

# **Urban Areas Associated to Population Growth and Transformations Produced by Migration.**

## **Case Study: Santiago De Cali, Colombia**

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### **Abstract**

The urban areas of Colombian cities in recent decades have undergone profound changes due to the effects associated with accelerated demographic growth due to particular social and economic determinants. Informality and illegality have negatively characterized the consolidation and urban development of the country's main cities, triggering processes that become more complex as a result of the accumulation of problems and their increase given the lack of timely actions. Consolidation routines and urban development have been territorialized, becoming physical-spatial in terms of urban patterns. This way, the territorial transformation processes can be visualized and understood. From these relationships and placing the use and nature of the surfaces as a basis. By understanding the city as a sum of territories with spatial characteristics (physical, social and economic determinants among others, and in the Colombian case where communes are defined by administra-

tive management), aspects (such as area, population, density urban) can be contrasted to demarcate the specific scenarios that describe urban development. The municipality of Santiago de Cali and its communes are hereby studied.

**Keywords:** Public space, Cali, urban, urban areas, urban planning

## **1 Introduction**

Cities across the world have experienced strong demographic growth in the last decades given economic dynamics and other specific factors. In the case of Latin America, there have been migrations from rural to urban areas throughout the last 50 years, which has marked the decline of rural population [2]. In the case of Colombia [6], these internal migrations have had more characteristics that mostly respond to natural and marked physical conditions of the territory, since the natural barriers of the country induce migratory flows directions. Routes are inscribed in regions where direction goes from the field (rural) to regional capital cities [1]. Therefore, each capital of every region has seen relatively similar growths. Bogotá, Medellín, Cali and Barranquilla are the main regional capitals in Colombia that have concentrated most of the internal migratory flows. By 1951, these cities held 71% of the country's population, in comparison to 1973, when they held 78.4% of the total population [16]. This evidences the punctual distribution in these urban centers and also the rhythm of growth of the settled population. Another determining factor for internal migration in Colombia is related to armed conflict, which has mostly used rural areas as its main scenario [17].

The municipality of Santiago de Cali, capital of the southwestern region, has been a historical focus, especially after the construction of the first railway lines during the 19th century. Internal migrations have defined urban development in the city. Founded in 1536, it is the capital of the department of Valle del Cauca and is located in the south west of Colombia in the extreme north of South America (see Figure 1). Its particular topography, which answers to the conditions created by the valley of the Cauca River, is mostly of flat surfaces, which has facilitated the processes of urbanization and expansion. It has an estimated population of 2,344,734 inhabitants who are settled in an area of 619 km<sup>2</sup>, of which 19.54% (12,097 Ha) are urban areas [14]. These urban areas correspond to 22 communes with a total of 622,094 homes registered. Other factors have characterized the different migration scenarios during the last decades: flow intensity and the ways in which arrivals take place. The investigative work of Nancy Motta González [12] clearly frames the moments of the migrations in the municipality. From the ranges defined by the author, those recent and close to the 90s are of interest, since throughout this time global economic instability [5] had a negative effect over productive dynamics of the region, as well as on working conditions [15]. This had implications on other social dimensions, where the deterioration of the population's economic capacity affects the ways in which territories are established [8].

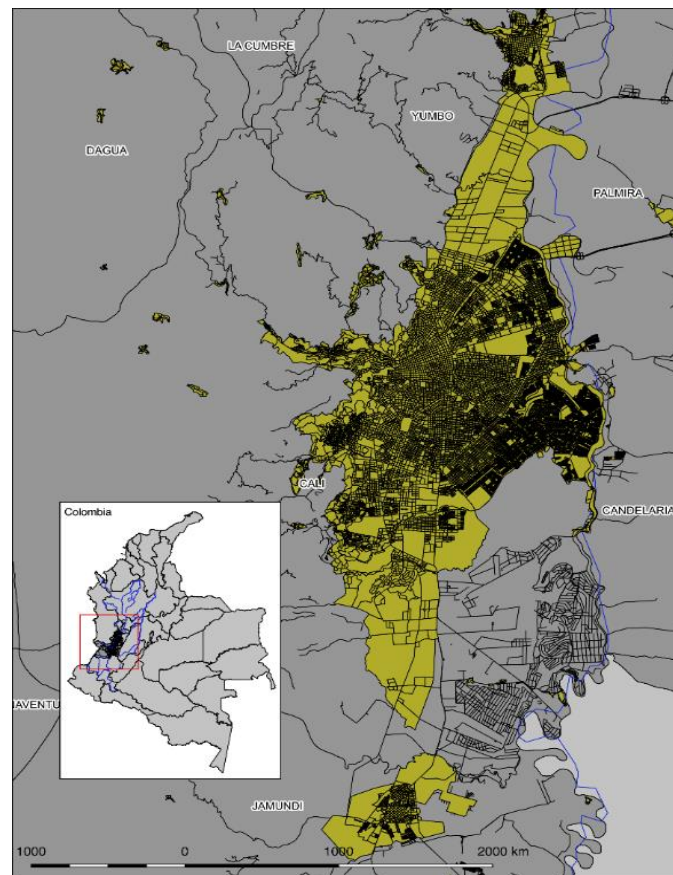


Fig. 1. Location of the Municipality of Santiago de Cali. Source: Authors.

Basic characteristics of urban conformation, in terms of the plot or the geometry with which it is urbanized –considering surface distribution–, are of interest. As the result of variables describing population (how the territory is inhabited), these characteristics define specific frameworks of relationship within territories (communes). This raises the theoretical possibility of contrasting the characterization of each city searching for patterns that defined or continue to define the ways in which urban areas of the Municipality of Santiago de Cali were developed, consolidated and have been transformed in recent years. According to law 388 of Colombian legal framework [3], the territories that are within a perimeter established as proposed in land-use planning define municipalities' urban surfaces. Therefore, urban perimeter is a construction made from specific technical considerations and projections about the ways in which citizens understand urban development in the future. There are different dimensions that, in specific contexts, can be positioned on the determinants that are established from technical studies (physical-territorial) and are placed as axis for the structural definition other considerations that distort the meaning and vocations of territories (for example, in terms of human habitability). In the municipality of Santiago de Cali, different socio-cultural processes have already defined multiple scenarios, which have added

to the technical responses other types of variables that are difficult to territorialize and measure. When these issues expand and increase -given neglect on behalf of administrations- they become determinants of urban development.

Informality as a socio-economic phenomenon [11] and high migration, which was notable during the 1990s in Santiago de Cali, are two factors that dramatically changed the course of many urban plans. At present, the impact that these phenomena have generated is visualized when quantifying the characteristics that are associated with urbanization [19]. These characteristics show patterns with specific related variables that allow understanding the conditions of the city's development scenarios. Variables describing the urbanization processes of Santiago de Cali [10] point to three structural conditions: a) urban layout growth through land occupation processes that, mediated by different factors, make up certain internal organizations of the urban space; b) demographic behavior and the housing deficit for low-income social sectors; c) capacity and coverage of the city's drainage system to the extent that it expands. Variables suggest that specific attributes of the settled population carry particularities as well as the territories they occupy, which are the two basic variables that describe the conditions for inhabitation.

## **2 Methodology**

Research methodology applied in this study is composed of four successive stages, which are complemented with results, discussion and conclusions. Figure 2 shows the flow diagram of the methodological stages of this research.

### **2.1 Population growth**

After reviewing the history of the settlement, it can be established that the population heterogeneity of the municipality of Santiago de Cali is the result of interracial crossbreeding [18] and the specific context of its arrival in the municipality. These are parameters of interest that accompany consolidation and the urban expansion process. The population growth curve is analyzed from official population data. It clearly shows two marked stages: before and after reaching one million inhabitants.

### **2.2 Multitemporal analysis of urban expansion**

With the temporary scenario of population growth identified, the ways in which surfaces were transformed by population demand is a second aspect of interest to understand the phenomena. The relationship between the temporal scenarios identified through population growth analysis and different factors that led to the expansion in the city are analyzed.

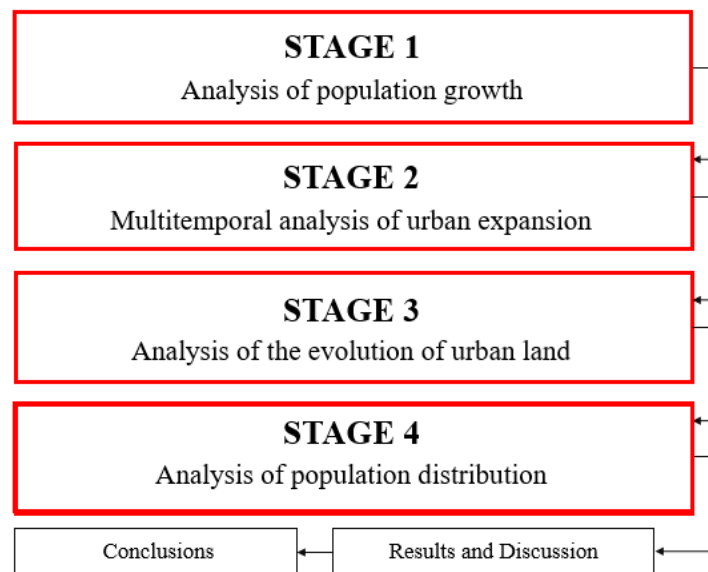


Figure 2. Research methodology. Source: Authors.

### 2.3 Analysis of urban land evolution

Based on information provided by the municipal administration through the Territorial Ordering Plan [4], the qualification of urban surface and its relationship with population growth is analyzed.

### 2.4 Population distribution analysis

The rhythms of population growth in the municipality of Santiago de Cali point to certain characteristics in the way urban expansion has occurred. It draws interest to population distribution at present among the twenty-two communes that make up the urban surface, consigned in the revision of the Territorial Planning Design [4], carried out in 2014.

## 3 Results

### 3.1 Population growth and interest scenario in the municipality

Population growth is described as a first attribute in Figure 3, showing the annual distribution from 1912 to 2014. The population scenario between 1985 and 2002 exceeds one million inhabitants. Later, in this range, the population is also doubled, giving a quantitative sense to what is exposed from the phenomena and the characteristics of population growth. The trend lines in the graph frame the moment where the logic of consolidation becomes differential, which translates into the scenario of interest to see the effects on the area of the municipality.

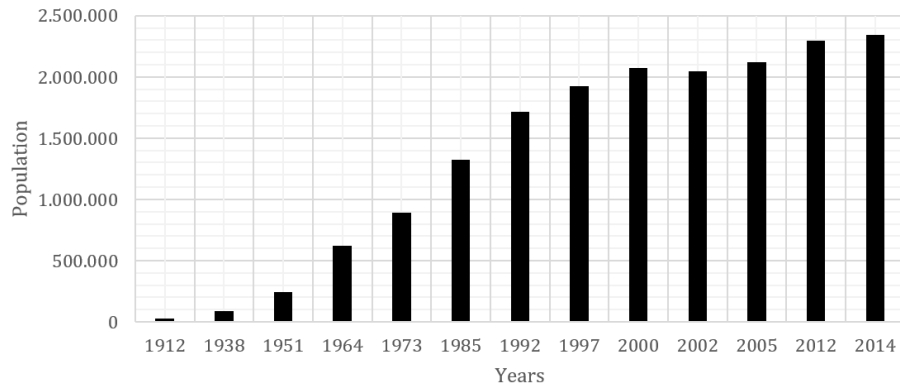


Figure 3. Data on Cali's urban population from the 20th century. Source: Own elaboration from Municipality of Santiago de Cali [13].

When analyzing population projection, it is estimated that by the year 2022 the municipality of Santiago de Cali will exceed 3 million inhabitants, marking three periods of population growth: the first, between the year of its foundation and the mid 80s (70 years time); a second period from then to the beginning of this century's first decade (15 years); and a third period, from then to the year 2022 (22 years). This marks a trend of approximately a quarter of a century for a population growth of one million more inhabitants. According to the trend marked by historical events occurred between 1975 and 2000, this amount could be higher.

### 3.2 Multitemporal analysis of urban expansion in the municipality

Multitemporal analysis is an important tool for the research performed by Jaramillo [9]. Over the years 1989, 1998 and 2014 the multitemporal analysis evidences the effects on urban surfaces associated with population growth. Data show that from 1986 to 1998 the expansion demanded an approximate 17% additional urban surface, going from 7,472.17 Ha to 8,724.85 Ha, and in 2014 approximately 37% more areas were added, totaling 10.228,70 Ha. This is shown in table 1, as well as how the time contrasted is related to the population and thus the attributes of interest. According to this data, it is evident that 45% of the population increase between 1986 and 1998 demanded 17% more of surface, and between 1998 and 2014 a population growth of 77% demanded 36% more of surface. This is defined as a complementary framework to characterize the demands of communes, and to establish the population distribution that demonstrates the associated patterns.

Year	Area (Ha)	Change rate (%)	Population	Change rate (%)
1986	7472.17	0%	1,323,944	0%
1998	8724.85	116.76%	1,922,633	145.22%
2014	10228.70	136.89%	2,344,734	177.10%

Table 1. Urban expansion according to multitemporal analysis and change rate associated with population growth in the Municipality of Santiago de Cali. Source: Authors.

### 3.3 Urban land according to administration information

Information recorded in the Territorial Planning Design of the municipality shows that land clearance has been performed according to mentioned characteristics, which are shown in Figure 4. Between 1990 and 2000, 3,402 hectares were authorized, representing 30% by 1995 and adding approximately 40% by the year 2000. This evidences a correlation between population growth and land clearance. Still, questions rise regarding where the habilitation was made and which territories changed their use (Fitriani and Sumarminingsih, 2015) from the technical perspective. Yet, the question is not necessarily answered because, as previously stated, informality presses decision-making in public policies.

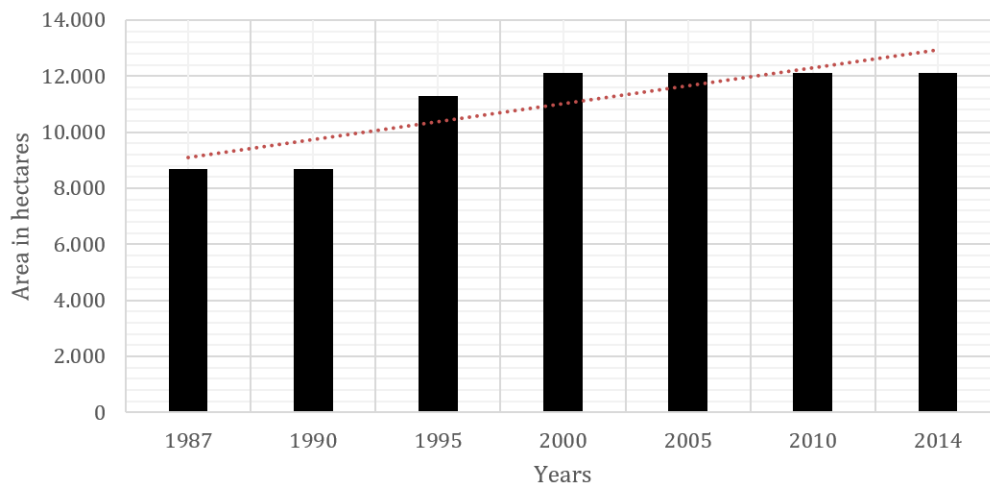


Figure 4. Constituting urban area in the municipality of Santiago de Cali. Source: Plan de ordenamiento Territorial [4].

### 3.4 Current distribution of the population in communes

The revision of the Territorial Planning Design (POT) carried out in 2014 provides information consigned for the year 2012. Figure 5 facilitates its analysis and shows a non-uniform distribution of the population and a wide range of variation, where commune six has the largest population with 189,837 inhabitants, while the twenty-second commune has the least inhabitants (11,160). Given the significant variation in population distribution between communes, it is interesting to observe each surface. Figure 6 shows a non-uniform distribution again, where the largest commune is number seventeen (1,256 Ha) and the smallest commune is number twelve (233 Ha).

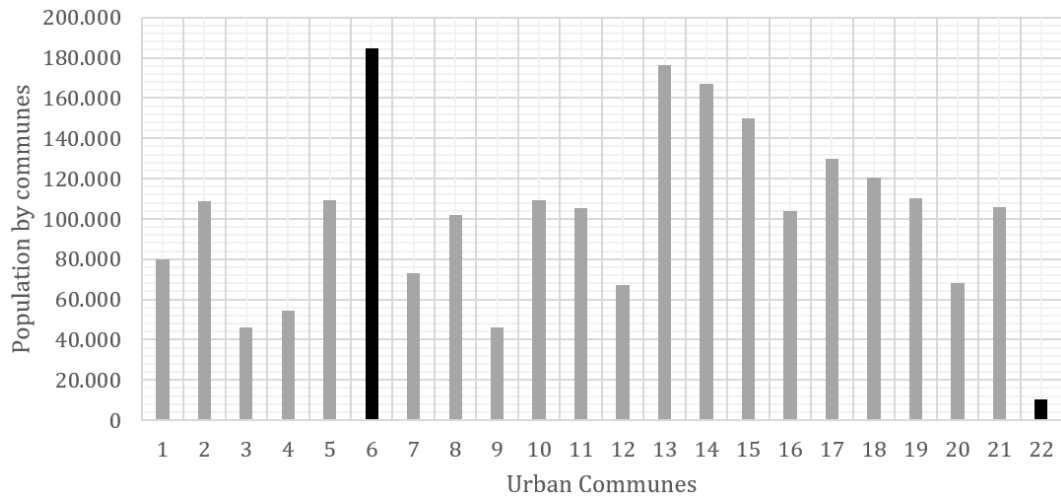


Figure 5. Population distribution between communes in the municipality of Santiago de Cali in 2002. Source: Plan de ordenamiento Territorial [4].

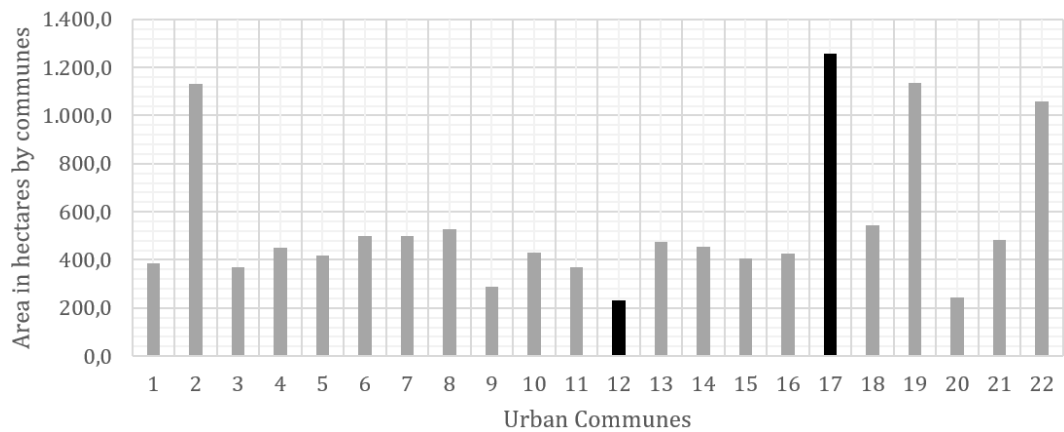


Figure 6. Commune area in Ha of the municipality of Santiago de Cali. Source: Plan de ordenamiento Territorial [4].

## 4 Results and Discussion

With information structured according to the attributes of interest, it can be observed that municipality surface has noticeably changed after 1985. The subsequent urban expansion has come to represent an urbanization of approximately an additional 40% of surface, which reached 12,097 Ha in the year 2000, according to Figure 4. The decision to enable sufficient land as a response to population growth was made between 1990 and 1992, as shown in Figure 7. Population growth trends after that year evidence other phenomena (See Figure 8).



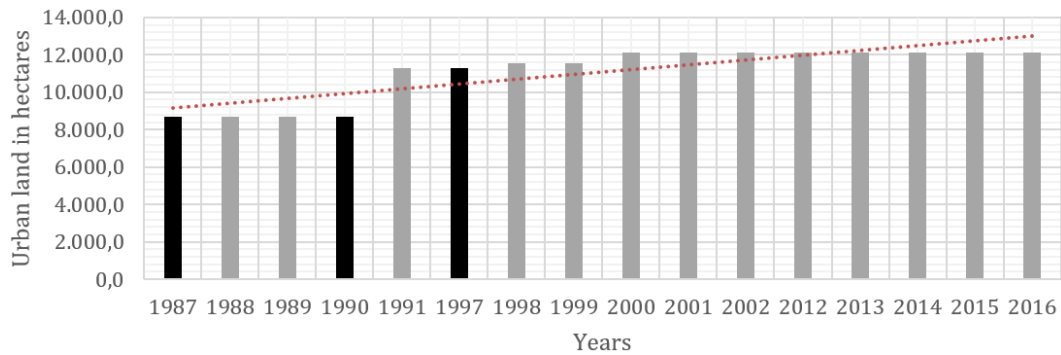


Figure 7. Habilitation of urban areas in the municipality of Santiago de Cali from 1987 to 2016. Source: Own elaboration from Municipality of Santiago de Cali [13].

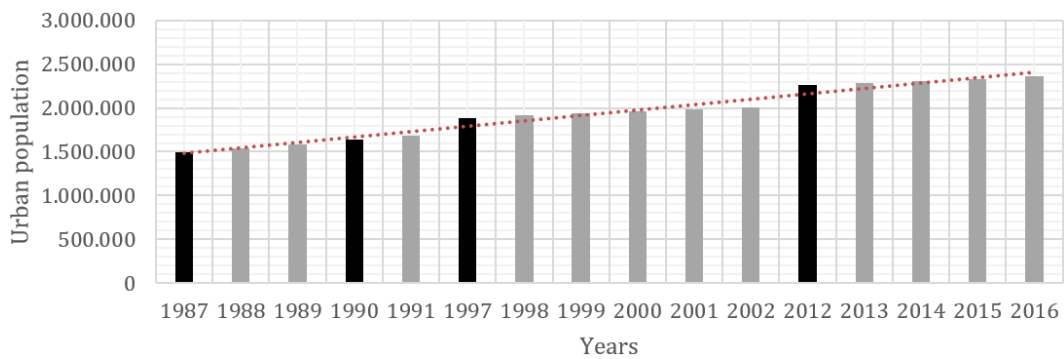


Figure 8. Trend of population growth in the municipality of Santiago de Cali from 1987 to 2016. Source: Own elaboration from Municipality of Santiago de Cali [13].

Although these respond to the 1991 surface permitting, they do not follow growth logic, since in 1997 and 2012 there are out-of-trend growths that are not accompanied by the authorization of urban land. Therefore, the urban land habilitated in the year 1991 was sufficient to absorb the urban expansion. House construction in the communes per year evidence real estate development associated with population growth that pressured policy-making in order to face housing deficit and informality in the urbanization. Figure 9 shows that the year 1998 was a particular year in relation to 1987, during which 120,628 units were built, representing a 40% increase. Then, the year 2015 is a second peculiar moment in relation to 2003 with 148,865 units built, representing an increase of 30%. According to the trend lines for periods of this graph, the two years out of range are clearly shown. Unit distribution among communes is worth noting. Recent conditions for the transformation of the communal areas are framed between 2005 and 2016.

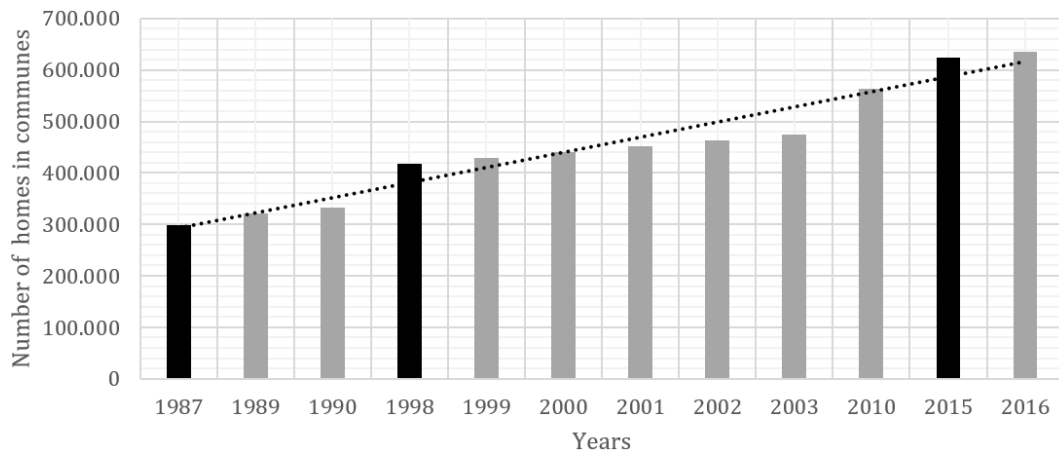


Figure 9. Number of homes in the communes of the municipality of Santiago de Cali from 1987 to 2016. Source: Own elaboration from Municipality of Santiago de Cali [14].

Figure 10 gathers the information according to the National Administrative Department of Statistics (DANE) issued by the municipal mayor's office. It provides the main input on territorialization at the commune level. This graph shows a marked increase in homes in communes two, thirteen, fourteen, fifteen, seventeen, eighteen and twenty-one. This defines them as the territories where the actions of urbanization, development or urban expansion within said time frame were executed.

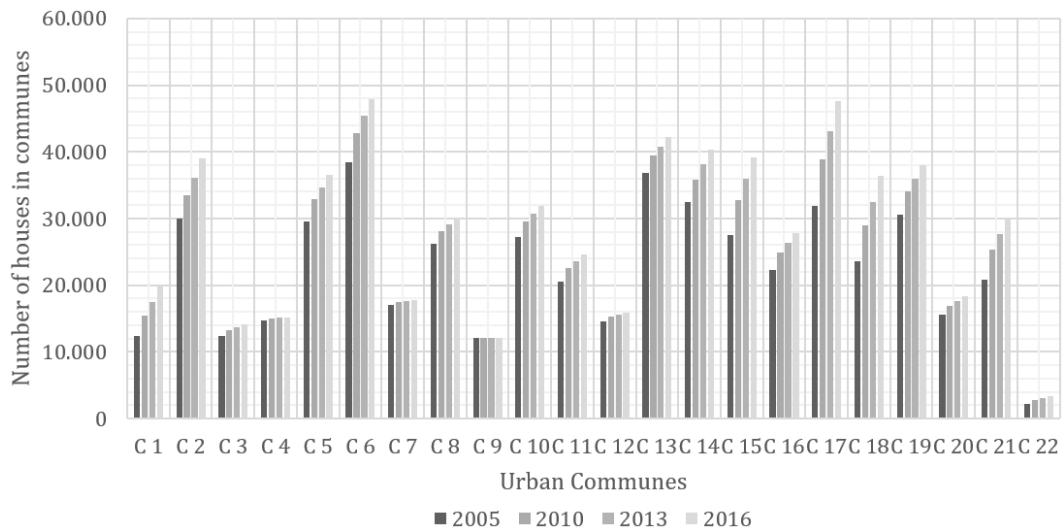


Figure 10. Number of homes built by communes from 2005 to 2016 in the municipality of Santiago de Cali. Source: Own elaboration from Municipality of Santiago de Cali [14].

This information documents the magnitude of the urbanization process by communes. Figure 11 shows the impact of house construction during the time frame established, within which communes six and seventeen were the territories with

most differentiated urban development. This suggests that their surfaces have been transformed more dramatically by being the focus of urban development and expansion. This phenomenon is also related to population density that is dramatically altered, considering surface expansion. There is a considerable change in previous patterns when comparing it. This supposes some type of imbalance in previous logics, since the territory has been stressed in a differentiated way, and informality becomes an element that conditions urban development of these surfaces. This defines surface changes that alter morphological conditions from a theoretical standpoint and, by representing such significant percentages of up to 40% of the surface, determine another particular scenario to be studied.

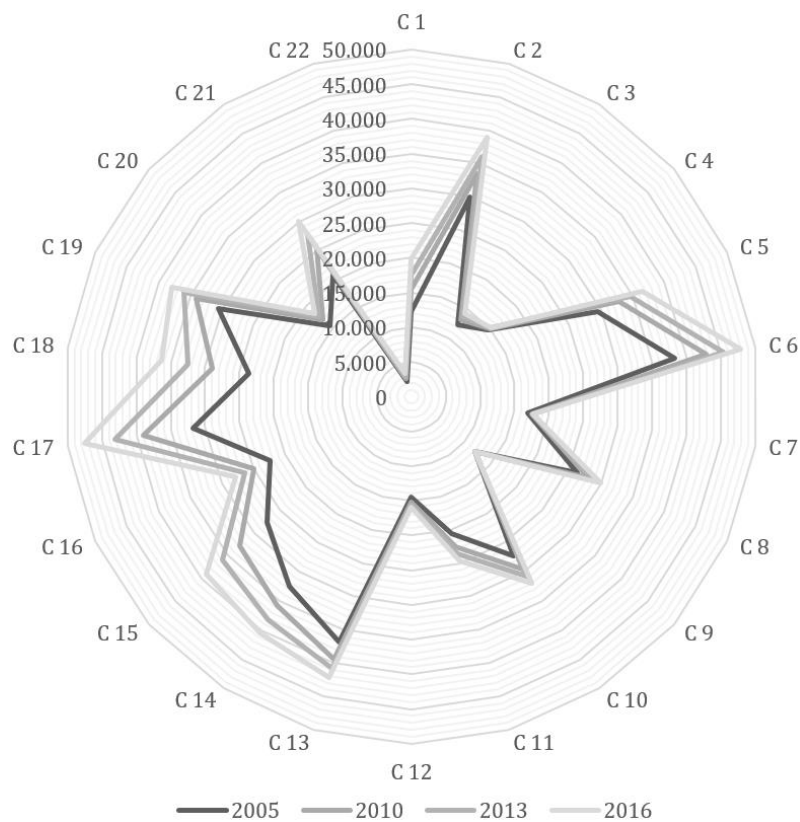


Figure 11. Construction magnitude of new housing by communes in the Municipality of Cali between 2005 and 2016. Source: Authors.

## 5 Conclusions

After analyzing the particular scenarios of internal migration during the 90s in the Municipality of Cali, there are two specific moments, the years 1998 and 2015, when the condition of change occurred according to previous forms of urban consolidation (see Figure 9) seen by population growth. In particular, the most important changes for the urban transformations caused by the expansion between 1985 and 2002 are defined (see Figure 3), considering historical population growth.

From 1986 to 2014, urban expansion in terms of municipal territory shows that growth demanded approximately an additional 37% of the area to place an extra population of 77% during said time (see Table 1). This suggests the densification of some sectors, given that population concentration is greater in relation to the inhabited area.

When seen in detail and at a commune level, expansion phenomenon was concentrated in terms of formal housing construction in communes seventeen and six, as shown in Figure 11. These are the communes where public policies operated due to housing deficit produced by population growth. At this point, the need to think about the sectors that were urbanized under the logic of illegality arises, typical of the processes of urban expansion in the Municipality.

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