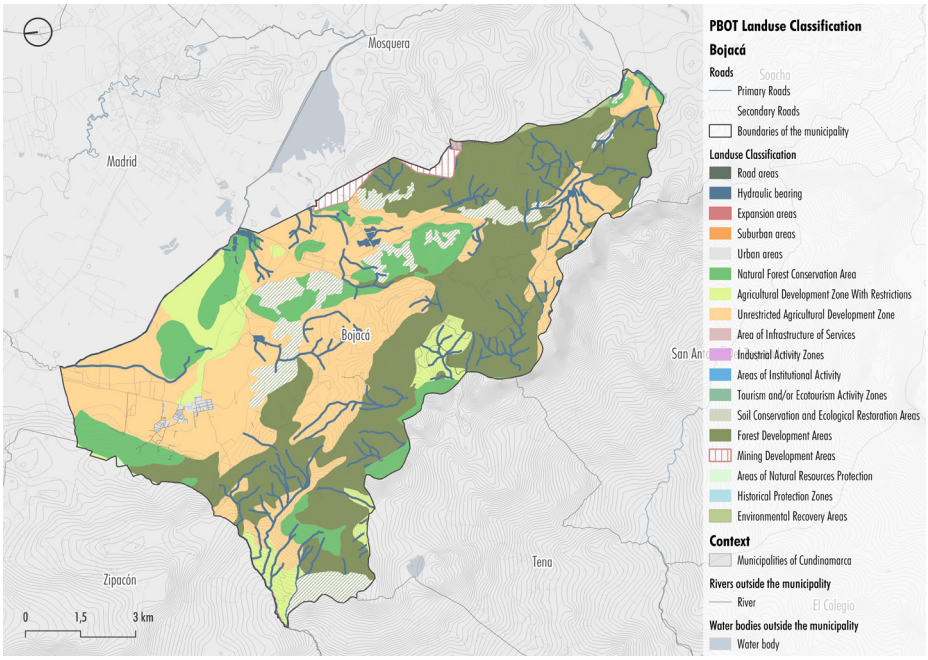


Figure 42 *Personal elaboration PBOT Landuse Classification Municipality of Bojacá*

In the specific case of the municipality of Madrid despite being the area with the greatest presence of greenhouses and degradation of productive rural land there is an important typology in the classification of land use that has allowed its protection and not urbanization unlike the areas with agricultural vocation around these. The areas of protection of natural resources have prevented the competition of the value of rural and urban land to be an advantage for the generation of new areas of expansion of the urban area due to its cost and on the contrary allowed the water systems of Mosquera and Bojacá be supported by a low impact consumption area. However, being so close to the east with the municipalities of Mosquera and Funza its conurbation is more than imminent causing its expansion zones to risk the conservation and ecological restoration areas around it, in addition to the corridors of ecotourism oriented to the protection and preservation through ecological parks that border industrial areas and one of the main structures of departmental connection. Similarly, as can be seen in the figure 43/44 both in the municipalities of Madrid and Facatativá one of the major problems is given when regulating these areas of activity demonstrating the lack of coherence between plans and preservation projects with what is actually done, where all forest, conservation and natural resource protection areas are surrounded by high-impact activities such as industries or unrestricted agricultural areas, which due to the limited presence of mitigation or transition zones, just as the economic interest of people expands endangering the ecosystems there. Although, Facatativá presents similar behaviors to the other municipalities and being the largest of these after Bogotá, its distancing and physical natural restrictions have allowed its growth to occur more slowly and controlled. In the same way, being in base of mountain surrounded in all directions except towards the east has caused its development in that direction, avoiding the deterioration of the natural zones located at a higher height.

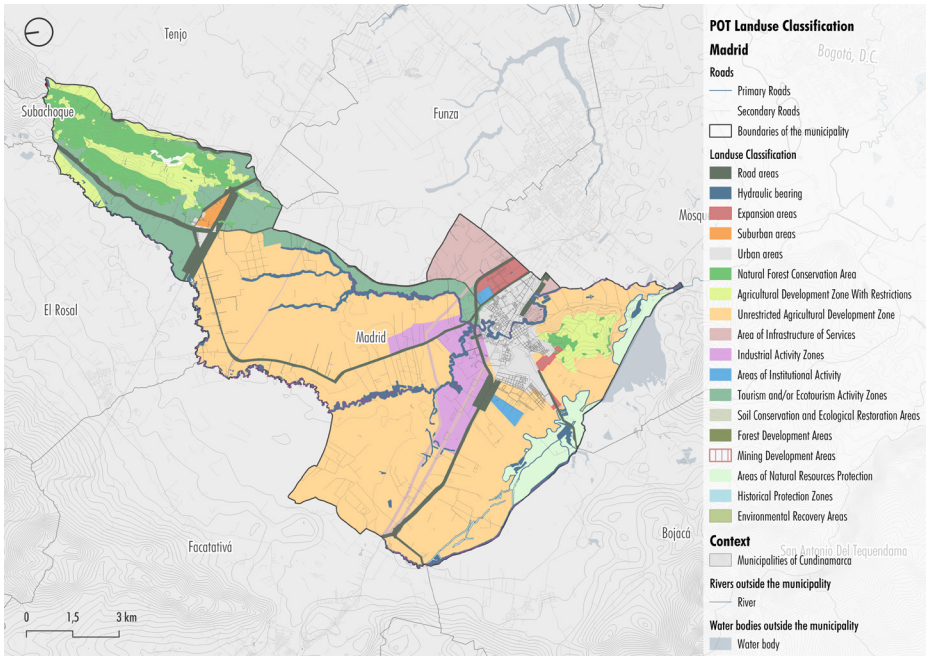


Figure 43 *Personal elaboration POT Landuse Classification*

Municipality of Madrid

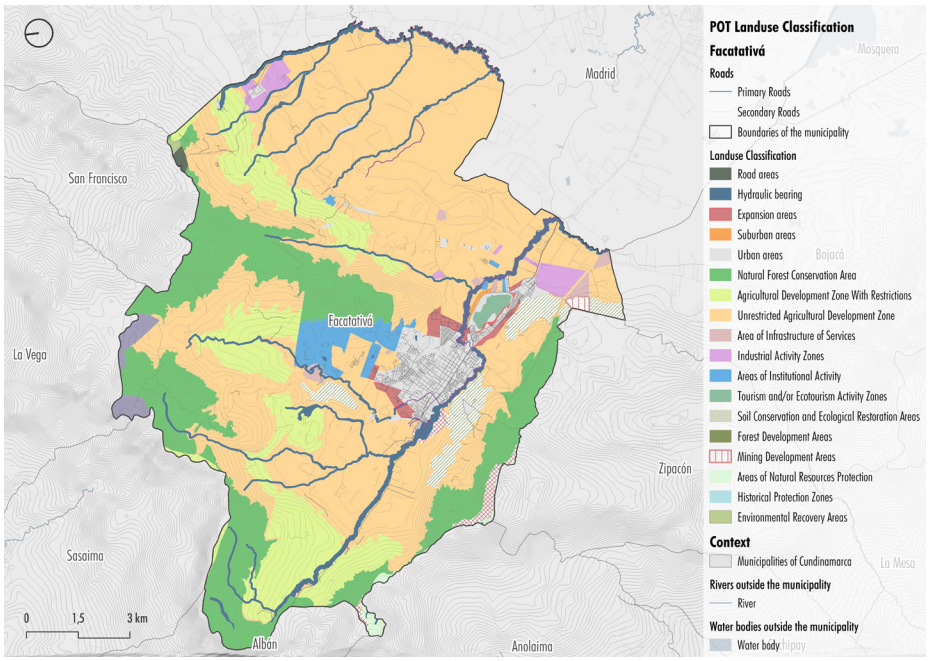
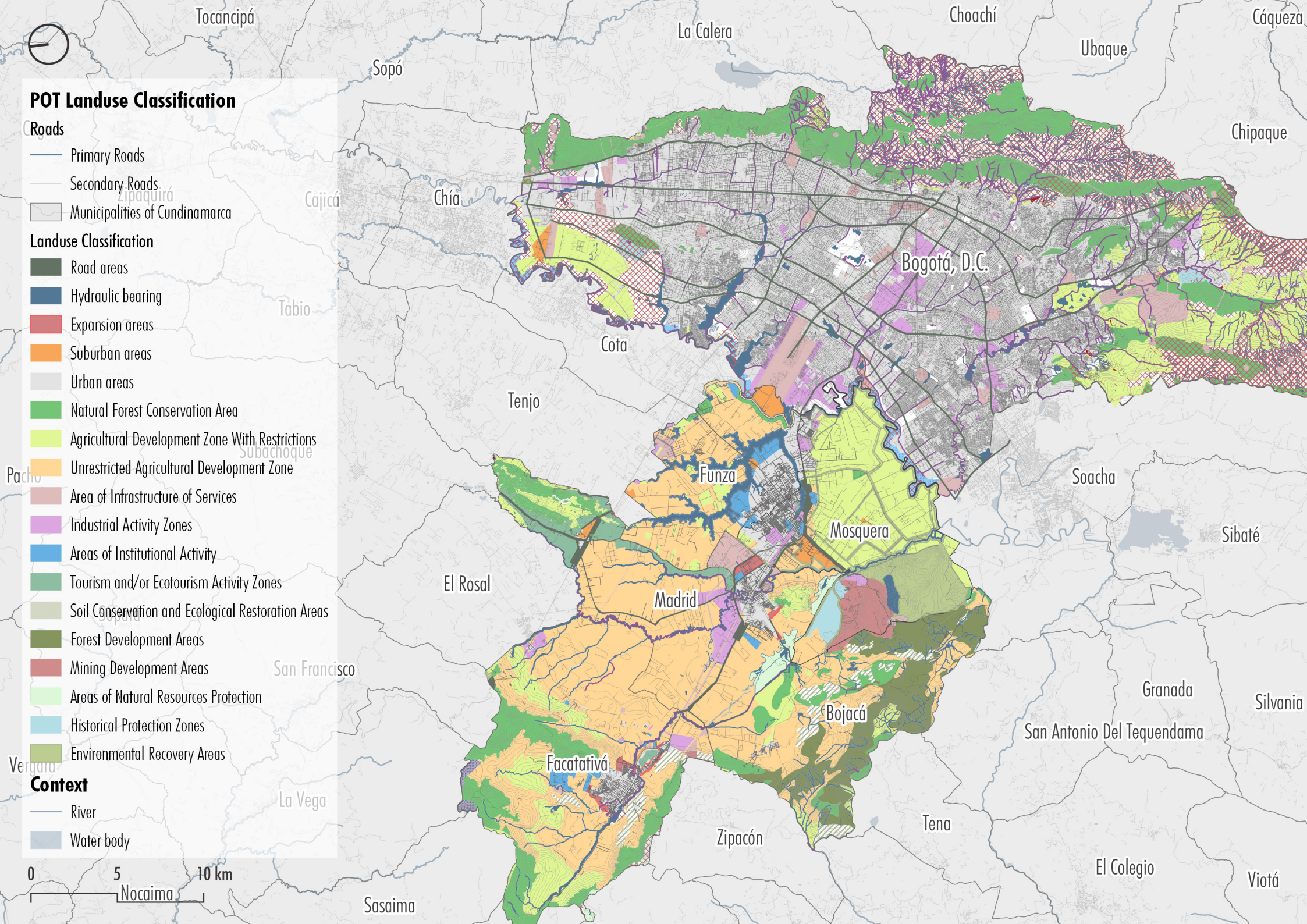


Figure 44 *Personal elaboration POT Landuse Classification*

Municipality of Facatativá

In the unified map of the land use classification of the POT and the PBOT of Bojacá can be seen the overall operation of the territory, which has taken advantage of its low variation in height for production activities beneficial to the surrounding settlements and their development, while the natural areas that are preserved are mostly due to their topographical conditions. Similarly, is possible to observe a trend towards agricultural activities that take advantage of the quantity of water bodies and a centralized and concentrated urban and industrial development on the Calle 13 axis. In addition to a unique classification of agricultural activities with restriction throughout the municipality of Mosquera in the area bordering Bogotá and Bogotá's River, as well as the natural resource protection zones in Madrid and Facatativá.


POT Landuse Classification
Roads
Primary Roads
Secondary Roads
Municipalities of Cundinamarca
Landuse Classification
Road areas
Hydraulic bearing
Expansion areas
Suburban areas
Urban areas
Natural Forest Conservation Area
Agricultural Development Zone With Restrictions
Unrestricted Agricultural Development Zone
Area of Infrastructure of Services
Industrial Activity Zones
Areas of Institutional Activity
Tourism and/or Ecotourism Activity Zones
Soil Conservation and Ecological Restoration Areas
Forest Development Areas
Mining Development Areas
Areas of Natural Resources Protection
Historical Protection Zones
Environmental Recovery Areas
Context
River
Water body
0
5
10 km
Nocaima
Tocancipá
La Calera
Choachí
Cáqueza
Ubaque
Sopó
Chipaque
Zipaquirá
Cajicá
Chía
Bogotá, D.C.
Tabio
Cota
Tenjo
Subachoque
Pacho
Funza
Soacha
Mosquera
Sibaté
El Rosal
Madrid
Granada
Silvania
Bojacá
San Antonio Del Tequendama
Facatativá
Vergara
La Vega
Tena
Zipacón
El Colegio
Viotá
Sasaima

2.3. Key elements and results

After having carried out the analysis of the study area and the elements that influence it, it is concluded that the lack of cohesion and joint vision has generated imbalances in the territory, which are easily evidenced in socio-economic conditions, which have developed increasingly through informal or independent responses, due to the lack of variety in the economic production of the area (municipalities except Bogotá) and the low percentage of population with access, in agricultural terms, to the amount of land to generate the production needed to survive. The increasing rate of unemployment accompanied by the demographic increase has pushed people in search of opportunities towards Bogotá increasing the development of informal settlements in highly densified peripheral areas, with an insufficient area for its expansion in the current administrative limits, which is generating conurbations with the surrounding municipalities and the loss of land with a productive vocation or areas of environmental importance for the region. These new urbanizations not only affect Bogotá, but the demographic growth in the city, as mentioned above, has increased the escape of middle and high income population, generating rural suburban complexes around the surrounding municipalities, increasing not only the urban footprint of each, but the consumption of undeveloped land and water resources in unplanned areas.

The lack of planning and prevision in each of the municipalities has led to their classification and distribution of land uses not being consistent with plans and projects in the long term, facing activities of high impact and unrestricted consumption such as industry, mining, agriculture and settlement expansion zones, with protected areas, in conservation or environmental recovery. The conflict of uses shows an obvious loser, which is the main ecological structure, which has not been able to be protected, nor recovered and which despite being the one that supports the other economic and productive activities of subsistence, annually loses a large percentage of hectares and liters in its aquifers, leaving the entire region in a critical state in the short, medium and long term. The inefficient control of these areas, accompanied by the inherent need to survive by the growing percentage of the population in a state of poverty is putting into conflict the socio-economic and environmental dimensions, this being reflected in a physical dimension, through informal urbanization of a self-constructed character, unable to fully meet the needs of people, and causing scattered patterns, increasing urban area, and reducing natural and rural areas with fewer topographical features.

In the same way, a dependence on the central government is perceived, limiting territorial development, resulting in inefficient alternatives for each municipality and

unsustainable urban conformations without control and management of its growth. The lack of a compact territorial model that provides the necessary public services and spaces for the population is evident, as well as employment opportunities through economic diversification limited by national and international policies, as well as the necessary communication and interconnection infrastructure. On the other hand, it is positive to emphasize the new regional associative figure that will allow the joint development of a sustainable vision of the territory, as well as specific policies for informal settlements that avoid gentrification and in turn re-establish the rights of citizens in each area. It is here that projects such as the Regiotram of the West or the first line of the Bogotá metro will help to improve the living conditions of the population, by reducing the trip times of the "dormitory" areas and to promote the economic development of the areas close to these projects. However, they must be accompanied by complementary systems mainly in the other municipalities that do not have a quality public mobility service.

3.

PROPOSAL: Bogotá Metropolitan/regional area

Source:https://www.yatzer.com/sammy-slabbinck-art/slideshow/7

3.1. Productive city model

Taking into account the results and conclusions of the analysis of the study area, the proposal of the "productive city" for Bogotá's savannah is developed. Is an integral model of metropolitan/regional development with the aim of generating an articulated, sustainable and efficient territorial development that regulates and controls urban growth through labor, ecological and economic production centers at various urban scales, ranging from localities to large metropolitan cities. Its focus is on achieving sustainability, economic stability and food sovereignty of the Bogotá's Savannah, achieving a balance between the urban and rural environment through the efficient coordination of each of the territorial actors involved.

The starting point is the Cundinamarca-Bogotá Metropolitan Region to propose an integrated planning model between the surrounding municipalities and Bogotá, seeking the creation of a unified urban network that avoids fragmentation of the territory. With this metropolitan region an intermediate level of planning is created that was non-existent for Bogota due to its status as Capital District, as mentioned in section 2.1.2. promoting a decentralized approach in which the department and each of its municipalities can orient territorial needs and priorities without relying on the central government. The integrated vision model called "productive city" follows the guidelines of respecting the autonomy of each municipality, but creating a joint planning that through public-private partnerships allows the development of urban, social, environmental and economic projects, that not only enhance the study area, but also be replicable and adaptable in the various affected areas of the country.

This approach of transition and balance between urban and rural environments is not limited to establishing a separation between urban and natural areas to control their expansion. Its main objective is to revitalize urban areas by prioritizing a sustainable relationship with natural and rural environments. This is achieved by maintaining the capacity for urban development with the preservation of open spaces for recreation and agriculture, as well as the conservation of biodiversity and natural habitats. The productive city aims to raise the quality of life of communities by improving air and water quality, providing opportunities for outdoor activities in areas close to cities and more efficient access to public services, employment centres and natural environments. To better understand the model, 6 structural strategies are proposed that support each of the dimensions considered in the analysis and their interrelationship, these are:

- Financial incentives: Establish fiscal policies that encourage construction in already urbanized areas, while imposing progressive taxes based on the size and use of non-urbanized areas to discourage uncontrolled expansion.

- Development of efficient transport: Improve connectivity between municipalities and the main city, Bogotá, through an efficient transport system that serves both the population and the movement of goods and food.

- Urban growth control and direction: Implement adequate control in the expansion of the city and promote densification in already urbanized areas, thus reducing uncontrolled expansion and minimizing pressure on non-urbanized areas.

- **Concentrated development along transport corridors:** Encourage urban development along efficient transport corridors, which facilitates access to the city and reduces dispersed expansion.

- **Integrated planning between nearby cities:** Develop joint planning between nearby municipalities and cities to create an integrated urban network that avoids fragmentation of territory and allows more coherent and harmonious growth.

- Preservation of natural spaces: Protect green and natural areas such as wetlands, forests and watersheds around cities, maintaining these spaces to preserve their ecological and landscape value.

- **Establishment of floriculture centres:** designate areas that promote sustainable agriculture and floriculture through a concentrated and sustainable production typology.

- Eco-neighborhoods and green corridors: Promote the design of "eco-neighborhoods" in informal settlements, oriented towards urban agriculture, as well as green corridors that facilitate flexibility and promote sustainability in urban architecture.

- **Restoration of river edges and mitigation zones:** Increase mitigation zones and develop river ecological park.

- Relocation of informal settlements: Propose the relocation of people from informal neighbourhoods in risk zones to areas with a higher density in height, exemplifying a new compact model of urbanization

- Financial Incentives

In the search for solutions for the sustainable urban development of the productive city, urban growth containment policies based on financial interventions (UGCFI), as explained in section 1.1.5. have emerged as key tools for directing and controlling the growth of cities. These policies are based on the application of economic and financial instruments with the aim of influencing urbanization patterns and trends, contouring accelerated and dispersed urbanization and promoting more sustainable development. The UGCFI encompasses a variety of strategies that use economic and financial incentives to guide urban growth towards planned areas, which will be explained below, promoting the conservation of natural spaces, the densification of existing urban areas and the protection of strategic resources. In this context, the use of different policies of UGCFI as part of the integral urban project and the regional/metropolitan model of the productive city, considering its impact, efficiency and potential to achieve more equitable cities, resilient and friendly to the environment.

- Differentiated taxes or fees: Establish taxes or fees that accurately represent the costs of urban development. For example, raise taxes on unplanned or unauthorized urban development or extensive and unsustainable agricultural production, while reducing them in urbanized and planned areas.

- Transfer of development rights: Enable the transfer of development rights from areas suffering from growth constraints to regions that promote or permit development. This encourages property owners to conserve natural or rural areas in exchange for the opportunity to develop in specific locations (Solution for greenhouse replacement and CAR land reclamation for environmental protection).

- Fiscal and financial incentives: Extend tax incentives, subsidies, or preferential credit alignment with sustainable urban planning. For example, grant tax benefits to affordable housing projects or those that foster sustainable construction practices.

- Financing and loan programs: Facilitate low-cost or favorable conditions financing for projects that foster sustainable urban development. This could involve loan programs for improving infrastructure, public transportation, green spaces, or affordable housing (public-private partnerships).

- Landowner incentive programs: Provide economic incentives to landowners to conserve natural or agricultural areas. This could involve payments for environmental services or land conservation programs that compensate landowners for maintaining their land in its natural state.

- Density bonuses and sustainable development: Provide bonuses to developers building sustainably, using energy-efficient designs, or promoting controlled density and open areas.

- Acquisition of development rights or land: Governments can purchase development rights or land to conserve natural areas or to control growth in specific areas.

One of the policies that is most important for the development of the other strategies is the Transfer of Development Rights (TDR) which is explained constitutes an urban mechanism used to manage the development of the land and to control the density of construction in specific areas. The fundamental concept behind the TDR, which is extended in the model of productive city also for rural areas and productive buildings, is the transfer of development rights from a restricted or less desired location (areas of environmental interest or protection of natural resources by the CAR) to another area where further development is permitted or sought (densification zones depending on the designation of urban treatment, which will be explained below).

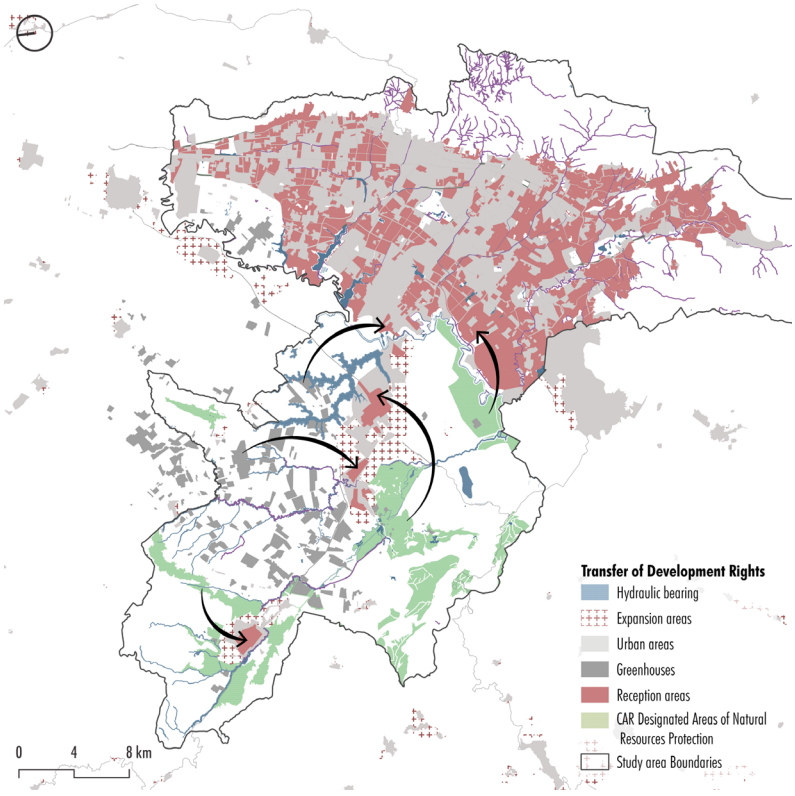


Figure 45 *Transfer of Development Rights (TDR), transfer areas and reception areas*

- Development of efficient transport

This strategy is composed fisrtly by the transmilenio lines that are the main and only current option of mass transport, although these are only in the interior of Bogotá and the connection with Soacha are those that capture the population flow from the neighboring municipalities, as well as the planned and developing projects, as are the two metro lines that connect the north and south west zones with labor centers in the east and the Regiotram, which as mentioned above will provide a faster and more efficient connection from facatativa to Bogotá, being this the first project of intermunicipal character of massive public transport with a joint vision of development. Taking these elements as a basis, a second line of Regiotram is proposed in Calle 80 in the north-west of Bogotá, the most important industrial and commercial axis towards the northwest, which borders the study area to the north and seeks to capture and mobilize the population of municipalities outside the study area, but with direct economic and physical relations through a complementary inter-municipal buses transport system. The Regiotram is considered as the backbone of the transport strategy due to its capacity and efficiency in interconnecting different areas, reducing mobilization times and integrating with other mass and local means of transport through specific stations based on population demand. As can be seen the second line of Regiotram has less number of stations because although it captures a greater number of municipalities, its population flow is lower, but it is vital for the industrial corridor along Calle 80. These transport centers interconnected mainly in the municipalities of Mosquera, Funzá and Madrid seek to generate controlled concentrations of specific commercial and productive activities that allow population flows to guide economic developments and the location of services, to facilitate access and inter-municipal interconnection for those working in large urban centres but living in smaller-scale municipalities.

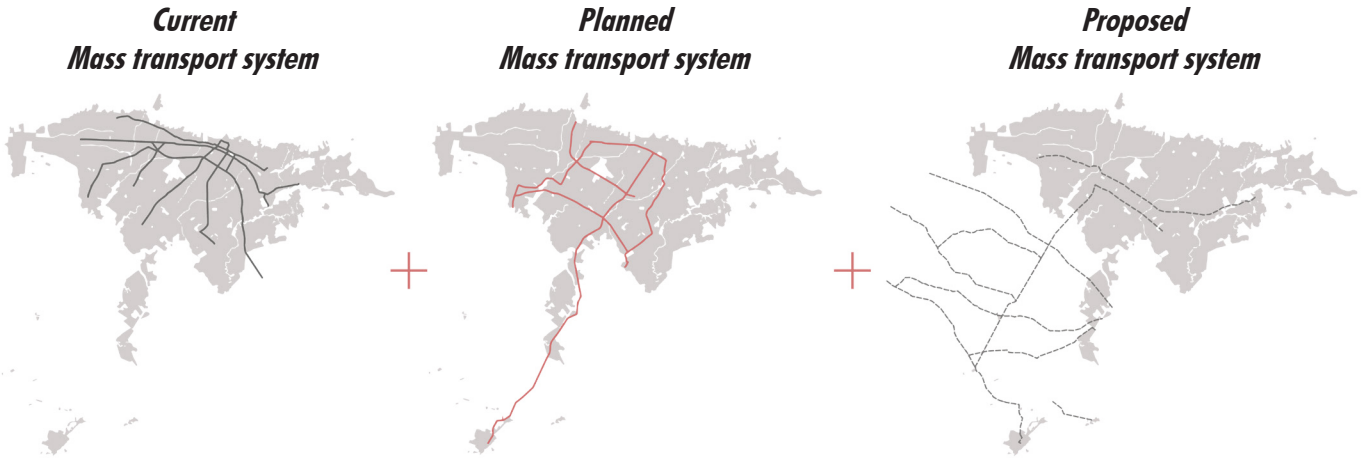
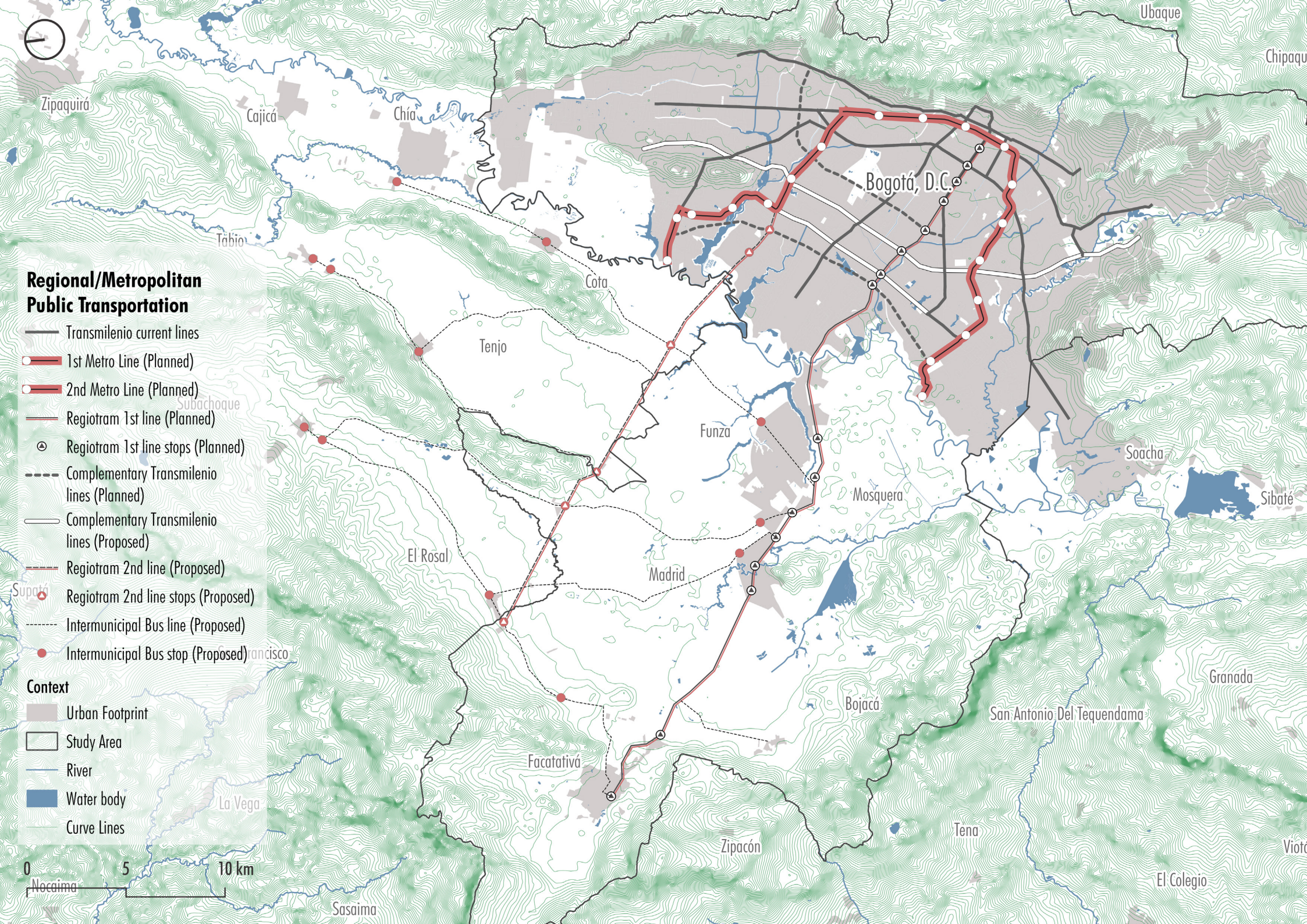


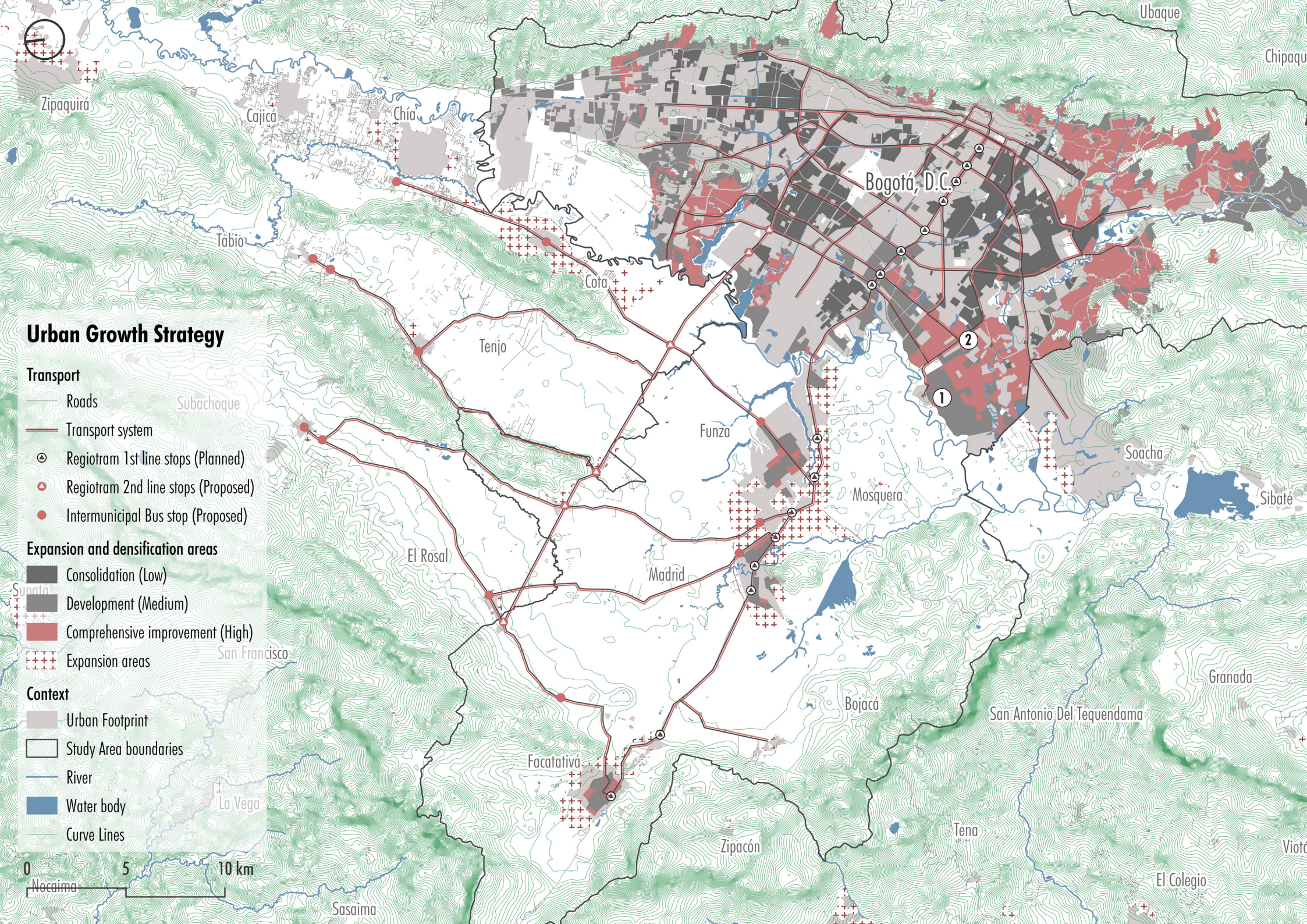
Figure 46 *Components of the transport strategy using current, planned and proposed mass transport lines*


Regional/Metropolitan Public Transportation
Transmilenio current lines
1st Metro Line (Planned)
2nd Metro Line (Planned)
Regiotram 1st line (Planned)
Regiotram 1st line stops (Planned)
Complementary Transmilenio lines (Planned)
Complementary Transmilenio lines (Proposed)
Regiotram 2nd line (Proposed)
Regiotram 2nd line stops (Proposed)
Intermunicipal Bus line (Proposed)
Intermunicipal Bus stop (Proposed)
Context
Urban Footprint
Study Area
River
Water body
Curve Lines
0
5
10 km
Bogotá, D.C.
Ubaque
Chipaque
Zipaquirá
Cajicá
Chía
Tabio
Cota
Tenjo
Subachoque
Funza
Soacha
Mosquera
Sibaté
El Rosal
Madrid
Supatá
Granada
Bojacá
San Antonio Del Tequendama
Facatativá
Tena
Zipacón
El Colegio
La Vega
Nocaima
Sasaima

- Urban growth control and direction

Given the demographic and urban growth trends explained above, urban development is encouraged along efficient transport corridors, facilitating access to the city and reducing scattered expansion. As mentioned in the transport strategy concentration centers of flows and activities are created, around which development is encouraged, with facilitated accessibility to and from the rest of the region. For this, two main approaches are taken, the first is based on the planning of future urban expansion areas until 2050. These areas along the municipalities of Mosquera, Funzá and Madrid have a joint behavior, because currently they are already completely conurbated, thus allowing to develop areas that currently tend to be scattered to group them and generate a compact development model along calle 13 and the first Regiotram line. The main factor that justifies the size and creation of the expansion areas is the population growth rate, that as expressed by Echeverri (2017) will be at a level of 0.5% per year for Bogotá and 0.2% for the other municipalities in the study area, making Bogota have 10.6 million inhabitants by 2050 and the other municipalities increase by 81,000 inhabitants its current population. Although in the historical growth analysis in section 2.1.1. evidenced from the year 1995 to 2023 the urban area quadrupled, while its population doubled, can be estimated with an increase of 350,000 people among the 5 municipalities, in addition to the new migrant population from Bogotá, it is necessary to generate areas that allow controlled urban development that provides accessible housing and avoids the generation of areas of informal and scattered origin outside the proposed future boundaries. This is why a joint expansion area of 2800 ha (current urban footprint of 4000 ha) together with densification zones within the already urbanized area, by using the urban treatments (section 2.1.1.4.) expressed in the POT which will provide different levels of densification in height according to the location, access to intermunicipal transportatin and typology of the area (higher modifications mainly in areas of informal or self-construction origin).

Figure 47 *Components of the Urban growth strategy using mass transport lines, expansion areas and density areas*


Urban Growth Strategy
Transport
Roads
Transport system
Regiotram 1st line stops (Planned)
Regiotram 2nd line stops (Proposed)
Intermunicipal Bus stop (Proposed)
Expansion and densification areas
Consolidation (Low)
Development (Medium)
Comprehensive improvement (High)
Expansion areas
Context
Urban Footprint
Study Area boundaries
River
Water body
Curve Lines
0
5
10 km
Ubaque
Chipaqu
Zipaquirá
Cajicá
Chía
Bogotá, D.C.
Tabio
Cota
Tenjo
Subachoque
Funza
Soacha
Mosquera
Sibaté
El Rosal
Madrid
Suesca
San Francisco
Granada
Bojacá
San Antonio Del Tequendama
Facatativá
La Vega
Tena
Zipacón
Viotá
El Colegio
Nocaima
Sasaima
1
2

- Preservation of natural spaces

The strategy where the PEMOT of the metropolitan region is most important is this, since it contains the most essential and priority elements of the model, the non-urban areas. This is where a general subdivision is generated, as can be seen in figure 48, productive areas (agricultural), natural areas (protection, conservation, restoration, etc) and CAR areas designated for natural resources protection (natural and productive). This general subdivision of non-urban areas provides a land use zoning, establishing specific areas within the productive city with limited and moderate construction and development restrictions, as well as regulations for conservation and environmental protection. As mentioned in section 2.1.5. problems related to urban expansion, over-exploitation of natural resources, loss of land by the CAR, erroneous use of designated areas for other functions and illegally protected land taking have led the study area to an unsustainable and risky condition in which extensive agricultural production without regulation (soil exploitation and dispersed growth of greenhouses) and urban and rural land value competition increases rapidly. This is why it is proposed to recover land from the CAR that is not complying with the provision of use for natural areas and the intensity of use for productive areas. As it can be evidenced these areas were taken into account for the development of the proposal of urban growth that seeks to remove the natural areas of the urban area having CAR transitional areas of low-impact production or restoration and forestry development to minimise the impacts of urbanization and increase ecological connectivity, mainly in Bojacá, which for its topographical conditions is presented as the main support and container towards the south and its western connection towards the west with Facatativá.

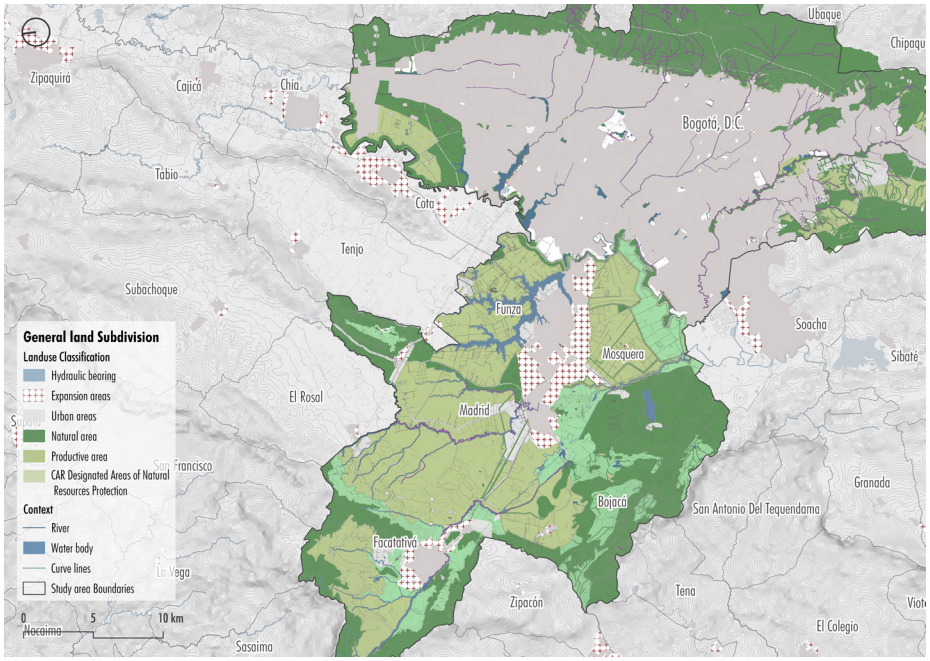
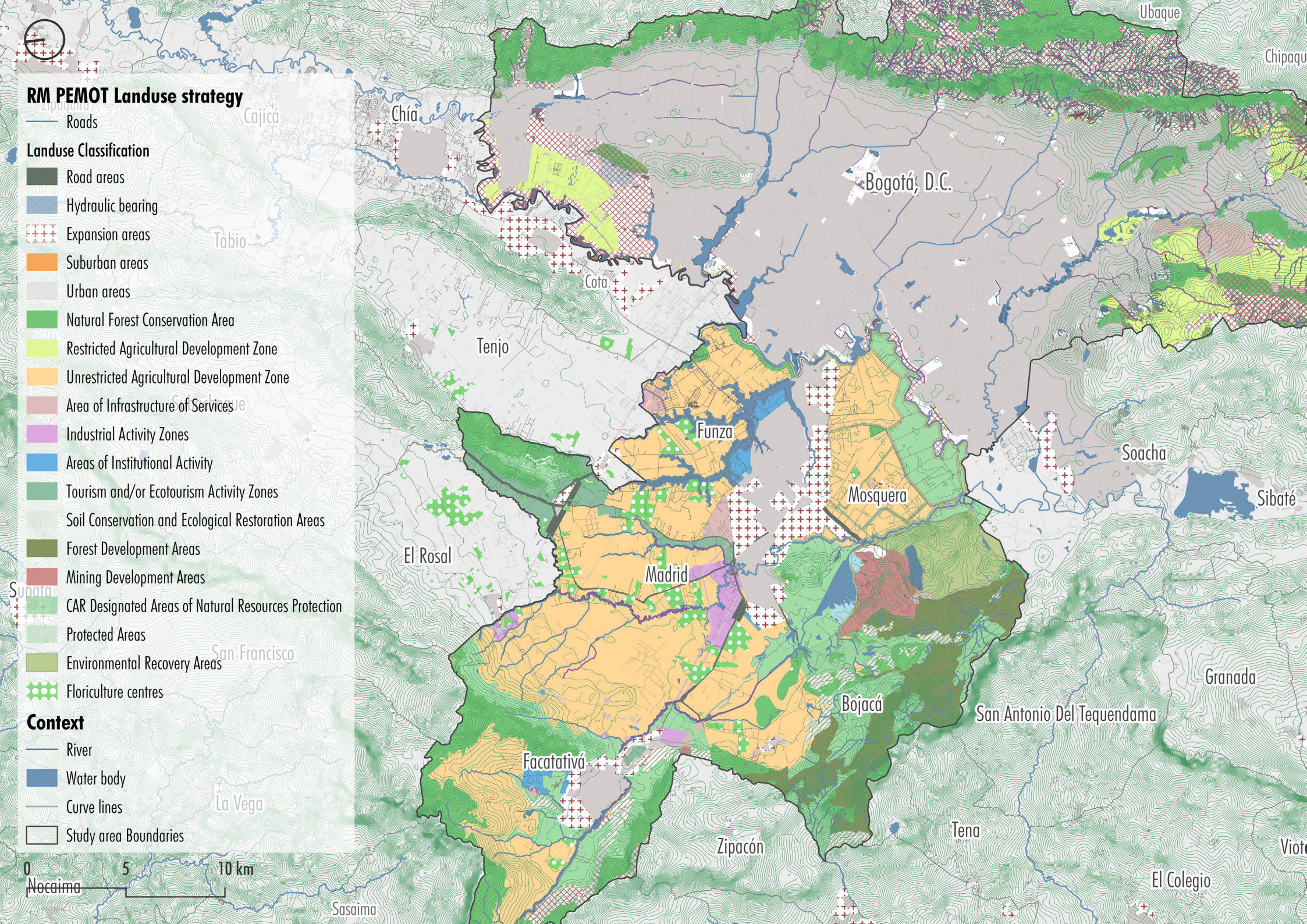


Figure 48 *General land subdivision: Productive areas, natural areas and urban areas*


RM PEMOT Landuse strategy
Roads
Landuse Classification
Road areas
Hydraulic bearing
Expansion areas
Suburban areas
Urban areas
Natural Forest Conservation Area
Restricted Agricultural Development Zone
Unrestricted Agricultural Development Zone
Area of Infrastructure of Services
Industrial Activity Zones
Areas of Institutional Activity
Tourism and/or Ecotourism Activity Zones
Soil Conservation and Ecological Restoration Areas
Forest Development Areas
Mining Development Areas
CAR Designated Areas of Natural Resources Protection
Protected Areas
Environmental Recovery Areas
Floriculture centres
Context
River
Water body
Curve lines
Study area Boundaries
0
5
10 km
Ubaque
Chipaqu
Chía
Cajicá
Tabio
Bogotá, D.C.
Cota
Tenjo
Funza
Soacha
Mosquera
Sibaté
El Rosal
Madrid
Granada
Bojacá
San Antonio Del Tequendama
Facatativá
Tena
Zipacón
El Colegio
Nocaima
Sasaima
La Vega
San Francisco

This environmental connection that begins with the areas of protection of natural resources designated by the CAR in Mosquera along the river and its administrative border with Bogotá until the municipality of Facatativá creates a long ecological network that borders the area of study. Leaving the regulated intensive agricultural production areas in central areas, allowing connection and access to smaller-scale municipalities to the north. To divide the productive areas and create a natural connection that extends from the protected areas of Madrid until the main environmental protection node in the north, Bojacá, ecotourism corridors and green and blue infrastructure inside urban areas are proposed. In this way the territory is divided and regulated by the main ecological structure that guides and organizes the land uses in an integrared and sustainable way. Although the productive areas were not only composed of open areas, but simultaneously with the historical development and growth of the urban area presented the scattered increase of large areas of greenhouses causing not only intensive use of the soil but at the same time destroying it for 30 years by being completely covered. This has generated an unsustainable production cycle throughout the agricultural and floricultural function that although it is the main productive medium due to its national and international importance generates problems in the short, medium and long term. For this reason, the location and area of these structures were analyzed for the same as the urban area to organize and distribute throughout the transport and communication structure, improving the efficiency of distribution and mobilization of products, and environmental protection of areas with productive capacity. For this reason, the idea of floriculture centers in the specifically selected areas is proposed, as can be seen in figure 49, to develop this new typology of production.

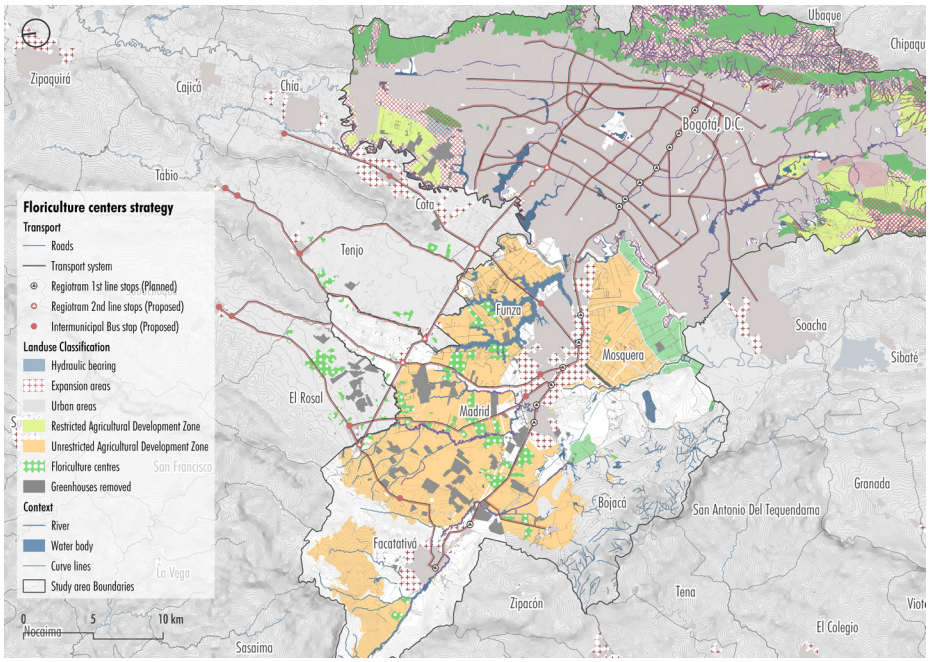


Figure 49 *Floriculture centers strategy: Replacement of existing greenhouses and land use modifications*

These floriculture centers take as a basis of building typology the project of the equipment "the Cité Maraîchère in Romainville" by Ilimelgo in 2021, as can be seen in image 7 and 8, and as they expressed in the description of their project:

> "is a new municipal equipment for urban agriculture and sustainable food, as well as the place of agricultural, social, architectural and technical innovation... exemplary for its rationality and constructive logic, the building is a link between traditional and modern horticultural practices. In the face of climate change, future major ecological and food challenges and projected population growth by 2050, urban agriculture is considered a solution with great potential for the future." (Vertical urban farm, 2021)

The selection of this type of construction and production methodology seeks to promote sustainable agriculture and urban agriculture within the model of the productive city. Generating an ecological transition, reducing natural resource consumption, creating jobs and offering the rural population with fewer resources and productive area the alternative of producing in height, increasing their income and generating shorter supply chains. This proposal seeks to continue with the approach of achieving sustainability, economic stability and food sovereignty of the Bogotá Savannah, in addition to diversifying and improving agricultural processes through research points and new technological alternatives located in these centers. The use of new alternatives that replace traditional elements that have negative consequences is part of the effort to generate economic diversification for the region, which will boost its economic growth and encourage development in the next 30 years.

Image 7 *Image extracted from Ilimelgo architects website, general view of the "vertical urban farm" project in Romanville, France, 2021 Source: https://ilimelgo.com/en/projets/cultiver/cite-maraichere*

Image 8 *Image extracted from Ilimelgo architects website, Internal view of the "vertical urban farm" project in Romanville, France, 2021 Source: https://ilimelgo.com/en/projets/cultiver/cite-maraichere*

This adaptable model can not only be implemented in rural and urban areas, but its flexibility allows addressing diverse contextual dynamics. This makes it possible to address issues such as community development, reducing the heat island effect, improving air and water quality. It also promotes sustainable and responsible land management that can have a positive impact on urban regeneration and the comprehensive improvement of informal settlements.

While it is true that its implementation can lead to a reduction of areas for agricultural production, especially in ecologically important areas, thus posing a challenge in terms of income for landowners, as mentioned in relation to economic incentives, there are viable options. One of them could be the use of Transfer Development Rights (TDR) in urban areas with development plans and increased density in height. This, along with exploring more sustainable economic alternatives, offers opportunities to balance economic demands with environmental preservation. In addition, in areas focused on natural and ecological protection, there are coherent options that could be considered:

1. Sustainable tourism as an economic alternative: Instead of relying exclusively on intensive agriculture, sustainable tourism emerges as a viable economic option. The conservation of natural areas attracts tourists interested in biodiversity and outdoor activities. Modalities such as ecotourism, bird watching, hiking and other conservation activities could be particularly attractive for this strategy.

2. Sustainable and adapted agricultural production: The adoption of organic farming

practices or the cultivation of species adapted to the environment in an environmentally friendly manner represent feasible alternatives. For example, the selection of crops that occupy less space or the implementation of vertical cultivation systems could be more appropriate options for areas with spatial limitations.

3. Promotion of local handicrafts and products: The manufacture of handicrafts, regional products and local cuisine is a potential source of income. Marketing local culture through the sale of artisanal products, traditional foods and souvenirs could prove profitable and contribute to the local economy.

4. Environmental research and education centres: The establishment of specialized environmental conservation research and education centres could generate income through educational programmes, training and sustainability-oriented events.

5. Environmental services and advice: Providing advisory services in sustainability, ecological restoration and natural area management can be a source of income. These areas have significant value for research and conservation, making these services in high demand.

6. Renewable energy: The implementation of renewable energy projects, such as wind farms or solar plants, emerges as an alternative in areas with restrictions for agriculture but with a high potential for the generation of clean energy.

As well as emerging technological options in Colombia and Latin America that can produce economic development in the region, new jobs and public-private partnerships that benefit the sustainable growth of the study area

1. Technology and Software: There is significant growth in software development, fintech, edtech and technology solutions in general.

2. Health and Biotechnology: Biotechnology applied to medicine, the development of medical devices and health research are constantly evolving.

3. Advanced Manufacturing: Advanced manufacturing development, including 3D printing and robotics.

- Eco-neighborhoods and green corridors

Based on the previous strategies of the productive city, it seeks to illustrate the urban treatment of development of one of the areas inside Bogotá, located on the administrative threshold with Mosquera and the first station of line 1 of the planned Metro, as can be seen on page number 113 in the urban growth strategy represented with number 1 on the map. It is based on the understanding of its physical layers, which together with the elements analyzed in chapter 2 result in the conception of urban eco-neighborhood development. First of all, it is important to understand that the "Eco-neighborhood" is both a model and a strategy of sustainable urban planning and development that allows creating new ways of inhabiting the territory with the minimum possible environmental impact through community involvement (Ubeira and Quiroga, 2010). The Santa Fe neighborhood is selected because the condition of its structuring dimensions (socioeconomic, environmental and physical) present a great problem for the population that inhabits it, as well as its relationship between the urban area and the intermunicipal rural limits. This makes it the perfect example of urban boundary areas with a development arrangement.

To better illustrate the conditions of Santa Fe de Bosa neighborhood can be observed that according to its layers is understood as:

Image 9 *Image extracted from Google Earth Pro, Santa Fe de Bosa Neighboorhood River round, administrative Threshold*

Image 10 *Image extracted from Google Earth Pro, Santa Fe de Bosa Neighboorhood, public park provision*

Image 11 *Image extracted from Google Earth Pro, Santa Fe de Bosa Neighboorhood, reserved land for road network continuation*

Image 12 *Image extracted from Google Earth Pro, Santa Fe de Bosa Neighboorhood, typology and urbanization contrast*

An area with a lack of effective public and green spaces, with a majority of neighborhood parks (image 10) and proposals for a metropolitan scale park. The flooding area that puts at risk the integrity of the buildings and the lives of the people, due to a zero separation with the protection zones of the river (image 11).

Figure 50 *Types of parks and green areas*

An area with a cadastral land value around 730,000 and 1,320,000 COP (165-300 Euro) per square meter, in its area of informal origin and values notoriously higher in the urbanizations of nearby reidencial complexes, as can be seen in figure 50. The lowest values are found in the current and proposed public spaces, in addition to the river rounds.

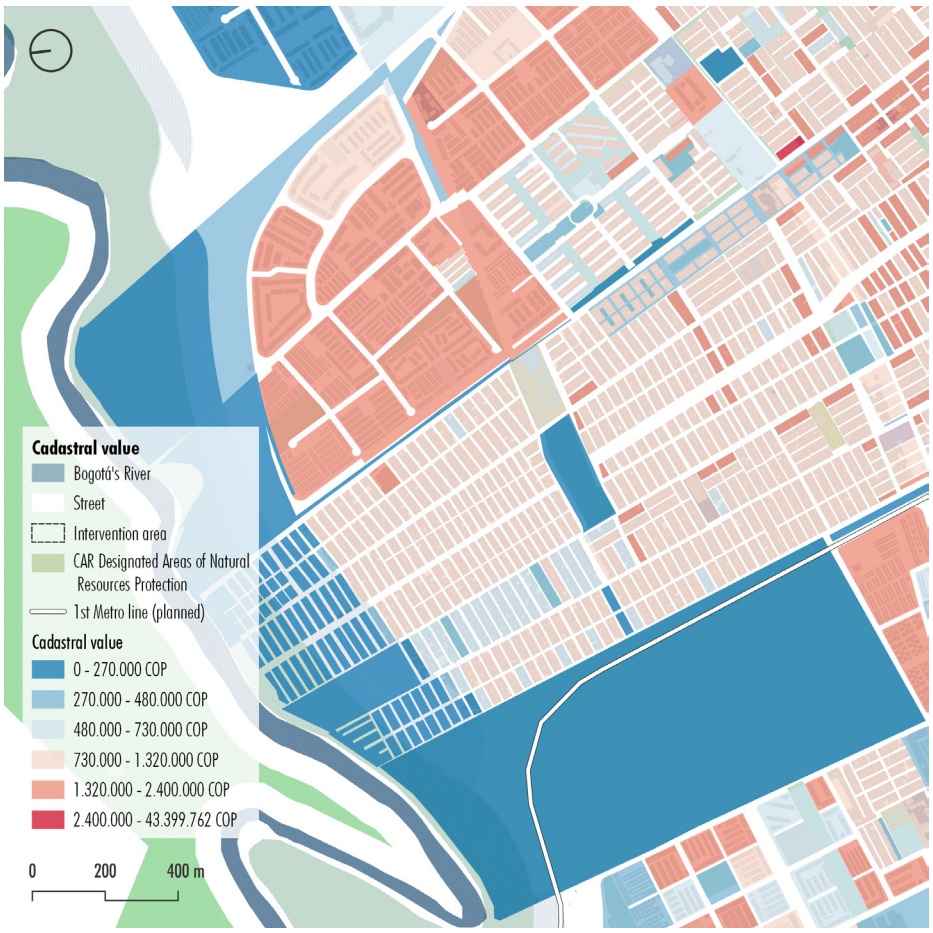


Figure 51 *Cadastral value*

Low provision of public services, mainly health (hospitals and care centers), in addition to the lack of sports or recreational areas. Most of the services available are of an educational nature and the presence of comfort services building (for marginal groups, elderly population, kids, etc.)

Figure 52 *Public services provision*

The only method of transport are the bus lines of the public transport service, in addition to the complementary informal transport lines. There are proposals and projects for the generation of two main metropolitan roads (as can be seen in image 11), as well as the construction of the first line of the metro.

Figure 53 *Transportation and Mobility*

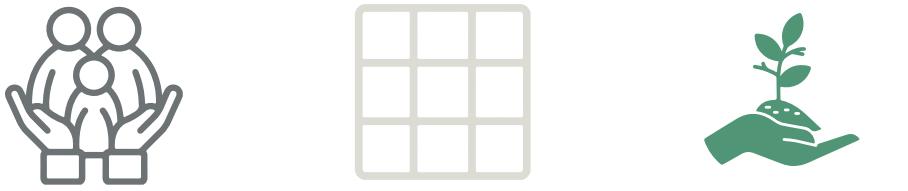
It has a great building density with a low index of free spaces beyond the zones of edge of the river and the area with disposition for the project of a metropolitan park. There is a great disconnection of the urban fabric with the regulated zones as well as a contrast in the full and empty relation with the typologies of residential complexes in height (image 12).

Figure 54 *Density, full and empty*

Based on the physical reality explained and as mentioned in sections 2.1.1. and 2.1.2. the majority of the resident population of these neighborhoods comes from a rural origin (in search of a greater number of opportunities), it is proposed the creation of an eco-neighborhood with an agricultural disposition, seeing as advantage and opportunity the knowledge of the population, as well as its proximity to the rural areas of the study area. This would allow the development of a community around urban agriculture, a social, cultural and economic dynamic that would provide economic diversity, as well as the possibility of self-sufficiency and generate food sovereignty, to not only reduce the environmental impact of this urban area, but improve the quality and opportunity of people by integrating a sustainable model that includes a greater number of public health, education, comfort, culture and recreational services, that relate to new public spaces and adjacent natural elements, such as the Bogotá's River. This is possible through the relocation of the population that was at risk of flooding areas or of interest for the development of services and public spaces, in order to extend the urban fabric and to relate to the adjacent areas and have a pattern that facilitates the access of public transport and new dynamics. Green spaces of urban agriculture and recreation are proposed, which like the previous strategy can have the typology of

vertical farm for the food and technology development of agricultural practices. In the same way, the river protection areas were expanded, so that together with the ecological park that was integrated with the new metropolitan park, agricultural transition zones and intermunicipal connection are generated to make the river an element of value and relationship and not as a physical barrier.

This new system of roads and public transport supported by the metro that would allow long mobilizations in short periods of time to the rest of the city, as well as the new provision of services, recreational areas and economic production, seek to improve the quality of life of the inhabitants of this neighborhood by protecting the value of the land and avoiding the increase in real estate pressure that gentrifies its inhabitants, through urbanization restrictions, increase in taxes by size of construction and generation of areas only arranged for the provision of housing of social interest and priority interest (Affordable housing), to avoid not only gentrification, but also urban expansion towards the river.



Socioeconomic cohesion *Spatial connectivity* *Environmental protection*

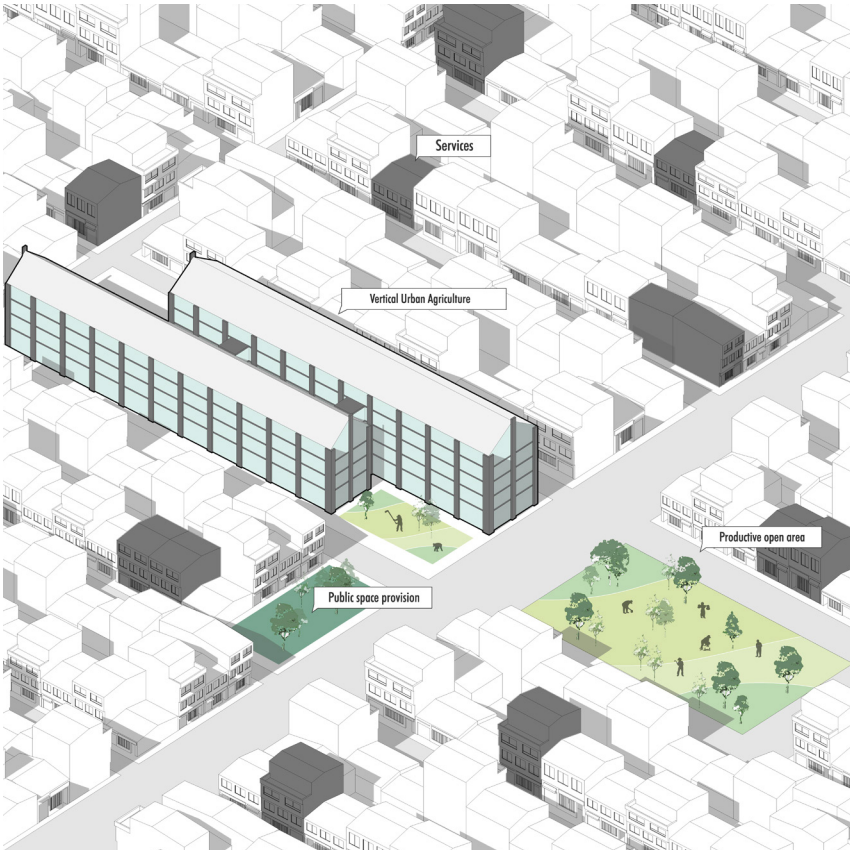


Figure 55 *Functional and spatial relationships of Eco-neighbourhood*


Eco-neighbourhoods
Buildings
Services
Shadows
Streets
Blocks
Parks
Natural protection
Agriculture
River
Urban Agriculture
0
200
400 m

- Relocation of informal settlements

Continuing with the developments made in the previous strategy, this time it seeks to illustrate the behavior of an area with the comprehensive improvement treatment, which can be seen located on page 113 with the number 2. This time it is assumed that a specific number of people had to move from the other area due to the danger posed by these areas or the interest for the development of the eco-neighborhood. This way, an area is selected that benefits this population, that allows them to access public services, the benefit of the construction of the first line of the metro and that does not break their social bonds generated. Having all this as a base, Britalia neighborhood is selected, as it is the location of the second metro line stop, allowing the relocated inhabitants the possibility of connecting in the same way with their old neighborhood and also make long trips in a short time around the city. This is because in the exercise of expropriation it is sought to protect not only the economic value and goods acquired by the person, but also their social, labor and cultural connections, so that the adaptation is easier in any age. Likewise, an analysis of the physical conditions will be performed that explains not only why it is an area that meets similarities with the previous area for the relocated inhabitants, but that allows to understand the need to carry out an urban treatment of development in an area more to the interior of the city.

Image 13 *Image extracted from Google Earth Pro, Britalia Neighboorhood, building typology*

Image 14 *Image extracted from Google Earth Pro, Britalia Neighboorhood, public park provision*

Image 15 *Image extracted from Google Earth Pro, Britalia Neighboorhood, urban fabric and economic activities*

Image 16 *Image extracted from Google Earth Pro, Britalia Neighboorhood, abandoned green areas*

The Britalia neighborhood is an area with a lack of public space and effective green areas, with a majority of parks of neighborhood scale (image 14) and a park of zonal scale (Gilma Jiménez, Margaritas). A better spatial interconnection of public spaces and green areas is perceived, however in its zone more disposed towards the south-east the disconnection and precariousness of these is evident (image 16).

Figure 56 *Types of parks and green areas*

The behavior of this neighborhood is similar to the previous one since it is an area with a cadastral land value around 730,000 and 1,320,000 COP (165-300 Euro) per square meter, in its area of informal or self-built origin and values notoriously higher in the urbanizations of nearby reidencial complexes as can be seen in figure 56. The lowest values are found in the current and proposed public spaces.

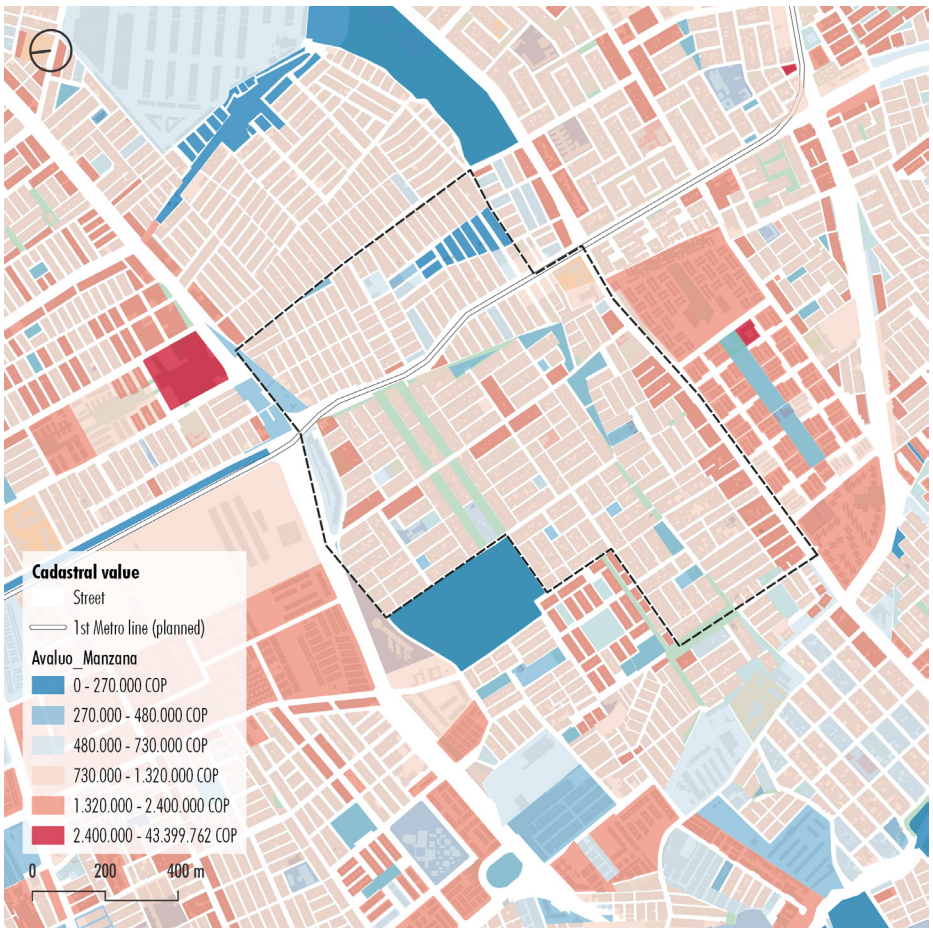


Figure 57 *Cadastral value*

In this case the provision of public services is even lower than in Santa Fe neighborhood. Although it is true that more educational services remain, the reality is that its scale and area of influence is lower, due to the services provided in the adjoining areas. The low presence of health services invites the need to generate a greater response.

Figure 58 *Public services provision*

This area has better provision and connection in terms of public transport, based on the SITP bus lines, as well as the metro line accompanied by the transmilenio, that is to say the accessibility is improved and the projects of main streets of metropolitan character continue the same line of the neighborhood Santa fe.

Figure 59 *Transportation and Mobility*

It has a great building density with a higher index of free spaces accompanied by the park of zonal character. There is a better connection of the urban fabric with the regulated zones, but an internal disconnection with the south-eastern zone, as well as a contrast in the full and empty relation with the typologies of the residential complexes in height.

Figure 60 *Density, full and empty*

Understanding the layers that make up this neighborhood, it is proposed to generate specific heights densifications that allow the realization of a compact city urban model and the continuation of the development of the city in the future. As mentioned above, informal or self-constructed neighbourhoods are used due to their urban and architectural flexibility, allowing easier to generate changes of pattern, new architectural and spatial typologies, as public spaces that would be perfectly interrelated due to the complementarity and adaptation character of informal or self-constructed urbanization. It starts from the correction of the urban fabric, to interconnect again the south-eastern zone and to be able to continue with the projects previously proposed of roads and interconnections of transport. Built spaces are released for the provision of public spaces accompanied by missing services, as well as the option of generating urban agriculture areas in less quantity. It is proposed urbanizations in height in those areas with greater building density to release different areas for the realization of public spaces or services, as well as to receive people who should be moved for the elaboration of this proposal. In this case a flexible and differential height model is proposed to the residential complex model. It does not pose a closed complex, but rather urbanizations that allow in its first floors to supply needs, through commerce and/or services, providing the opportunity for the population to generate income with a similar principle to that

proposed in a self-built building building. This will provide economic development and an increase in the quality of life as a model that can be replicated and adapted to different dynamics such as urban agriculture, remote jobs or neighborhood commerce. In these areas subject to urban treatment of integral improvement, which are specified and more clearly located in the urban growth strategy on page 97, it is possible to make major changes in density due to its location in the city to complete the urbanization processes in order to correct and improve the physical conditions of these areas ensuring their habitability, thus respecting the population that lives there avoiding population flight and gentrification.

This model in height seeks to supply and create the concept of vertical city and city building which can offer the different components and services of a city, so as to reduce the routes and displacement along the city, avoiding the permeabilization of undeveloped land that can be disposed as a complementary part of the main ecological structure.

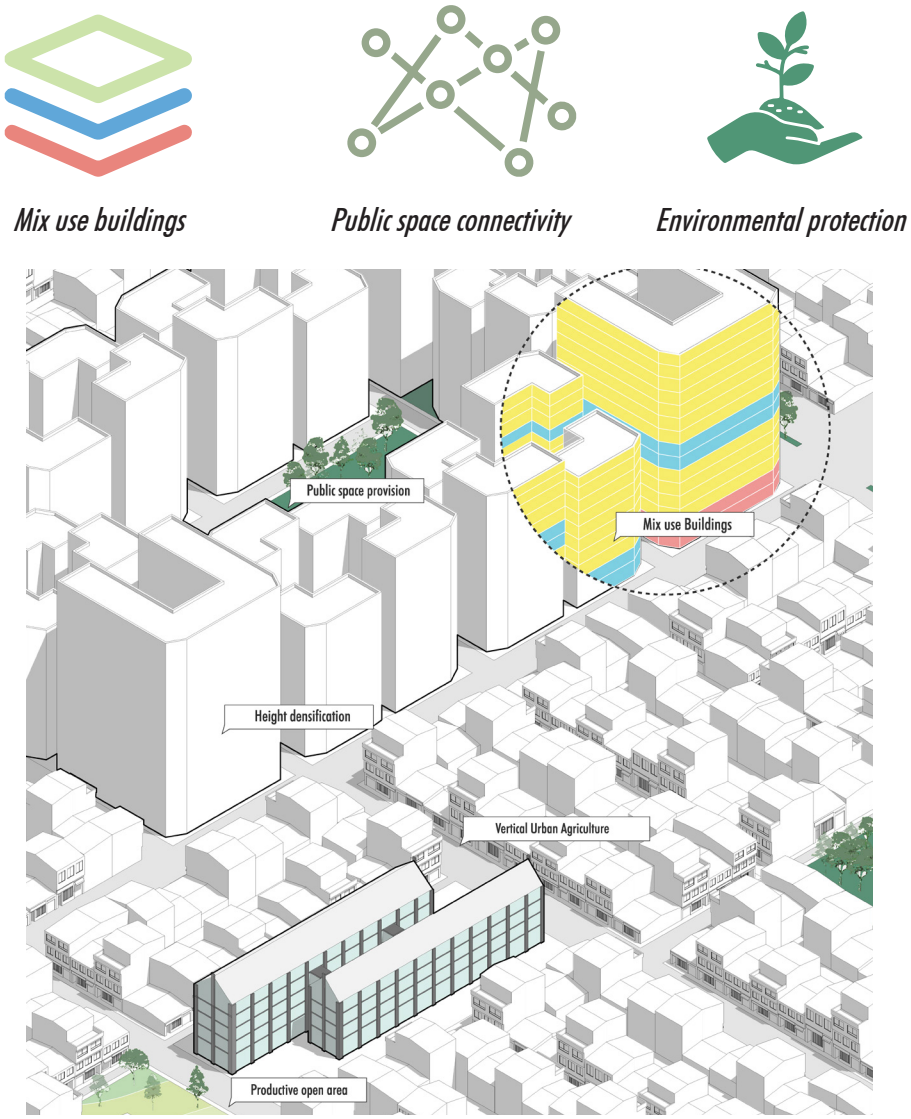
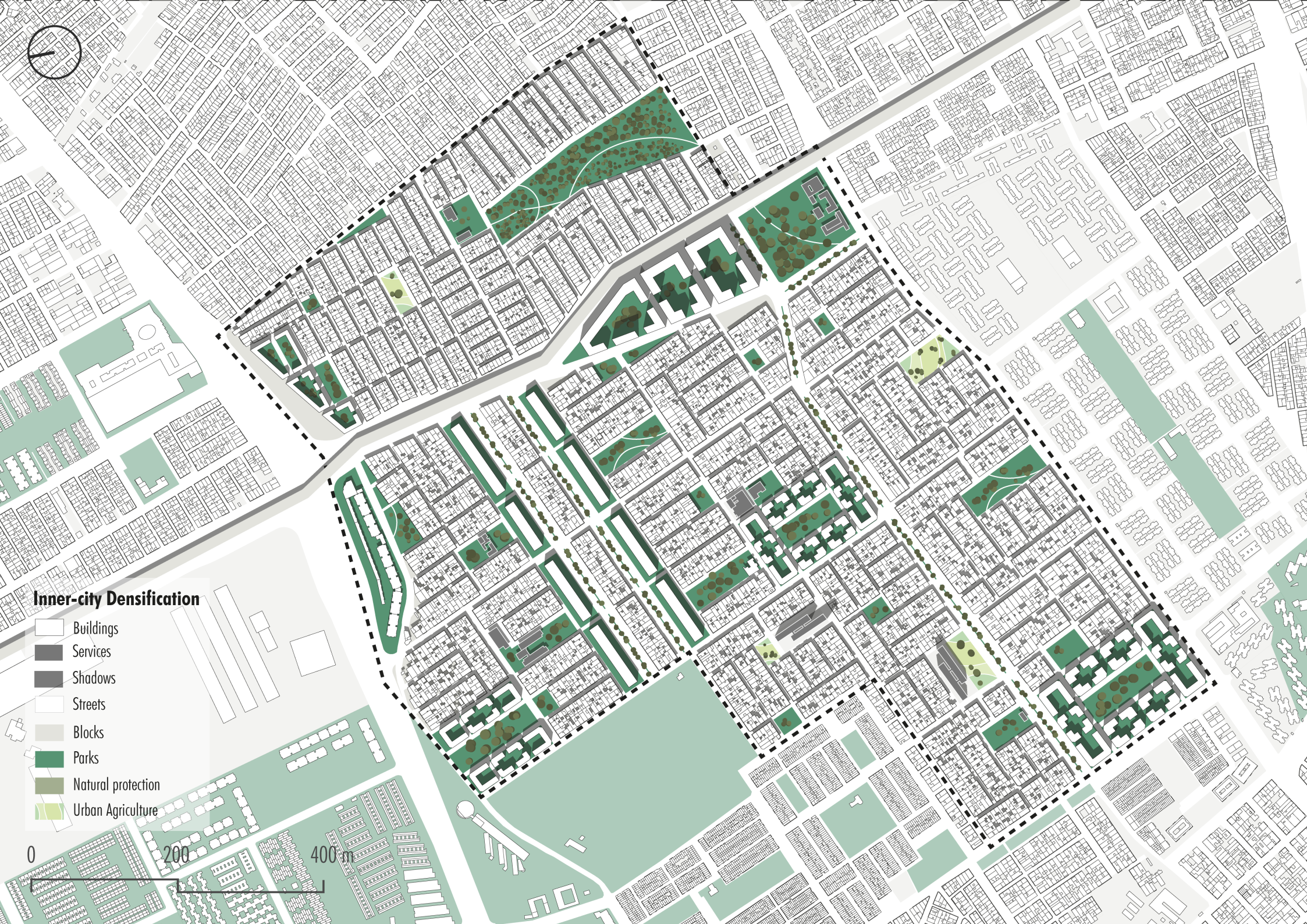


Figure 61 *Functional and spatial relationships in height densification*


Inner-city Densification
Buildings
Services
Shadows
Streets
Blocks
Parks
Natural protection
Urban Agriculture
0
200
400 m

CONCLUSIONS

The primary objective of this thesis was to elucidate the planning model capable of fostering efficient, sustainable, and cohesive territorial development within the southwestern threshold of Bogota's metropolitan/regional area. This entailed organizing, regulating, and overseeing urban growth, economic activities, and the circulation of resources. The study focused on a case analysis situated in Bogota, Colombia.

Both the theoretical framework and the practical project aimed to comprehend the underlying elements and dimensions propelling rapid urbanization. This understanding was pivotal in regulating unchecked urban expansion while facilitating sustainable urban development over the next 30 years. The diverse theoretical frameworks facilitated an understanding of the factors underlying contemporary urban development in the study area, delineating differential aspects prevalent in Latin America that diverged from patterns observed in the global north. These frameworks also facilitated an exploration of options for controlling urban growth through planning and financial interventions, thereby cultivating a critical perspective in proposing a planning model within a megacity characterized by direct spatial interdependencies with smaller-scale urban settlements, all influenced by continual urban and economic expansion.

The study concludes that the savannah region of Bogotá necessitates decentralization in decision-making concerning the capital district's development to engender integrated planning. This integration would be achieved through a coherent Metropolitan Strategic Plan for Territorial Ordering (PEMOT) that correlates with each facet of the Land use plan (POTs). Economic diversification emerges as a requisite solution to address prevalent economic and environmental challenges engendered by the region's limited alternatives, primarily beyond Bogotá, for fostering economic development and attracting public-private investments. Stringent restrictions and environmental safeguarding policies, administered by the relevant regulatory authority (CAR), are indispensable to govern land utilization and consumption in alignment with its attributed function. This integrated approach, in conjunction with other land uses, seeks to extract and optimize the inherent values and potentials of the region, rendering them more adaptable to the local area and it population. The study advocates leveraging the principal ecological structure as the primary support and regulatory framework for Bogota's savannah, fostering a collective consciousness for conserving elements intimately linked to urban settlements.

Proposing a transport network as the backbone for urban expansion aims to curtail dispersed urban sprawl by establishing focal points for service provision and economic activities, consequently reducing commuting durations for the transient population. Additionally, advocating for compact urban development models at various scales strives to meet the diverse needs of the population. Furthermore, the study advocates minimizing closed residential complexes typifying a fear-based city model, favoring urban and architectural typologies that, through increased foot traffic, engender security and foster social and spatial interactions at a public ground level. This approach prevents the proliferation of expansive commercial buildings reliant on extensive commuting and private transportation. Informal and self-built settlements emerge as potential anchors for the city's compact development, owing to their urban and spatial flexibility, enabling height densification and innovative urban projects that promote affordable housing and urban progress.

Conclusively, the thesis underscores the imperative linkage of urban planning intervention with financial frameworks. These frameworks not only dissuade urbanization of rural or natural land but also facilitate development within urban cores without adversely impacting underprivileged populations. It is essential for such strategies to promote sustainable development, necessitating an integrated vision among the constituent municipalities shaping the productive city model. This integrated approach ensures the utilization and enjoyment of each element, natural resource, and land use, not only by the present generation but also by future generations.

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