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Journal of  
Land Use, Mobility and Environment

Urban sprawl processes characterize the landscape of the areas surrounding cities. These landscapes show different features according to the geographical area that cities belong to, though some common factors can be identified: land consumption, indifference to the peculiarities of the context, homogeneity of activities and building typologies, mobility needs exasperatedly delegated to private cars.

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**LANDSCAPES OF URBAN SPRAWL**

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# TeMA

Journal of  
Land Use, Mobility and Environment

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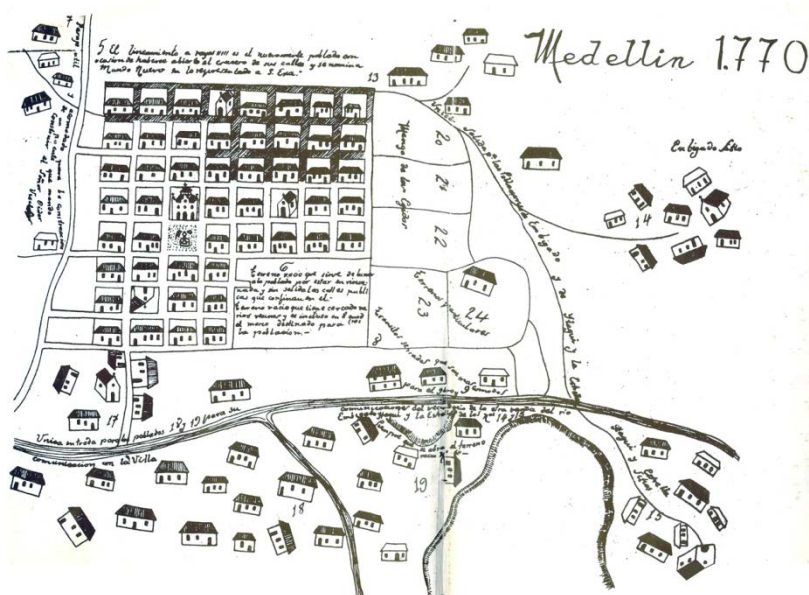
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## SPRAWL AND FRAGMENTATION

THE CASE OF MEDELLIN REGION IN COLOMBIA

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### ABSTRACT

Sprawl and fragmentation are phenomena common to many cities but they do have particularities depending on the geographic, economic and societal context. This paper will examine the particularities of these two phenomena, intrinsically related, in the Aburra Valley (the metropolitan area of Medellín – Colombia). The phenomena will be analyzed from their origins, their different manifestations and the possible solutions of control within this context.

Low density and discontinuous urban growth is a matter of great interest to city governments, transport authorities, urban planners, economists, sociologists and environmentalists. From a technical view, sprawl is associated with negative effects such as larger commuting times and greater consumption of fuel, which also means increase of pollution; increase in capital investment to accommodate population growth in space; acceleration of inner-city urban decline due to the abandonment of former urban spaces, social segregation manifested in spatial mismatch of population (poor living in inner city, rich living in peripheral areas). But from the citizen's perspective, regardless of income, small low-density communities, which shape sprawl, are an ideal of living. This dichotomy with its implicit factors represents a big challenge to contemporary urban governance.

### KEYWORDS:

Regional urbanization; urban sprawl; fragmentation; urban centrality; governance; urban mobility; urban sustainability; Medellín – Colombia.

## 1 URBAN SPRAWL AND THE REDEFINITION OF CITY

The deep urban transformations of cities during the last decades due to technological and economic changes have caused big impacts in urban periphery and inner city areas. In many cities the migration of central economic activities toward peripheral areas is a difficult issue for governments, urban planners, urban designers and scholars. This is a process that conceptually implies the reinterpretation of centrality and periphery, and technically needs the design of strategies to control the negative impacts. This control implies as well, in many cases, complex negotiations between different jurisdictions and administrative bodies. The complexity of the subject and its current importance in many regions around the world make of this theme an important part of the research agenda in urban planning and urban design schools.

Inner-city areas have been strongly affected in many cities around the world as a result of the technological advances of communications and transport during the XXth Century. One of the most outstanding impacts of the introduction of cars has been urban sprawl and the consequent restructuring processes of the traditional compact city, induced by the new mobility infrastructures (TRB - NRC 2002). It has been argued that as a consequence of this process, traditional centrality has lost its importance within cities because of the generation of other centralities in the periphery and emigration of inhabitants and economic activities from the inner-city toward the outer-city (Dear and Dahmann 2008). Paradoxically in an increasingly urbanized world it is not easy to define the concept of "the urban". The former simplistic differentiation of the rural from the urban has been transformed by the influence of technological changes, the phenomenon of global urbanization, and by changes in theoretical paradigms. All these three aspects have deeply transformed "the urban" and reshaped the city during the last decades. "What is today a city" seems a simple question but in fact it can have as many answers as cities there are. The huge increase in urbanization means diverse patterns of urban settlements that have been classified: by size [going from village to mega-cities], by economical function [the concepts of Daily Urban Systems (Coombes et al., 1979), "regional" city, "national" city, "world" city or the most recent "global city" (Sassen 1991)]; by form and density ["compact cities" (Jenks & Burgess, 2000), "edge cities" (Garreau, 1991), "diffuse city", "urban corridors" or "linear cities", etc.]; by morphology ["organic cities", "grid city", "diagram cities", etc. (Kostoff, 1991)]; by the structure of centrality [mononuclear, polynuclear, (Lynch, 1981)]. And many other formalizations. The urban has become one of the most elusive concepts to be defined. One of the reasons for this difficulty is the great diversity of forms of spatial occupation and the subtle differences between rural and urban. Classifying the population into urban and rural became very complex with recent explosion in urbanization and can be very different from one country to another. According to The United Nations (UN Population Division World Urbanization Prospects: The 2001 Revision), these criteria depends on the degree of economic development. In some developed countries, a village of 200 inhabitants can be considered urban, as people who live there work and spend their leisure time in a nearby bigger agglomeration. A good illustration of this case can be the Randstad in The Netherlands. But elsewhere, in densely settled developing countries like India or China agglomerations of 50,000 can be considered rural, since their inhabitants depend on agrarian economies and their lifestyle and patterns of consumption are very different from those related to urban areas. The delimitation of city boundaries is a complex conceptual (and technical) process, in which the result of diverse measures and analysis can differ significantly according to the delimitations. In a work prepared by Pumain (2003) for the European research program ISCOM, there were notorious differences in the rank and population of French cities when defined by different agglomerations, and Daily Urban Systems. The city has been understood in the tradition of urban sociology as specific system of social relations, of culture, and especially, of political institutions of self-governance (Borja and Castells, 1997) and with its official (non-physical) borders considered in terms of the municipality. In most cases this delimitation makes difficult to understand the phenomena of the contemporary city, due

to the rapid growth of cities and the addition of new constructions to the original urban core that spill over the original boundaries, expanding the agglomeration into the surrounding municipalities. Some studies (Andrew K Copus Rural Policy Group, Management Division, SAC, 1999; Coombes, et al, 1979; Pumain, 2003) argue that a better definition of city involves the integration of all urban entities which are continuous and are part of the historical growth around an urban centre: the urban agglomeration. This means that a city (as a system) is organized by the logic of a principle of centrality around which it is consistently developed by an aggregated spatial growth process.

However the continuity in built-up areas that urban agglomeration implies also presents some difficulties, given the frequency of polynucleated and discontinued urban regions, and the claim of some authors who argue that functionally, cities do not require spatial continuity. Thus the urban region arises as the new form of urbanization that integrates a network of urban nuclei of different sizes, sometimes around a bigger urban centre but also a polynucleated urban system formed by several cities of similar size (Borja et al. 2004). The concept of urban region or regional urbanization, which starts to be very frequent in contemporary urban question, was already introduced since 1902 by H. G. Wells, who predicted that the words 'city' or 'town' will be obsolete due to the development of communication infrastructure (in that time: railways, roads, and telegraph and telephone networks) that will integrate in a functional unity the urban nuclei of vast territories.

## 2 THE CONCEPT OF FRAGMENTATION

A fragment is a part broken away from a whole, an incomplete, detached or isolated part. The term fragmentation has been widely used in recent years when referring to recent phenomena, economic, cultural and spatial, specially to put together heterogeneity of facts that are happening at the same time in contemporary societies. The concept of fragmentation is especially used when referring phenomena usually denominated with the prefixes post (*post-modernism, post-industrial, post-metropolis, post-national, post-urban*), ex (*exurbia, exopolis*), sub (*suburbia, suburban downtown, , dis (disurbia)*), (GUST, 2002) When fragmentation is referred to the city, the concept of Urban Fragmentation arises, which is defined by Burgess (2005) as 'a spatial phenomenon that results from the act of breaking up, breaking off from, or disjoining the pre-existing form and structure of the city and systems of cities'. Agglomeration, the opposite phenomenon, needs also to be included in questions about fragmentation, especially when referred to cities. If the contemporary city is fragmented, does it mean that it is disintegrated? According to different "post" theories, it seems more that the contemporary city is an agglomeration of fragments. To this extent the question of fragmentation is related, first, with the forces that cause it, and second, with the forces that maintain together the urban fragments into urban agglomerations or urban systems. The other essential question concerns centrality, both as a force that fragments and as a force that integrates the city. Are the new kinds of centralities producing fragmentation within cities or within urban systems? Are they causing fragmentation at the local scale, but agglomeration at a bigger scale? In an empirical view regarding urban territories, fragmentation is mainly related to three aspects. The first is the spatial splintering of traditional urban fabric by the construction of infrastructure like highways or railways, '*particularly associated with promising urban cohesion whilst delivering fracturing and fragmentation*' (Dear, 1999). The second is related to social fragmentation, linked to social differences about race or income that are manifested in space by gated communities or territorial separation between social groups (Murray, 2004). The third is the fragmentation of urban territories into several administrative jurisdictions (Howell-Moroney, 2008). Urban sprawl and fragmentation in all these three dimensions are interlinked phenomena.



The fragmentation produced by highways and other mobility infrastructure is a phenomenon produced by the modernization project and the city as machine metaphor with its separation of urban functions. Mobility infrastructure conceived as separated piece from urban context produced the disintegration of spatial, social and economic relations in large fringes of urban territory. *Urban highway networks, for example, which purported to deliver 'access for all' and add 'coherence' to cities, were often found to destroy communities, undermine interaction in places, and worsen social and gender unevenness in access to transport* (Graham and Marvin, 2001). The modern city paradigm of mobility sacrificed the local urban relations in benefit of metropolitan connectivity. As a result, postmodern city is a landscape dominated by mobility, where the principal urban dynamics have shifted from inner-city to the periphery, creating a landscape dominated by enclaves (Dear and Dahmann, 2008). The social fragmentation arises strongly in contexts where economic inequity is bigger or where it exist racial conflicts. Pronounced economic disparities are a cause of social mistrust and tensions that produce in space gated communities and marked segregation of wealthy and poor populations. This situation produces that M.J. Murray (2004) denominates 'precarious urbanization', "*where extreme disparities in wealth and income, class polarization, along with rampant crime and the middle-class fears that it engenders, have fostered heightened anxiety, insecurity, and unease*". The fragmentation of urban territories into several administrative jurisdictions is, in most of cases, a pre-existence of modern state. Divisions in municipalities, boroughs or other administrative jurisdictions were earlier to urban sprawl. Nonetheless the existence several municipal boundaries in contexts of polycentric urban system is source of difficulties in urban governance, especially because many urban questions, traditionally tackled by municipal administrations, are increasingly spillover problems that involve a novel regional dimension. This is the case of transport, public services, environmental issues or even social services like health or education. The difficulties of fragmented governance arise when, as mentioned by Howell-Moroney (2008) "*municipal boundaries tend to create a myopic patchwork of interests in which communities seek their own self-interest in isolation, sometimes to the detriment of other communities*".

### 3 THE REGION OF MEDELLIN AS CASE STUDY



Fig. 1. Panoramic view of the city from the western hills (2010)

Medellin is the second largest city in Colombia, and is part of a conurbation called Metropolitan Area of Aburra Valley, composed of 10 municipalities, which together have a population of 3.5 million. Medellín as a municipality has an estimated population of 2.3 million. The valley where the city stands is narrow and elongated, with its widest part of maximum 10 kilometres, but the conurbation longitudinally is extended about 30 kilometres.

The city was during Spanish colony a village without political or economic importance, but located in a fertile valley, favourable to agriculture and cattle, which would gain in importance thanks to the discovery of gold deposits in neighbouring areas. After independence and consolidation of republican life in Colombia, it

became regional capital of the province of Antioquia in the first half of the nineteenth century. Gold mining and coffee plantations, which were for much of the nineteenth and twentieth centuries the main national export products, allowed the accumulation of capital and the creation of industries, mainly textiles, but also food, supplies and tools, that would consolidate the city as the main industrial centre by 1950 (Poveda, 1988). The Economy of the city has maintained a significant share of the industry, although the services sector has been gaining ground. Currently the business structure of the city, according to information from the Chamber of Commerce (MCC, 2010), is composed by 2% for activities related to the primary sector (agriculture, hunting and forestry, fishing, exploitation of mining and quarrying), a 36.5% in industry-related activities (manufacturing and construction) and 61.5% in service sectors (trade, financial sector, public administration, education, health, real estate, social services, etc.).

### 3.1. URBAN EXPANSION

In Colombia, the tendency of urban sprawl could have historic and cultural origins, rooted in the history of settlements in the former Spanish colonies in which land was seen as an unlimited resource. The colonial government during the sixteenth, seventeenth and eighteenth centuries promoted the colonization of new territories and encouraged the foundation of new towns and cities. This tendency of colonization and new settlements is maintained in Colombia even until the first decades of the twentieth century under the republican government, particularly fed by coffee production. Colombia was until the middle of the twentieth century a country of dispersed population. Urbanization pattern was formed by a large number of towns and small cities, most of them located in the Caribbean coast and in the Andes region. The vast areas of the Pacific coast, the Orinoco river basin and the Amazonian regions which totalize almost 70% of the national territory were almost depopulated. Colombia was a rural country until some decades ago. The process of urbanization, originated in the migration from rural areas and small towns to larger urban areas, took place mostly during the second half of the twentieth century. In 1951 only 36% of the population was living in urban areas whereas in 2005 the percentage was 76% (DANE, 2005). If it is considered that in the same period the national population increased from 12.5 million to 42.3 million, it would be concluded that urban population grew from 4.5 million to 31.7 million, that is to say, an increase of 700%<sup>1</sup>.

Bogotá in 1951 had around 0.5 million inhabitants, today its population oscillates around 7 million inhabitants, which means an increase of 1400%, twice the rate of national urbanization. Medellín, Cali and Barranquilla, the cities that follow in size, have multiplied around eight times their population during the last half century. This vertiginous process of urbanization has caused deep transformations on urban space. The transition between the traditional city faces of development (pre-industrial city, industrial city and post-industrial city) has happened in a few decades.

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<sup>1</sup> In Colombia urban population is considered the people inhabiting the urban perimeters of the municipal heads, independently of the size or the economic activity to which they are dedicated. The numbers presented here have been processed from information taken from the site [www.dane.gov.co](http://www.dane.gov.co). Departamento Administrativo Nacional de Estadísticas DANE.

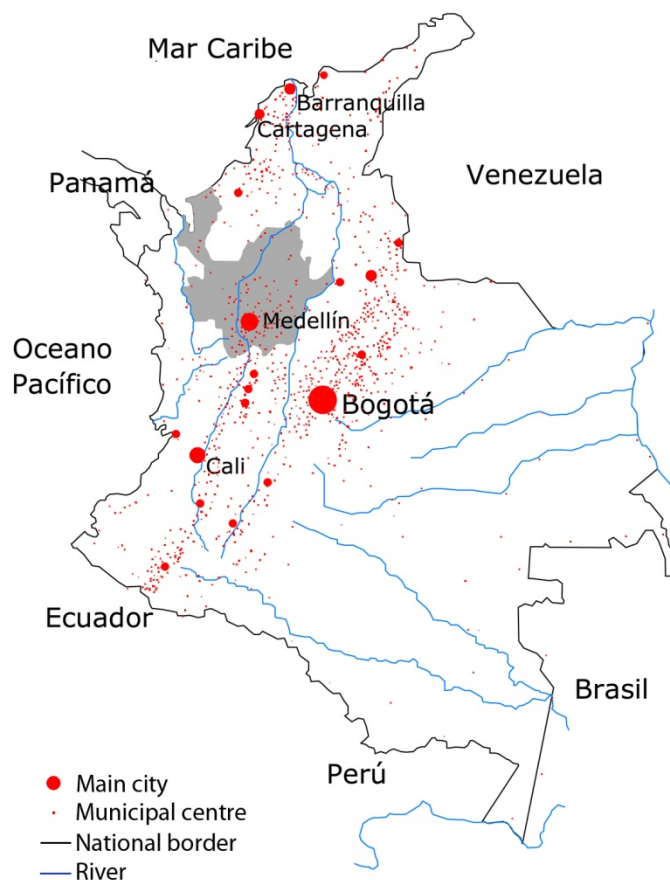


Fig. 2 Map of Colombia

In the Aburra Valley the pre-industrial city was characterized by a system of small towns of different sizes, being the radius of the largest no more than two or three kilometres, and the distance between them, no more than the distance covered by a half day journey walking. The urban structure was formed by the Hispanic block characterized by plots of narrow façade usually with backyards. Even most of the wealthiest properties had front directly on the sidewalk that was also bordering the street without any separation. All urban activities, residential, commercial and manufacturing were mixed in the space and it was common, especially in the central areas, that houses shared space with economic activities. The coexistence in vicinity of wealthy and poor neighbourhoods was also common. Both the sizes of towns and distances between them, were determined by the mobility technologies based on pedestrian trips and animal power.

Industrialization arrived late to Colombia. It was only during the first decades of the twentieth century when the first factories, particularly textile, were founded in the region around Medellín. It was not until the second half of the century when industrialization started with bigger force, with the introduction of a more diverse gamma of industries devoted to serve the local market: mining tools, beverages, tobacco, food and textiles (Poveda, 1988). This first flourishing of local industry coincided with the start of the Colombian internal conflict with the hostilities between political parties. The combination of both phenomena caused a big migration from rural to urban areas during the 1950s. The arriving of industrialization produced a centripetal growth of cities, attracting migration from rural areas. In the metropolitan area of Medellín the

population grew from 156.000 in 1938 to 381.000 in 1951 (Botero, 1991). This growth continued during the following decades to a linear rate of 12% annual until 1985, year in which the national census totalized 1'948.000 inhabitants. The 1980s is a period of big economic crisis and the end of Welfare State and import substitutions policies in Latin American countries (Carmona and Burgess, 2001).

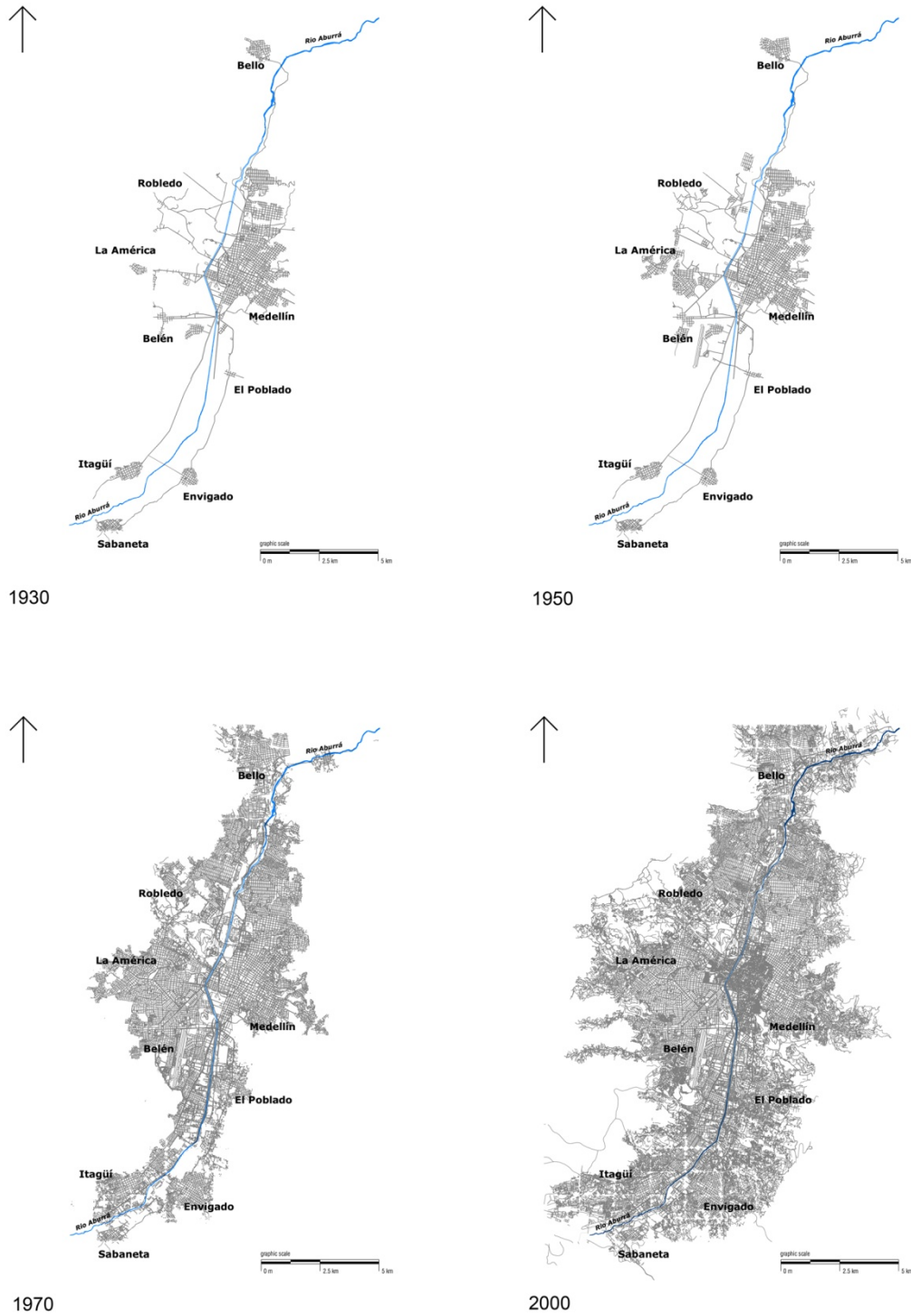


Fig. 3. Expansion of the city throughout the Twentieth Century

### 3.2. METROPOLITANIZATION

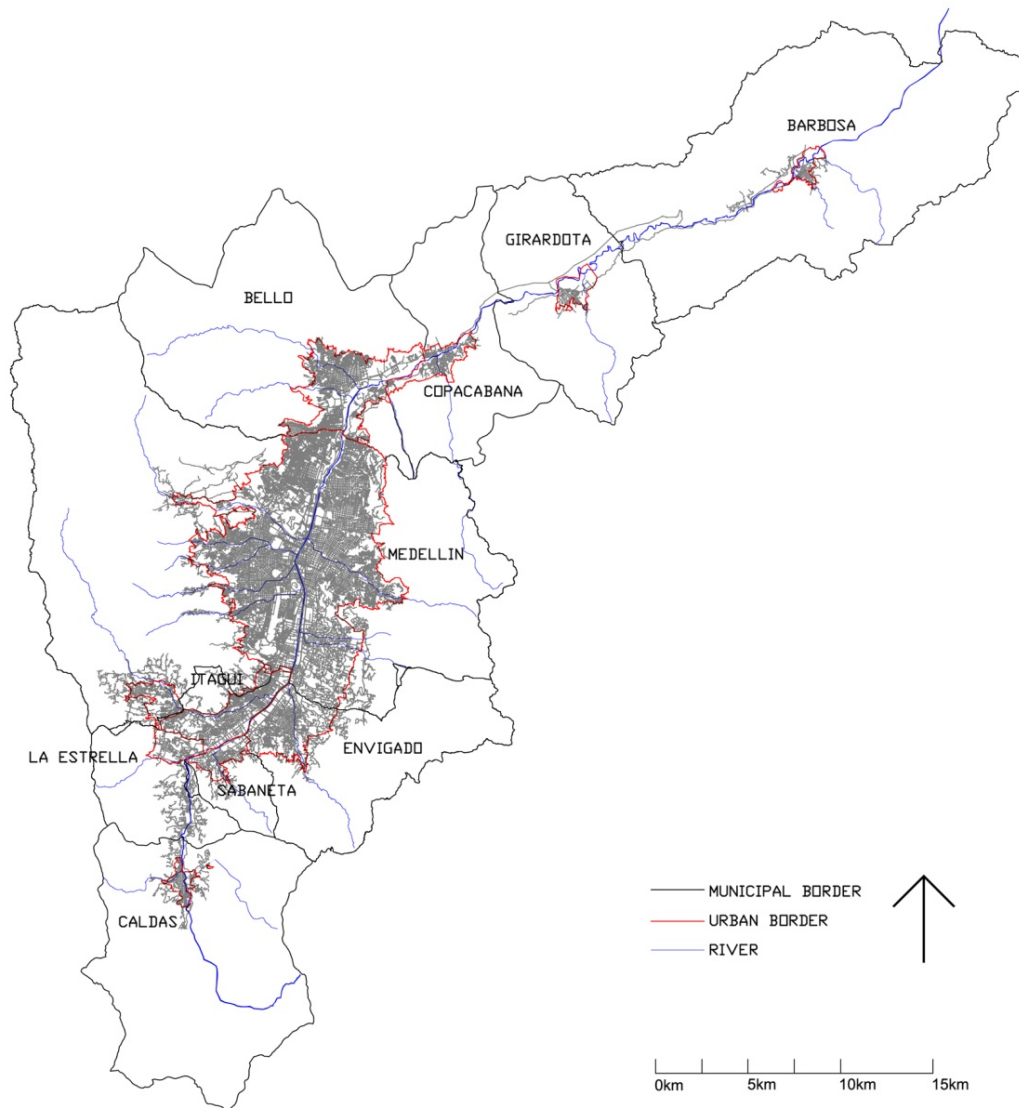


Fig. 4.- Map of the Metropolitan Area of Aburra Valley

Metropolitanization, understood as the phenomenon of urban expansion 'driven by economic and technological developments at a global scale that largely escape the control of urban governments', can explain well what happened to the city during the second half of the XXth century (Kubler 2012). The industrial forces originated a process of metropolitanization characterized by the conurbation of the former nuclei of the Aburra Valley. The industry was concentrated out of central areas, around the ways that connected the municipal centres. The planning policies of that period saw the pre-industrial patterns of downtowns with mixed uses as a problem of functioning. Measures were focused in the segregation of functions, downtown should be devoted to business, housing should be out of the centre and industries and low income housing should be in the periphery. The introduction of the railroad, tramways lines and buses made possible the expansion of the city during the first half of the twentieth century (Correa, 2002). This had an effect of a significant reduction of density compared with the former pre-industrial city. In the following table it is possible to see how urban density falls down due to the massive incorporation of rural land to the urban use simultaneously with the increase of population.

YEAR	URBAN POPULATION	URBAN EXTENSION ha.	URBAN DENSITY inh./ha.
1890*	32.000	110	291
1905*	45.000	160	281
1915*	56.000	210	267
1925*	75.000	300	250
1938*	168.000	-	-
1951*	350.000	-	-
1971*	1'039.000	4.700	221
1983*	1'524.000	8.330	183
2005**	3'136.853	24.496***	128

\*Information from Botero F 1991 p.289 y Botero F 2000 p.177

\*\* Information processed from data obtained from Area Metropolitana del Valle de Aburrá [www.metropol.gov.co](http://www.metropol.gov.co)

\*\*\* The cipher consider the urban, suburban and expansion land, this is, the land qualified for urban activities

**Table 1: urban density evolution in the metropolitan region of Medellín**

During the second half of the twentieth century urban growth physically merged at least four of the ten municipalities of the Valley to form one continuous built up area. Bello, Medellín, Envigado and Itagüí became a continuous conurbation. Within this new form of the city, social segregation started to have a marked character: the north area of Medellín and the municipality of Bello started to absorb most of low income housing while the southeast of Medellín was occupied by weekend houses of the rich, and at the same time, Envigado was enlarged by middle class housing. Industry was mainly located toward the south along the important roads. Physical fragmentation was also generated by the constructions of new highways and wide avenues that broke the original cohesion of the traditional grid. These interventions were particularly strong in the central area and it is argued to be one of the main causes of the deterioration and economic decline in the centre of Medellín. During this period, the newcomers overcrowded the working-class neighbourhoods, and the opportunities for employment became exhausted. As a consequence, enormous shantytowns appeared in the peripheral areas without appropriate urban structures and with deficient public and social services. Despite this situation, people continued to come to the city as a consequence of the lack of economic opportunities in the rural areas, and in many cases, the violence of the internal conflict in Colombia forced them to abandon their land and to come to the city where most of work opportunities and social services were concentrated.



Fig. 5. Fragmentation in the inner-city due to the introduction of highways

During this period, the newcomers overcrowded the working-class neighbourhoods, and the opportunities for employment became exhausted. As a consequence, enormous shantytowns appeared in the peripheral areas without appropriate urban structures and with deficient public and social services. Despite this situation, people continued to come to the city as a consequence of the lack of economic opportunities in the rural areas, and in many cases, the violence of the internal conflict in Colombia forced them to abandon their land and to come to the city where most of work opportunities and social services were concentrated. The complexity of the situation and the trans-municipal character of problems like housing, public services and mobility, made necessary the creation of instruments to confront the situation. In 1980 the public bureau of the Metropolitan Area of Aburra Valley was created with the purpose of a better articulation and coordination of policies between the municipalities. This figure of a metropolitan planning bureau was new in Colombia and the Aburra Valley became the first of its kind in the country. At the same time, all public services: electricity, telephony, water and sewage gradually became administered by a sole public company. During the eighties the metropolitan railway system was also constructed to provide massive transport to the conurbation formed by Bello, Medellín, Envigado and Itagüí. The national regulations related to the metropolitan areas were only created more than ten years later, when similar entities began to appear in other urban regions of the country. The metropolitan areas are defined in the Colombian legislation like administrative organizations (non-territorial) formed by two or more municipalities integrated around a bigger municipal nucleus or metropolis, tied to each other by close relations of physical, economic and social order. The purpose of those institutions is to coordinate the administration and programming of its land planning, public services and mobility. Nevertheless these functions are frequently antagonistic with the municipal autonomy defined in the same national constitution, frequently making it difficult to construct strategies to approach the urban problems.

### 3.3. SPRAWL AND INCREASE OF FRAGMENTATION

The free market policies implemented in the early 1990s marked the end of “welfare state” and the import substitutions policies that favour the consolidation of the national industry, many of them based in the Medellín Metropolitan region. The new conditions of competitiveness generated big transformations that in few years would produce deep effects on cities (Carmona and Burgess 2001). In 1999 the national GDP growth was negative in 4.4%, in 2000 national rate of unemployment reached over 23% and the Medellín Metropolitan Area suffered the worst economic depression of its history. Many local companies experimented important restructuring processes that implied always less labour force, others were forced to move to other places to look for better comparative advantage regarding cost of operation, and some others, particularly middle and small industries, disappeared (Samper, 2004).

Parallel to this economic situation, the social conflict was in its worst phase, guerrillas and paramilitary forces had almost surrounded the main cities and were controlling vast areas of the country, including peripheral areas in the big cities like Bogotá, Medellín and Cali. Thousands of internal refugees from rural areas arrived to the urban peripheries searching for security; situation that together with the economic crisis manifested in high rates of unemployment made the national circumstances look chaotic and hopeless. Some international editorialists and academics referred to Colombia at that time as a failed state (McLean 2002).

This combined crisis has had deep repercussion in the city form. The first has been the vacancy of important parts of old industrial lands that with the conurbation process were incorporated as part of the inner-city areas. The second is the enlargement of shantytowns in the city borders, most of them in areas of high risk of avalanches due to high slopes and the proximity to small rivers and creeks.



Fig. 6. Informal settlements in peripheral hills from the metro-cable line (2010)



In recent years the national economy has shown a sustained tendency toward recuperation, at the time that the State gains control and monopoly of force in many important areas of the national territory. 2006 was the best in the last 28 years with a growth in GDP of 6.80%. Despite international economic crisis the country maintains a positive tendency with an economic expansion of 5.9% in 2011. This national recuperation has been driven by growth in oil, gold and coal production which positively stimulated also building and manufacturing sectors with evident impacts in the Medellín Metropolitan Region. Both public and private investment, have shown a growing tendency. For instance, the Medellín municipal government has invested during the last four years more than 2000 USD million in social infrastructure, like new massive transports systems, public libraries and public schools in poor peripheral areas. On the other hand, private investment is evident in the massive construction of new low density closed condominiums in rural areas, new luxury shopping malls, new sumptuousness apartment towers, at an unprecedented rate. Despite the good health of economy, unemployment keeps over 10% and poverty is still over 45%. These ciphers manifest the fact that the poorest are the last in getting benefits from the economic growth. The labour force that the new shift of national economy requires is more qualified people. Former uneducated rural inhabitants, like the majority of internal refugees of the national conflict, do not have much opportunity in urban labour market. Unfortunately much of the national funds for peace have been devoted to attend the reincorporation of the former members of irregular forces to the civil life, while the victims represented in thousands of refugees get a slim aid. Even with the big effort of local authorities, reflected in massive investment in social infrastructure, this good economic moment paradoxically is accentuating fragmentation rather than consolidating and integrating the existing city, already socially and physically fragmented during the metropolitanization period. Low density developments are being expanded toward adjacent municipalities like Rionegro, El Retiro, Guarne; Marinilla and La Ceja in the east plateau, and toward municipalities in the west valley like San Geronimo, Santa Fe y Sopetran. All these new developments have been made possible due to the improvement of road linkages with tunnels and viaducts connecting the central Aburra Valley with bordering regions and forming a city highly dependent from automobile, following the trends of "exurban" development characteristic of the North American cities since the 1970s. (Bruegman, 2005).

The vision of a great metropolitan region in the centre of Antioquia province born during the 1980s with the construction of the new international Airport in Rionegro is now becoming a reality. The new roads improvements in the connection of Medellín with this area, together with the economic growth, are triggering big suburban developments with a large stock of luxury low density housing, new private schools, hotels, shopping malls, and even new hospitals planned to sell services to foreign market. With the consolidation of these developments a sort of local version of the "Edge city" is being formed (Garreau, 1991). This new centrifugal growth can be explained by four main causes. The first is the tendency toward emigration from inner-city of the high income population because of the existing city represents low quality of life manifested in enormous traffic congestion, air pollution, growing informal economy and insecurity. The second is a lack of *'adequate governance and planning regimes that facilitates an accelerating process of socio-spatial polarization, in which the wealthy are increasingly self-segregating in gated communities and fortified enclaves'* (Sorensen and Okata 2011). The third is the improvement of the connections between the Aburra Valley and the adjacent regions. The four is the shortage of soil appropriated for urban activities inside the ten municipalities of the Aburra Valley given the existence of the bordering mountains which represents natural barriers.

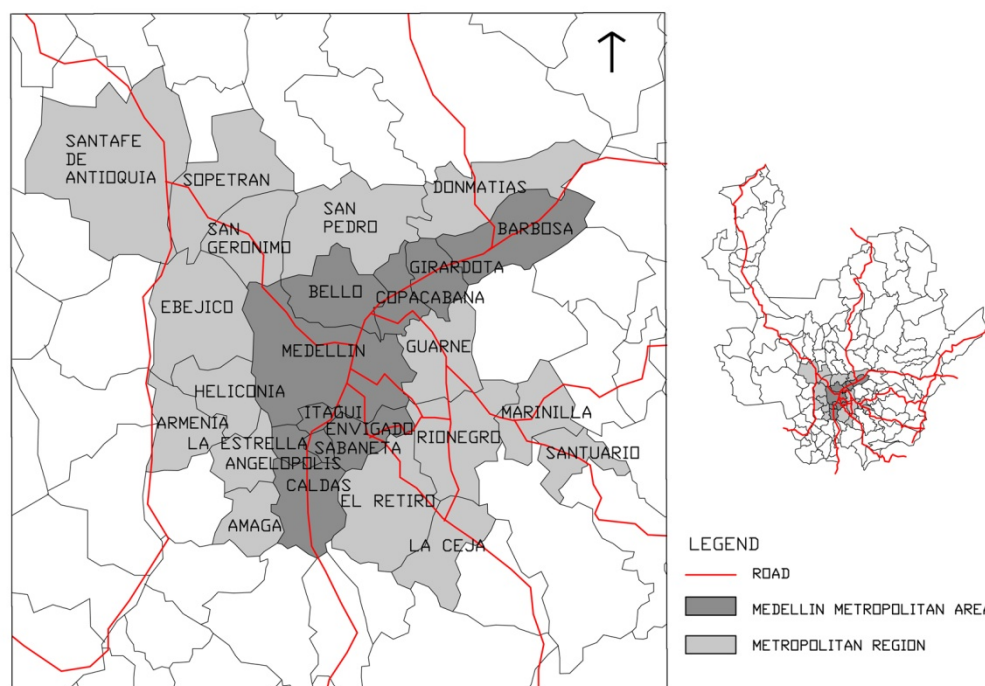


Fig. 7. Antioquia Province and the urban region of Medellín

In 1997 was introduced a national legislation that obligated every municipality to formulate a spatial master plan. According to this regulation, municipalities have to divide their territories in five categories: urban land, suburban land, urban expansion land, rural land, and protected land. According to a recent analysis of the first generation of municipal master plans implemented during 1999 and 2000 in the metropolitan region, the urbanized land and the land open for urbanization (urban, suburban and urban expansion) totalizes 24.496 hectares, whereas the total land surface potentially useful in future urban uses (with slopes minor to 25% and low risk of natural disasters) totalizes only 26.970 hectares. This means that in 2006 the 90% of the usable lands of the Valley was already open for urbanization. The biggest difficulty of the first generation of master plans in the Metropolitan Area of Medellín was related to the weak inter-municipal agreements for the definition of joint policies. Those agreements are the only way to solve the land shortage for new urban developments in the municipalities of the central conurbation. These circumstances of municipally fragmented land policies confirm the statement made by Burchell (2002) that *"sprawl occurs within a regional framework that is fragmented into many relatively small units separately controlled by different local governments, with differing rules and regulations concerning the development of land"*. While the municipalities of the conurbation were forced to include in the category of 'urban expansion land', areas faraway from mobility infrastructure, and located in zones of high slopes (with low effective urban usage), the municipalities of the Aburra North, that still have land availability for urban development, incorporated to urbanization very small areas. It results clear that peripheral municipalities determined their master plans with a local logic perspective in which they closed their jurisdiction to low income newcomers, while they opened to suburbanization large areas served by good mobility networks, expecting to attract high income population (see table 2). Some other decisions also appear illogic, as in the case of the flat areas of the municipality of Bello, that being served by the metro system, have been dedicated to industrial uses instead of being opened to housing intensive uses.

	Caldas	La Estrella	Sabaneta	Itagüí	Envigado	Medellín	Bello	Copacabana	Girardota	Barbosa	Total
Total urban land in ha.	200.	358	367	1159	1212	10524	1981	495	315	208	<b>16819</b>
Total expansion lands in ha.	229	0	98	0	258	510	330	12	42	0	<b>1479</b>
Total suburban lands in ha.	393	1011	129	60	40	1822	190	1157	1000	396	<b>6198</b>
Total land urbanized or open to urban use in ha.	822	1369	594	1219	1510	12856	718	1664	1357	604	<b>24496</b>
<b>Total land usable in urban uses*</b>	760	1560	750	1310	1490	13280	2500	1740	1800	1780	<b>26970</b>

Notes:

\*Source: Municipal master-plans consulted in Area Metropolitana del Valle de Aburrá

\*\*Land potentially usable in future urban uses correspond to areas with slopes minor to 25%, free of environmental risk

Table 2: Land destination in the metropolitan master plans in vigour in 2005\*

#### 4 THE QUESTION OF GOVERNANCE IN A SCENARIO OF REGIONAL URBANIZATION

The development of new forms of urban governance is a crucial issue in controlling urban sprawl and fragmentation and their effects. The expansion of cities outside traditional political jurisdictions is weakening the power of local administrations (municipalities) to deal with problems associated to regionalization of urbanization. It is argued that this new reality *'is undermining the ability of the local state to serve the collective interests of its constituents, and may even intensify the subordination of the local state to plutocratic privatism'* (Dear and Dahmann, 2008). Municipalities were developed to face the question of urbanization and social development during industrialization, when cities were clearly defined by the existence of a centre and some peripheral neighbourhoods. The contemporary city is characterized by unclear definition, where the relation centre-periphery became blurred. It does not obey to political boundaries or spatial continuity of urbanized land. It is formed by pre-existing conurbations and a constellation of urban nucleus of variegated form, different sizes and diverse ages, and includes the rural and natural areas in between. As argued by Borja and their collaborators in a inform over the governance of metropolitan areas (2004), beyond the spatial aspects, the social, economic and environmental facts of contemporary city overwhelm the limits of the city understood as municipality and even could overcome superior delimitations as provinces, states or even national boundaries, becoming a territorial reality not considered by legal definitions. In this new situation, decisions taken in the central city affect the citizens of peripheral territories as they are users of central city, but are not represented in their government. This is a situation common to both urban areas in developed and developing world that requires new instruments of governance. An extensive low density development outside of the boundaries of central conurbation municipalities in large urban agglomeration is a phenomenon with no more than two decades in Colombian context. But impacts and challenges are already evident in major cities. As in other context, sprawl is regarded as a problem from a technical perspective, especially for its implication in environmental

sustainability (consumption of rural land, automobile dependency and increase of carbon emissions), economic efficiency (abandonment of inner-city location, underuse of urban infrastructure and demands of new infrastructure in peripheral locations) and social implications (segregation of population by income, increase of gated communities and devaluation of public space). But from the view of the common citizen, life in low density small communities is a paradigm of lifestyle, far from noise, pollution and insecure inner-city (Ulfarsson and Carruthers 2006). In addition, this divergence regarding low density development outside urban agglomerations represents a great challenge to governability. In the Colombian case as in many other countries, municipalities are autonomous of establishing land use regulations. And as local governments are moved by the aspirations of citizens, the strategic questions belonging to trans-municipal level like environmental sustainability, economic efficiency or social inequalities are outside of priorities of agendas in local governance (Howell-Moroney, 2008). By introducing land regulation oriented to low density developments, municipalities aspire to increase land prices, attract high income inhabitants and avoid the arrival of low income population that demands municipal services in a bigger proportion. The motorization in cities has been provoking several changes in the condition of the urban and in the nature of inner-city areas. New forms of centrality are emerging in the urban landscape while traditional centralities present problems. Corridors and strips around avenues and highways seem to concentrate shopping, work and leisure activities, while traditional core areas lose prestige and many activities, particularly headquarters of companies, banks and diverse professional services migrate to new locations. Motorization has integrated into the functional city a vast territory that involves all the areas accessible within one hour trip. Depending on the location and the quality of mobility infrastructure, this territory may involve an area with a radius of 30 or 40 kilometres, which generally includes tens of administrative jurisdictions. In consequence, location of economic activities has a large spectrum of possibilities which stimulates competition between municipalities or districts to attract investors to their perimeters. A big concern of city authorities seems to be focused in the conservation or in the creation of new centres to attract economic activities.

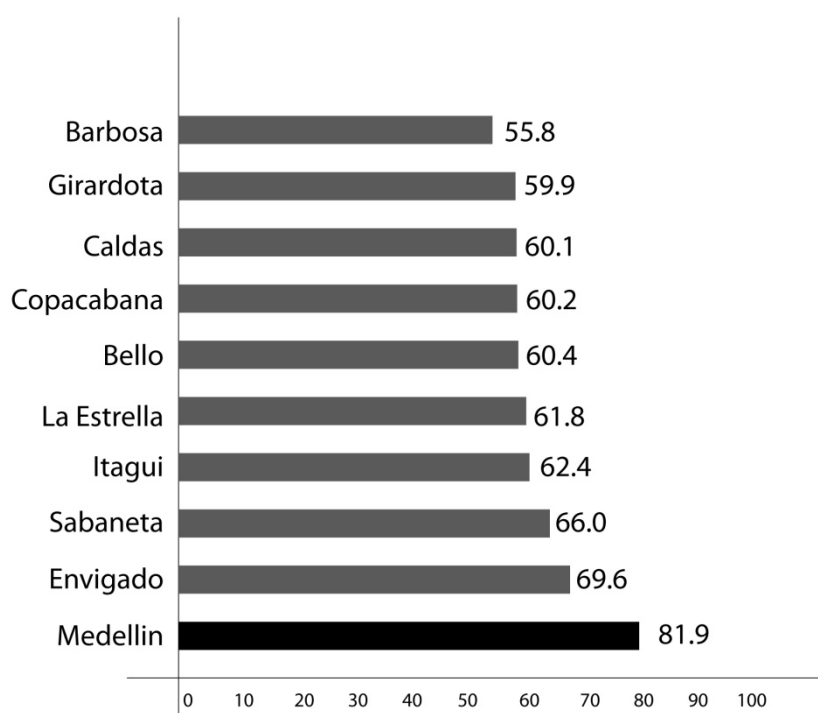


Fig. 8.- Quality of life indicator in the metropolitan area (2010)

The actions devoted to this purpose are mainly tax incentives, flexible and favourable land use regulations to investors, and the construction or improvement of infrastructure in specific areas. In this proposal, competition between administrative jurisdictions is unavoidable and in some cases with great risk of dysfunctional and fragmented urban agglomerations, where economic opportunities are concentrated in a few districts and housing is located in other distant areas. Despite differences in quality of life among municipalities in the Metropolitan Region of Medellín do not present yet big contrasts; a process of fragmentation could be starting. The successful strategy of Medellín Municipality during the last years in creating new social infrastructure, economic facilities and renovated transport systems is concentrating quality of life in the city, while adjacent municipalities remain stagnated tens of points below in quality of life indexes. The improving of urban quality and the scarcity of urban expansion soil in Medellín Municipality creates a risk of gentrification and social fragmentation. The generation of urban quality in an urban region with several municipalities is a strategy that involves competition within administrative jurisdictions. It is common that not all urban administrations within an urban agglomeration have the same technical and economic resources to deal with urban quality improvement and urban renewal, and when they have, the expulsion of low income inhabitants is a frequent result. This is not yet the case in Medellín, but if differences persist, a scenario of bigger social fragmentation and intra-metropolitan inequity shall be unavoidable. Actions and interventions to improve urban quality and to promote the establishment of multiple centres to create functional equilibrium in urban performance should have an even emphasis in the complete metropolitan region. The implementation of such strategy offers a big potential to control urban sprawl and fragmentation, but requires a concerted agenda between several administrative jurisdictions. Achieving agreements arises as the biggest weakness of this strategy because the difficulties that the negotiation between different municipalities implies, particularly when they involve long term projects.



Fig. 9.- Terminal cable-car station of the West

## 5 CONCLUSIONS

Sprawl and fragmentation put in risk the environmental, economic and social sustainability of urban areas and require renovated and integral approaches, not only addressing the manifestation of the phenomenon but its causes. They can form a vicious circle in which fragmentation stimulates sprawl and sprawl at the same time encourages the fragmentation into new scopes. For instance, territories are fragmented in several administrative jurisdictions: municipalities in the Colombian case. Every municipality, in a separate

way, is trying to solve their spatial, social or economic problems inside their territory. Each municipality acts as independent entity trying to attract high income inhabitants and new economic activities to their territories. As municipalities have different criteria to organize their space, and the market is demanding soil outside urban areas, the opportunity to obtain this soil results from fragmented decisions about land use among municipalities. In consequence, urban expansion with low density occupation is a common spatial response to fragmented spatial policies. The improvements in transport infrastructure necessary to enhance urban and regional competitiveness have the triggering effect of urban sprawl. A more competitive region also means economic growth and consequently bigger accessibility to automobile tenancy and bigger incomes. As consequence, in the context of free market oriented economies with certain degree of success, low density exurban development becomes inevitable. The questions regarding sprawl should be then focused on the degree of low density development that is acceptable to guarantee economic and social sustainability of urban regions. It means that the limit of exurban occupation must be treated as a regional issue, nor as a municipal matter. Besides economic growth, the poor quality of exiting compact city is a crucial factor in the stimulation of urban sprawl. The urban area of Medellín conurbation is affected by negative aspects as noise, air pollution, insecurity, lack of public spaces and traffic congestion. Due to this, particularly high income population searches new spaces in extra-urban areas. A short term perspective could suggest that the demands of this population could be solved by suburbanization. But an uncontrolled tendency toward sprawl could put in risk the supply of water and environmental goods necessary to maintain basic urban functions and competitiveness. Construction of infrastructure water supply, sewage, roads and facilities are easily paid in compact areas, but result too expensive for low density occupation. What usually happens is that compact city areas subsidize infrastructure for low density areas, excavating inequity and social fragmentation. Controlling of sprawl requires a clear regional vision about the future urban development and well-coordinated inter-municipal decisions on land policies. Fragmented and short term decisions considering local interests, are the fissures through which sprawl appears easily and in an uncontrolled way. Parallel to the coordinated policies on land legislation, economic disincentives to sprawl are required. Those instruments could be focused on two aspects: the controls to the use of private cars and especial taxations to non rural extra-urban properties. The first requires instruments as tolls, extra taxes on fuel prices, higher costs of parking in some urban zones, and development of high quality public transport. The second can be implemented via differentiation of land taxes for extra-urban residential areas and extra payments for the use of electricity and drinkable water. The best way of promoting compact city and facing urban sprawl and its undesirable effects is improving urban quality in inner-city areas. When applied from the logic of municipal administrations, it presents also social risks as gentrification or uneven human development at regional scale. This situation is frequent because municipalities within an urban region do not have equal resources to address urban quality strategies. Once again it is clear that urban areas work as a single system, which is highly sensitive to fragmented actions, even when these are well conceived and technically well executed. Municipal actions that can be very positive at the local level in the short and medium term could cause regional dysfunctionalities in the long term. As in many other contexts in the world, in the urban phenomenon around Medellín and the Aburra Valley it is possible to distinguish at least three levels: the first is the city-municipality level characterized by the dominance of a historic centre of pre-industrial origin, with a long institutional tradition of self-governance and democratic legitimacy. The second is the urban agglomeration or the classical metropolitan area, product of the urban expansion during the industrialization, which in the Aburra Valley context, despite difficulties, has several decades of institutional tradition of cooperation. The third is the city region or metropolitan region, characterized by spatial discontinuity and polycentric pattern linked by new infrastructure, raised from the economic growth of services sector and globalization, (Arias and Borja 2007). This is a newer phenomenon for which there

are no formal institutions to deal with. In the new regional scenario it is necessary to develop agreements and contracts outside formal institutional frames. Municipal structure despite its long tradition and advantages in many aspects is a pre-modern institution that presents also important weaknesses to face contemporary urban challenges. Structural problems as urban sprawl and fragmentation, environmental sustainability, economic development or social equity, are increasingly related to regional issues. Political fragmentation which is natural in urban regions with polycentric administrations is a frequent obstacle in developing tools or in achieving consensus to deal with trans-municipal problems. Contemporary urban regions require a new form of government, raised from agreements between municipalities to tackle the regional dimension of issues like social services, sustainability, land uses, mobility and public services.

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## IMAGES SOURCES

Cover image: Map of Medellin made by anonymous author in the eighteenth century. Source: Medellin Municipality / Office of City Planning

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